

[My sites](#) / [21W-LIFESCI7B-1](#) / [Midterm II](#) / [Midterm II W 21 LS7B](#)

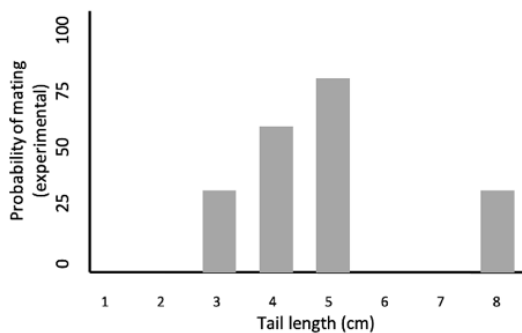
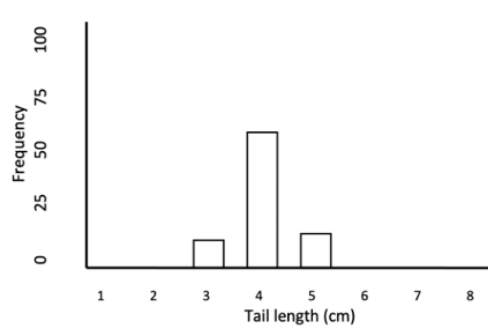
Winter 2021 - Finals week

Winter 2021 - LIFESCI7B-1 - PIRES

**Started on** Monday, 22 February 2021, 12:40 PM PST**State** Finished**Completed on** Monday, 22 February 2021, 1:57 PM PST**Time taken** 1 hour 16 mins**Grade** 114.00 out of 123.00 (93%)

Information

**[Questions 1–3]** The figures below show results from a series of observations on male tail length of the red bishop bird (*Euplectes orix*). The figure on the left shows female preference for male tail length in experimental populations. The grey bars represent tail lengths manipulated by researchers (they artificially added long feathers to the tails of the experimental birds). Probability of mating is a proxy for estimating the ability of males to attract mates and have offspring. In the figure on the right, the white bars represent observed variation in male tail length in natural (*i.e.* wild) populations.

**Experimental Results****Natural Population****Question 1**

Correct

3.00 points out of 3.00

The longer a male's tail is, the more likely the male is to survive.

Select one:

- True
- False ✓

Explain why sexual selection typically does not result in adaptation to the environment

Define sexual selection

Compare and contrast the mechanisms of natural and sexual selection.

The correct answer is 'False'.



Correct

3.00 points out of 3.00

Male tail length is subject to both natural and sexual selection in wild populations.

Select one:

- True ✓
- False

Explain why sexual selection typically does not result in adaptation to the environment

Define sexual selection

Compare and contrast the mechanisms of natural and sexual selection.

The correct answer is 'True'.

**Question 3**

Correct

3.00 points out of 3.00

In the wild population, sexual selection produces the adaptation of tails that are 7 cm in length.

Select one:

- True
- False ✓

Explain why sexual selection typically does not result in adaptation to the environment

Define sexual selection

Compare and contrast the mechanisms of natural and sexual selection.

The correct answer is 'False'.

**Information**

**[Questions 4–6]** You're studying one genetic locus in a population of 700 wombats. Within the population, 35% are AA, 40% are Aa, and 25% are aa.



Correct

3.00 points out of 3.00

What is the frequency of allele a in the population?

- a. 0.55
- b. 0.45
- c. 0.40
- d. 0.50
- e. None of the answer choices are correct



Your answer is correct.

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

Calculate genotype frequencies expected under HW equilibrium in a population given its allele frequencies

The correct answer is:

0.45

**Question 5**

Correct

3.00 points out of 3.00

This population is in HW equilibrium

Select one:

- True
- False ✓

Calculate allele frequencies based on phenotypic or genotypic data for a population

Calculate genotype frequencies expected under HW equilibrium in a population given its allele frequencies

State whether a population is evolving based on deviations from HW equilibrium

The correct answer is 'False'.



Correct

3.00 points out of 3.00

If there is natural selection for heterozygotes, then the frequency of aa individuals will decrease in the population.

Select one:

- True ✓
- False

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

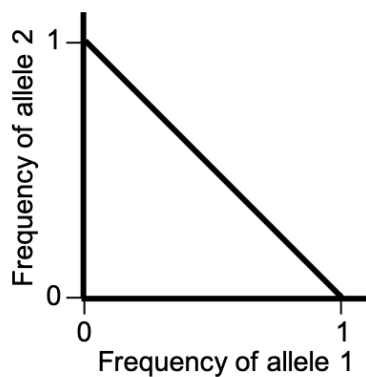
Explain how natural selection and genetic drift can affect the elimination, maintenance or increase in frequency of various types of alleles (e.g. dominant, recessive, deleterious, beneficial) in a population.

Lab Week 5

The correct answer is 'True'.

Information

**[Questions 7–8]** The graph below shows the relationship between allele frequencies of two possible alleles for a gene in a population of a diploid organism.





Correct

3.00 points out of 3.00

There is at least one point on the line where the frequency of heterozygotes will be greater than 0.50 for a population that is in Hardy-Weinberg equilibrium.

Select one:

- True
- False ✓

Calculate allele frequencies based on phenotypic or genotypic data for a population

Calculate genotype frequencies expected under HW equilibrium in a population given its allele frequencies

State whether a population is evolving based on deviations from HW equilibrium

Lab Week 5

The correct answer is 'False'.

**Question 8**

Correct

3.00 points out of 3.00

If assortative mating were to occur in this population, where like genotypes only mate with like genotypes, then after many generations (when the frequency of heterozygotes is effectively zero) this graph would still represent allele frequencies in the population.

Select one:

- True ✓
- False

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

Calculate genotype frequencies expected under HW equilibrium in a population given its allele frequencies

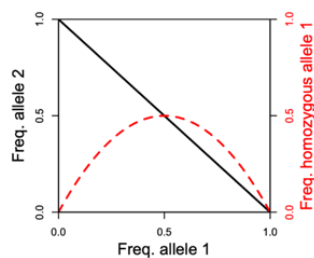
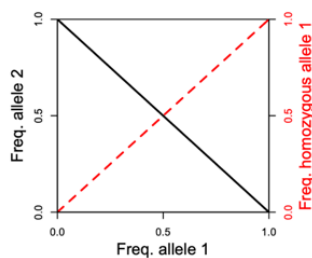
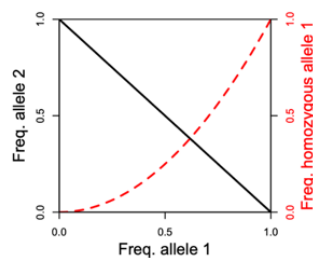
The correct answer is 'True'.



Correct

3.00 points out of 3.00

In which of the figures does the dashed red line most closely reflect the frequency of homozygotes with allele 1 if the population is in Hardy-Weinberg equilibrium?

**A****B****C**

- a. Graph A
- b. Graph C
- c. Graph B



Your answer is correct.

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

Calculate genotype frequencies expected under HW equilibrium in a population given its allele frequencies

The correct answer is:

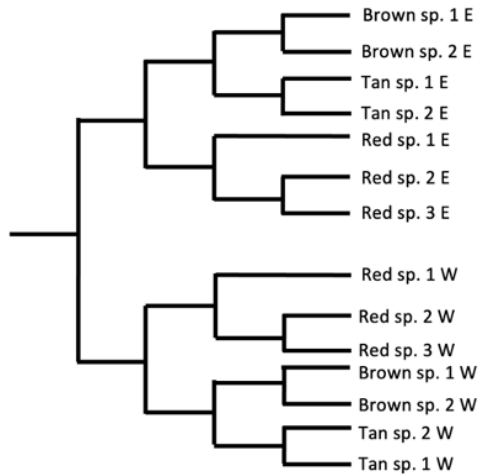
Graph C



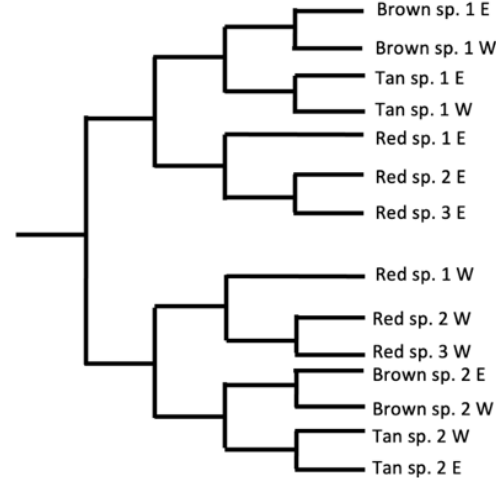
**[Questions 10–12]** Approximately 10,000 years ago the Grand Canyon was formed.

You are a field biologist studying 14 species of rodent that are found on both sides of the Grand Canyon. There are three species that are red in color, two species that are tan, and two species that are brown on each side of the Grand Canyon. You are interested in understanding how speciation occurred in these species of squirrels, and you have competing hypotheses about how speciation may have occurred in the group. The two phylogenies below represent two possible hypotheses for speciation patterns in this group.

**Tree 1**



**Tree 2**



**Question 10**

Correct

3.00 points out of 3.00

The development of the Grand Canyon represents a vicariant event.

Select one:

- True ✓
- False

Recognize how phylogenies are hypotheses of evolutionary relationships

Interpret patterns of speciation and divergence based on the branching patterns represented on a phylogenetic tree

Predict phylogenetic tree topologies in the presence or absence of convergent evolution

The correct answer is 'True'.



Correct

3.00 points out of 3.00

Your hypothesis is that there were seven different species of squirrels that were all separated by the formation of the Grand Canyon. Tree 1 supports this hypothesis.

Select one:

- True
- False ✓

Recognize how phylogenies are hypotheses of evolutionary relationships

Interpret patterns of speciation and divergence based on the branching patterns represented on a phylogenetic tree

Predict phylogenetic tree topologies in the presence or absence of convergent evolution

The correct answer is 'False'.

## Question 12

Correct

3.00 points out of 3.00

Your hypothesis is that there was a single species of squirrel that was separated by the Grand Canyon, and then there was subsequent diversification.

Tree 2 supports this hypothesis.

Select one:

- True
- False ✓

Recognize how phylogenies are hypotheses of evolutionary relationships

Interpret patterns of speciation and divergence based on the branching patterns represented on a phylogenetic tree

Predict phylogenetic tree topologies in the presence or absence of convergent evolution

The correct answer is 'False'.

## Information

**[Questions 13-14]** You are studying a gene locus with three distinct alleles (A, B, and C) found in *Daphnia magna*, a species of water flea. Alleles A and C both have the same frequency in the population, 0.3.





Correct

3.00 points out of 3.00

Expected genotype frequencies for BC and AB individuals will be the same.

Select one:

- True ✓  
 False

Calculate allele frequencies based on phenotypic or genotypic data for a population

Calculate genotype frequencies expected under HW equilibrium in a population given its allele frequencies

Lab Week 5

The correct answer is 'True'.

**Question 14**

Correct

3.00 points out of 3.00

Your sample reveals the following genotype proportions:

$AA = 20$

$AB = 30$

$BB = 25$

$BC = 5$

$CC = 20$

According to these data, there is an excess of heterozygous individuals compared to what is expected under Hardy Weinberg.

Select one:

- True  
 False ✓

Calculate allele frequencies based on phenotypic or genotypic data for a population

Calculate genotype frequencies expected under HW equilibrium in a population given its allele frequencies

Lab Week 5

The correct answer is 'False'.



**[Question 15]** You are an evolutionary biologist studying evolution in a population of leaf-eating insects. There are two alleles for wing color in these insects, green (G) and brown (B).

You set up a series of controlled experiments where you have 10 populations, but the population size (N) varies for each experiment. All populations are given an excess of resources and constant environmental conditions. For all experiments, the starting frequencies of the G and B alleles are equal. You run the experiment for each trial until all populations are fixed for one of the alleles. The data from each of your experiments is shown below.

Population Size	Trial	Populations fixed for G allele	# of generations where all populations are fixed for either G or B allele
N=20	1	1, 3, 5, 6, 8	18
N=20	2	1, 3, 5, 6, 8	70
N=50	3	1, 3, 5, 6, 8	52
N=50	4	1, 3, 5, 6, 8	400
N=120	5	1, 3, 5, 6, 8	520
N=120	6	1, 3, 5, 6, 8	300

### Question 15

Correct

3.00 points out of 3.00

If you ran another experiment with N=80 individuals, you would expect all populations to be fixed for one allele within 450 generations.

Select one:

- True
- False ✓

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

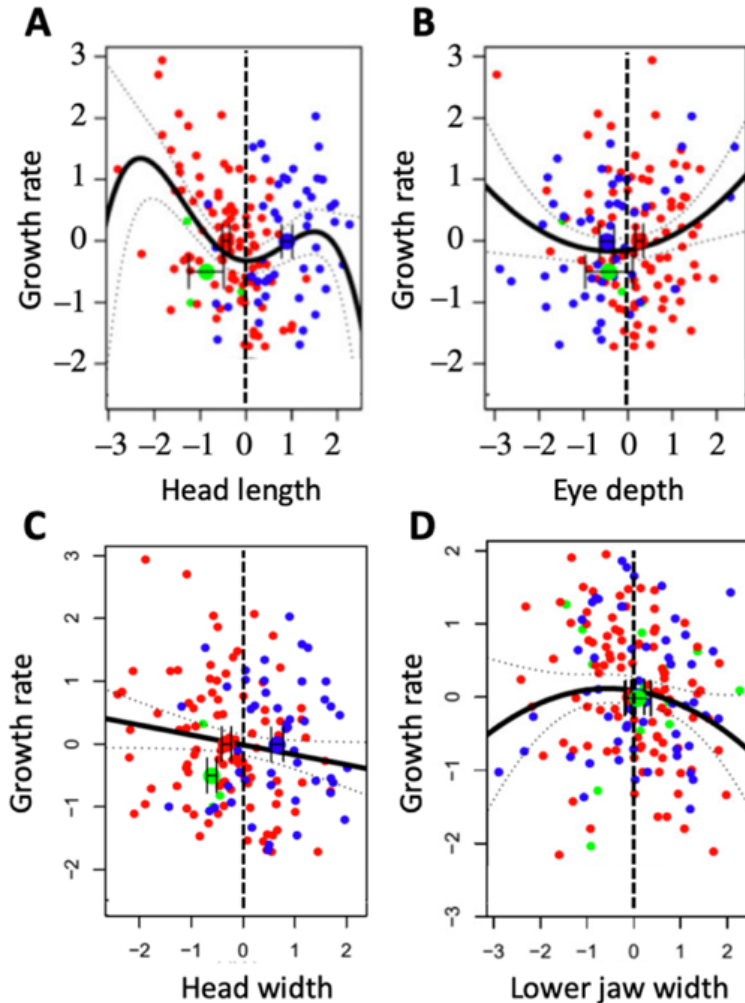
Explain how natural selection and genetic drift can affect the elimination, maintenance or increase in frequency of various types of alleles (e.g. dominant, recessive, deleterious, beneficial) in a population.

Lab Week 5

The correct answer is 'False'.



**[Questions 16–19]** Researchers measured the growth rate (a proxy for fitness) of Cichlid fish living in Lake Victoria, and several of their physical traits, including their head length (A), eye depth (B), head width (C), and lower jaw width (D). Each point shows data for a single fish. To facilitate comparisons, the trait values were standardized in these plots, so that the mean trait value equals zero (shown by the vertical dashed line). Growth rates were standardized similarly, so that the mean growth rate equals zero. Thick black lines show the statistically significant relationships the researchers estimated between growth rate and a trait.





Correct

3.00 points out of 3.00

Which of the following traits are NOT experiencing directional selection?

- a. Head width and eye depth
- b. All of the traits
- c. Lower jaw width and head width
- d. None of the traits
- e. Head length and lower jaw width



Your answer is correct.

Differentiate between disruptive, directional, and stabilizing selection

Evaluate data to determine the direction and mode of selection on a specific trait in a population

The correct answer is:

Head length and lower jaw width

**Question 17**

Correct

3.00 points out of 3.00

Consider the trait of Eye depth. Assuming it is heritable, over one generation of natural selection the most likely outcome is:

- a. The mean trait value will stay the same, and variance would increase
- b. The mean trait value would increase, and variance would change very little
- c. The mean trait value will stay the same, and variance would decrease
- d. The mean trait value would decrease, and variance would change very little



Your answer is correct.

Predict how different modes of selection affect the distribution of phenotypes in a population

The correct answer is:

The mean trait value will stay the same, and variance would increase



Correct

3.00 points out of 3.00

Consider the trait of Lower jaw width. Assuming it is heritable, over one generation of natural selection the most likely outcome is:

- a. The mean trait value would decrease, and variance would change very little
- b. The mean trait value would increase, and variance would change very little
- c. The mean trait value will stay the same, and variance would decrease
- d. The mean trait value will stay the same, and variance would increase



Your answer is correct.

Predict how different modes of selection affect the distribution of phenotypes in a population

The correct answer is:

The mean trait value will stay the same, and variance would decrease

**Question 19**

Correct

3.00 points out of 3.00

In reality, these fish actually come from two different populations (red and blue; ignore green). The mean trait values of each population for each trait are shown with the large red and large blue dot in each graph. Assume that these populations cannot interbreed, that new variation can arise through mutation, and that the fitness curve does not change.

After many generations of selection, the mean Head length of the blue population will converge on a value of 1.7

Select one:

- True ✓
- False

Interpret fitness curves to make predictions about the outcome of natural selection over many generations

The correct answer is 'True'.



**[Questions 20–21]** You are working with a population of lizards. During the mating season, you observe that individuals in the population will only mate with others of the same genotype (for example,  $Gg$  individuals will only mate with  $Gg$  individuals). There are only two alleles at this locus ( $G$  is dominant;  $g$  is recessive); you have determined that the frequency of the  $G$  allele = 0.8. The fitness of homozygous individuals is half of the fitness of heterozygous individuals.

**Question 20**

Correct

3.00 points out of 3.00

After one generation, the frequency of heterozygous individuals in the population will decrease.

Select one:

- True ✓
- False

Explain how inbreeding increases the number of homozygotes (and possibly disease) in comparison to HWE.

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

The correct answer is 'True'.

**Question 21**

Correct

3.00 points out of 3.00

After enough generations have occurred that the heterozygotes have reached a frequency of zero in the population, the frequency of  $G$  and  $g$  alleles will remain consistent in each subsequent generation.

Select one:

- True ✓
- False

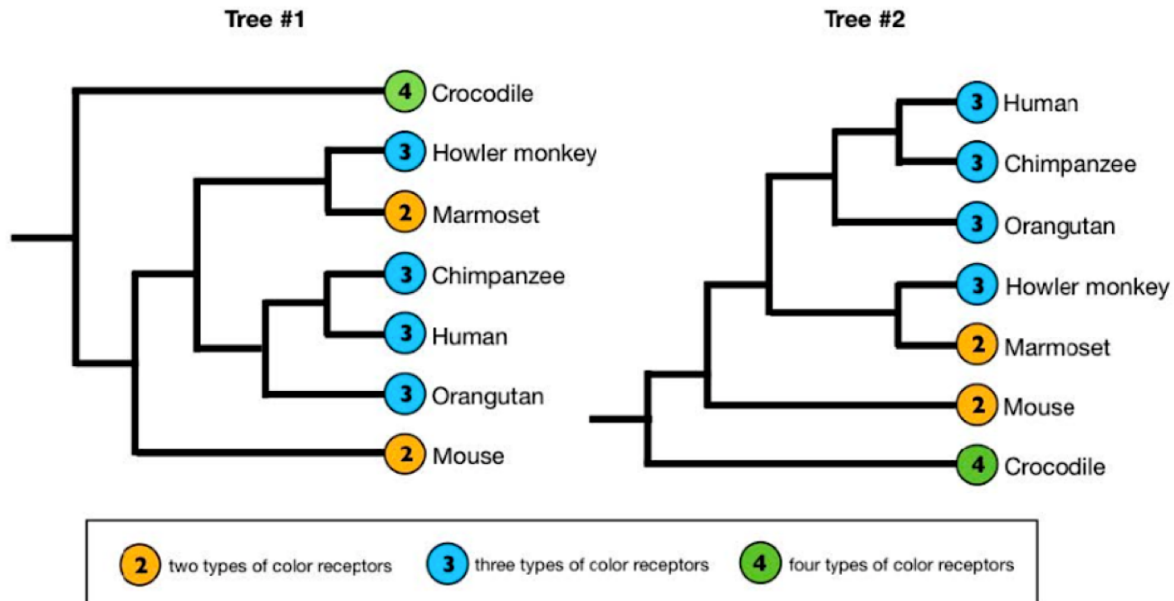
Explain how inbreeding increases the number of homozygotes (and possibly disease) in comparison to HWE.

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

The correct answer is 'True'.



**[Questions 22-27]** The two phylogenies below represent two hypotheses of evolutionary relatedness for seven taxa based on molecular sequence data and a morphological character (the types of color receptors present in each taxon). Reptiles have four types of color receptors, mammals have two types of color receptors, and primates have three types of color receptors.



### Question 22

Correct

3.00 points out of 3.00

Both phylogenies show equivalent evolutionary relationships among the apes, but not for the other taxa included in the phylogeny.

Select one:

- True  
 False ✓

Recognize how phylogenies are hypotheses of evolutionary relationships

Evaluate the relationships between various groups of organisms based on a phylogeny.

Define the terms synapomorphy, homoplasy, node, sister taxa, monophyletic and paraphyletic group, and phylogenetic tree.

The correct answer is 'False'.



Correct

3.00 points out of 3.00

Considering only Tree #2, the presence of three types of color receptors in apes is an ancestral trait.

Select one:

- True ✓
- False

Recognize how phylogenies are hypotheses of evolutionary relationships

Evaluate the relationships between various groups of organisms based on a phylogeny.

Define the terms synapomorphy, homoplasy, node, sister taxa, monophyletic and paraphyletic group, and phylogenetic tree.

The correct answer is 'True'.

**Question 24**

Correct

3.00 points out of 3.00

Tree #1 shows a more parsimonious evolution of color receptors than Tree #2.

Select one:

- True
- False ✓

Recognize how phylogenies are hypotheses of evolutionary relationships

Evaluate the relationships between various groups of organisms based on a phylogeny.

Define the terms synapomorphy, homoplasy, node, sister taxa, monophyletic and paraphyletic group, and phylogenetic tree.

The correct answer is 'False'.





Correct

3.00 points out of 3.00

Considering only Tree #1, Orangutans are more closely related to Howler Monkeys than they are to Marmosets.

Select one:

- True
- False ✓

Recognize how phylogenies are hypotheses of evolutionary relationships

Evaluate the relationships between various groups of organisms based on a phylogeny.

Define the terms synapomorphy, homoplasy, node, sister taxa, monophyletic and paraphyletic group, and phylogenetic tree.

The correct answer is 'False'.

**Question 26**

Correct

3.00 points out of 3.00

If crocodiles are designated the outgroup for Tree #1, then there are five monophyletic groups that can be defined for Tree #1 if crocodiles are excluded.

Select one:

- True ✓
- False

Recognize how phylogenies are hypotheses of evolutionary relationships

Evaluate the relationships between various groups of organisms based on a phylogeny.

Define the terms synapomorphy, homoplasy, node, sister taxa, monophyletic and paraphyletic group, and phylogenetic tree.

The correct answer is 'True'.



Correct

3.00 points out of 3.00

Consider Tree #2, If Mouse and Marmoset were instead sister taxa, this would be a more parsimonious explanation for number of color receptors for the taxa included in the phylogeny.

Select one:

- True ✓
- False

Recognize how phylogenies are hypotheses of evolutionary relationships

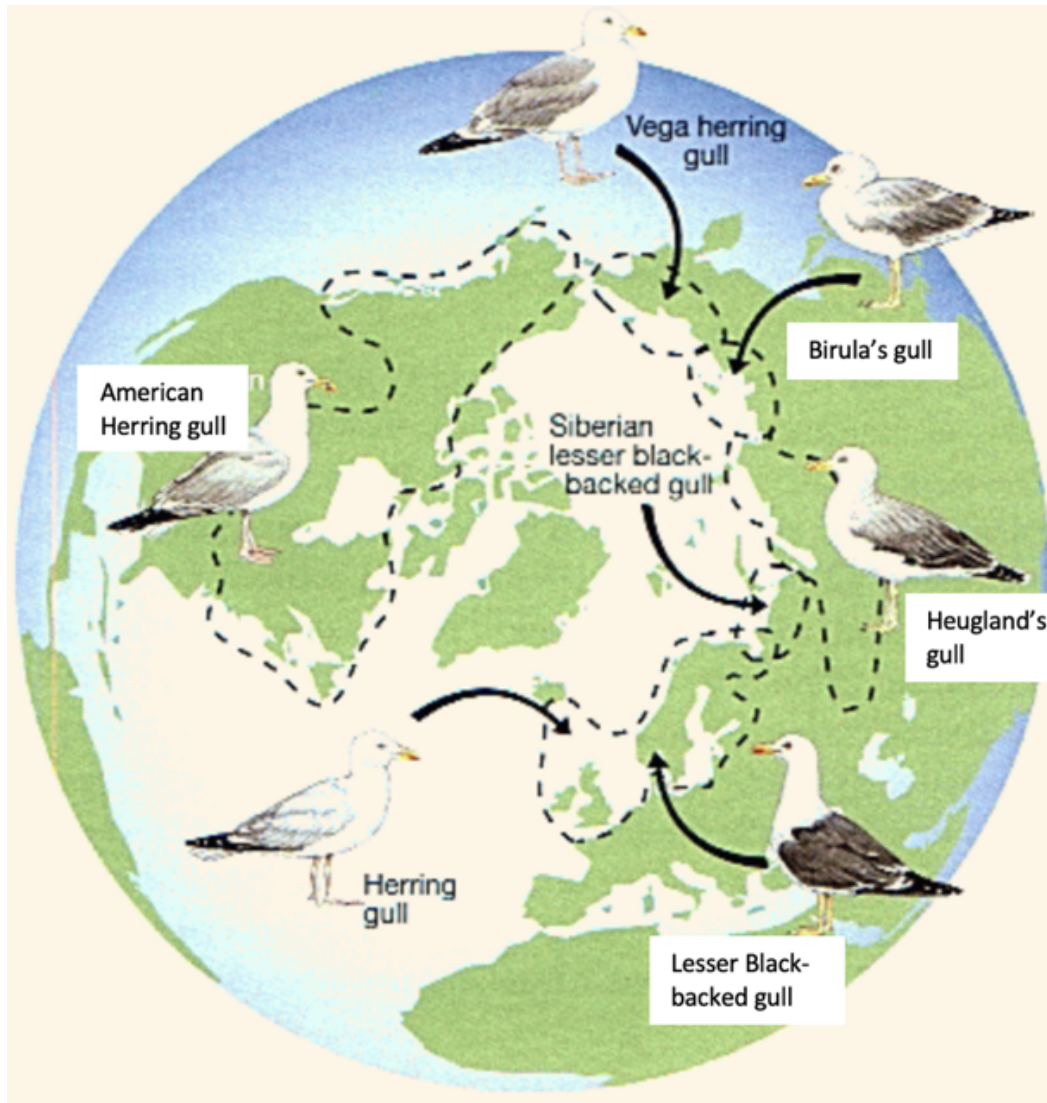
Evaluate the relationships between various groups of organisms based on a phylogeny.

Define the terms synapomorphy, homoplasy, node, sister taxa, monophyletic and paraphyletic group, and phylogenetic tree.

The correct answer is 'True'.



**[Questions 28-31]** The range of *Larus* gulls forms a ring around the North Pole. Within the ring, neighboring species (species with adjacent distributions, e.g. the Vega herring gull and the Birula's gull) can mate with each other, even though they look slightly different. The birds at the two "ends" of the ring, the Herring Gull and the Lesser Black-backed Gull, cannot mate.





Correct

3.00 points out of 3.00

Absence of mating between the Herring gull and the Lesser Black-backed gull is an example of a pre-zygotic isolating mechanism.

Select one:

- True ✓
- False

Differentiate between pre- and post-zygotic isolating mechanisms.

Relate the pre- and post-zygotic isolating mechanisms to the process of speciation

The correct answer is 'True'.

**Question 29**

Correct

3.00 points out of 3.00

Mating between Heuglan's gull and Birula's gull could preclude speciation.

Select one:

- True ✓
- False

Differentiate between pre- and post-zygotic isolating mechanisms.

Relate the pre- and post-zygotic isolating mechanisms to the process of speciation

The correct answer is 'True'.



Correct

3.00 points out of 3.00

We would expect the Vega Herring gull to show more genetic divergence from the Lesser Black-backed gull than from the Birula's gull.

Select one:

- True ✓
- False

Differentiate between pre- and post-zygotic isolating mechanisms.

Relate the pre- and post-zygotic isolating mechanisms to the process of speciation

The correct answer is 'True'.

**Question 31**

Correct

3.00 points out of 3.00

According to the biological species concept, Herring gull and Lesser Black-backed gull are different species.

Select one:

- True ✓
- False

Define the biological species concept.

Recognize the limitations of the biological species concept.

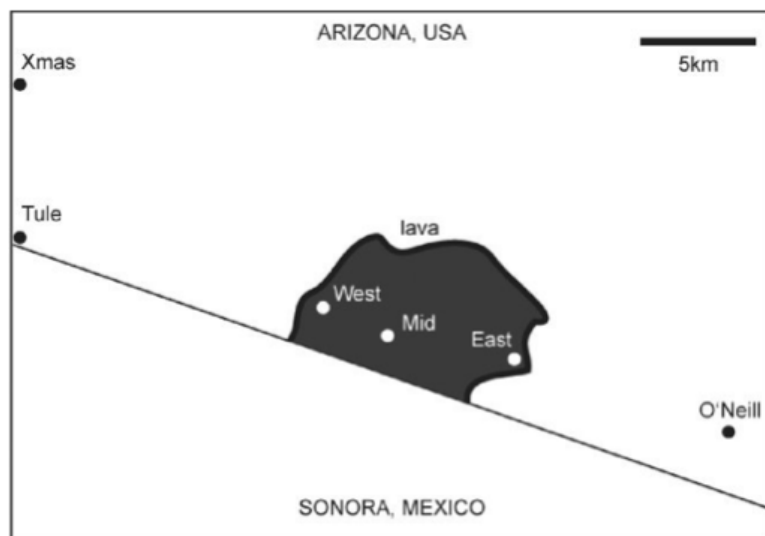
Differentiate between pre- and post-zygotic isolating mechanisms.

Relate the pre- and post-zygotic isolating mechanisms to the process of speciation

The correct answer is 'True'.



**[Questions 32–35]** Some populations of Arizona pocket mice live on light-colored granite substrate and others live on dark volcanic rock substrate. Their coat color also varies and is determined by the Melanocortin-1 receptor (*Mcr1*) alleles, *D* and *d*, which differ by four amino acids. Mice with *DD* genotypes have dark coats, *dd* give the mice light-colored coats, and heterozygotes develop an intermediate coat color. The figure below shows the geographic distribution of pocket mouse populations and substrate color. (Hoekstra et al. 2004 *Evolution* 58:1329–1341)



### Question 32

Correct

3.00 points out of 3.00

Pocket mice are subject to predation throughout their Arizona habitat. Assuming their predators detect them visually, what mode of selection is acting on coat color when considering the entire species as a whole?

- a. sexual selection
- b. disruptive selection
- c. stabilizing selection
- d. directional selection



Your answer is correct.

Recognize that selection acts upon individuals, while populations evolve

Differentiate three components of organismal fitness, in the context of natural selection

Evaluate data to determine the direction and mode of selection on a specific trait in a population

Predict how different modes of selection affect the distribution of phenotypes in a population

The correct answer is:  
disruptive selection



Correct

3.00 points out of 3.00

In their investigation of natural selection on *Mc1r* alleles in Arizona pocket mice, Hoekstra et al. determined the frequency of the *D* and *d* alleles in each population. They also determined the frequency of alleles for two neutral mitochondrial DNA genes (genes that do not affect and are not linked to coat color). Why did the researchers include the mitochondrial DNA genes as part of their experimental design?

- a. Allele frequencies for the neutral mitochondrial genes serves as a control and determines coat-color differences among these populations.
- b. Allele frequencies for the neutral mitochondrial genes serves as an experimental group and gives information on coat-color differences among these populations.
- c. Allele frequencies for the neutral mitochondrial genes serves as a control and gives information on general background genetic difference among these populations. ✓
- d. Allele frequencies for the neutral mitochondrial genes serves as an experimental group and gives information on general background genetic differences among these populations.

Your answer is correct.

Recognize that selection acts upon individuals, while populations evolve

Differentiate three components of organismal fitness, in the context of natural selection

Evaluate data to determine the direction and mode of selection on a specific trait in a population

Predict how different modes of selection affect the distribution of phenotypes in a population

The correct answer is:

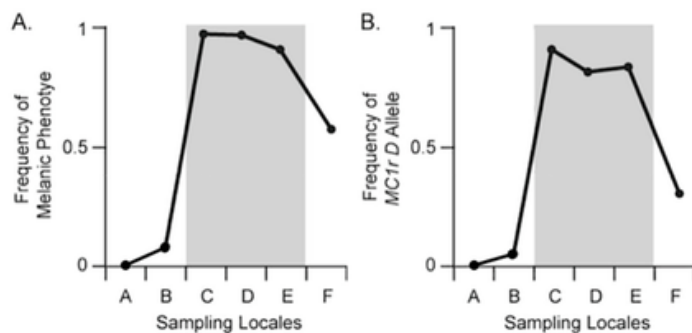
Allele frequencies for the neutral mitochondrial genes serves as a control and gives information on general background genetic difference among these populations.



Correct

3.00 points out of 3.00

In the figure below, graph A shows the frequency of the melanic (dark) coat phenotype across six populations. Populations C, D, and E live on dark volcanic rock; populations A, B, and F live on light-colored granite. Graph B shows the frequency of the *D* allele of the Melanocortin-1 receptor (*Mc1r*) gene across these populations. Which of the following statements best interprets the results shown in graphs A and B?



- a. Frequency of the *D* allele is associated neither with the melanic phenotype nor with the presence of dark substrate color.
- b. Frequency of the *D* allele is closely associated with the melanic phenotype, but is unrelated to the presence of dark substrate color.
- c. Frequency of the *D* allele is not associated with the melanic phenotype, but is associated with the presence of dark substrate color.
- d. Frequency of the *D* allele is closely associated with both the melanic phenotype and the presence of dark substrate color. ✓
- e. Frequency of the *D* allele does not vary across populations.

Your answer is correct.

Recognize that selection acts upon individuals, while populations evolve

Differentiate three components of organismal fitness, in the context of natural selection

Evaluate data to determine the direction and mode of selection on a specific trait in a population

Predict how different modes of selection affect the distribution of phenotypes in a population

The correct answer is:

Frequency of the *D* allele is closely associated with both the melanic phenotype and the presence of dark substrate color.

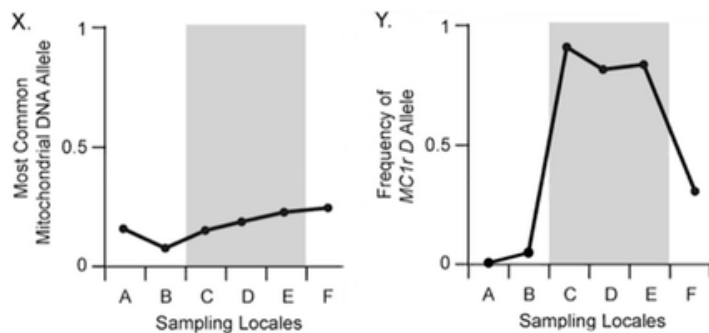




Correct

3.00 points out of 3.00

In the figure below, graph X shows the frequency of the most common neutral mitochondrial DNA allele across six pocket mouse populations. Populations C, D, and E live on dark volcanic rock; populations A, B, and F live on light-colored granite. Graph Y shows the frequency of the *D* allele of the Melanocortin-1 receptor (*Mc1r*) gene across these populations. Compare graph X with graph Y. What should you conclude after comparing these two graphs?



- a. Little to no correlation exists between neutral mitochondria alleles and habitat color. ✓
- b. The most common neutral mitochondrial DNA allele is strongly associated with the frequency of the *Mc1r D* allele.
- c. The most common neutral mitochondrial DNA allele varies more among populations than does the *Mc1r D* allele.
- d. The most common neutral mitochondrial DNA allele is strongly associated with substrate color.

Your answer is correct.

Recognize that selection acts upon individuals, while populations evolve

Differentiate three components of organismal fitness, in the context of natural selection

Evaluate data to determine the direction and mode of selection on a specific trait in a population

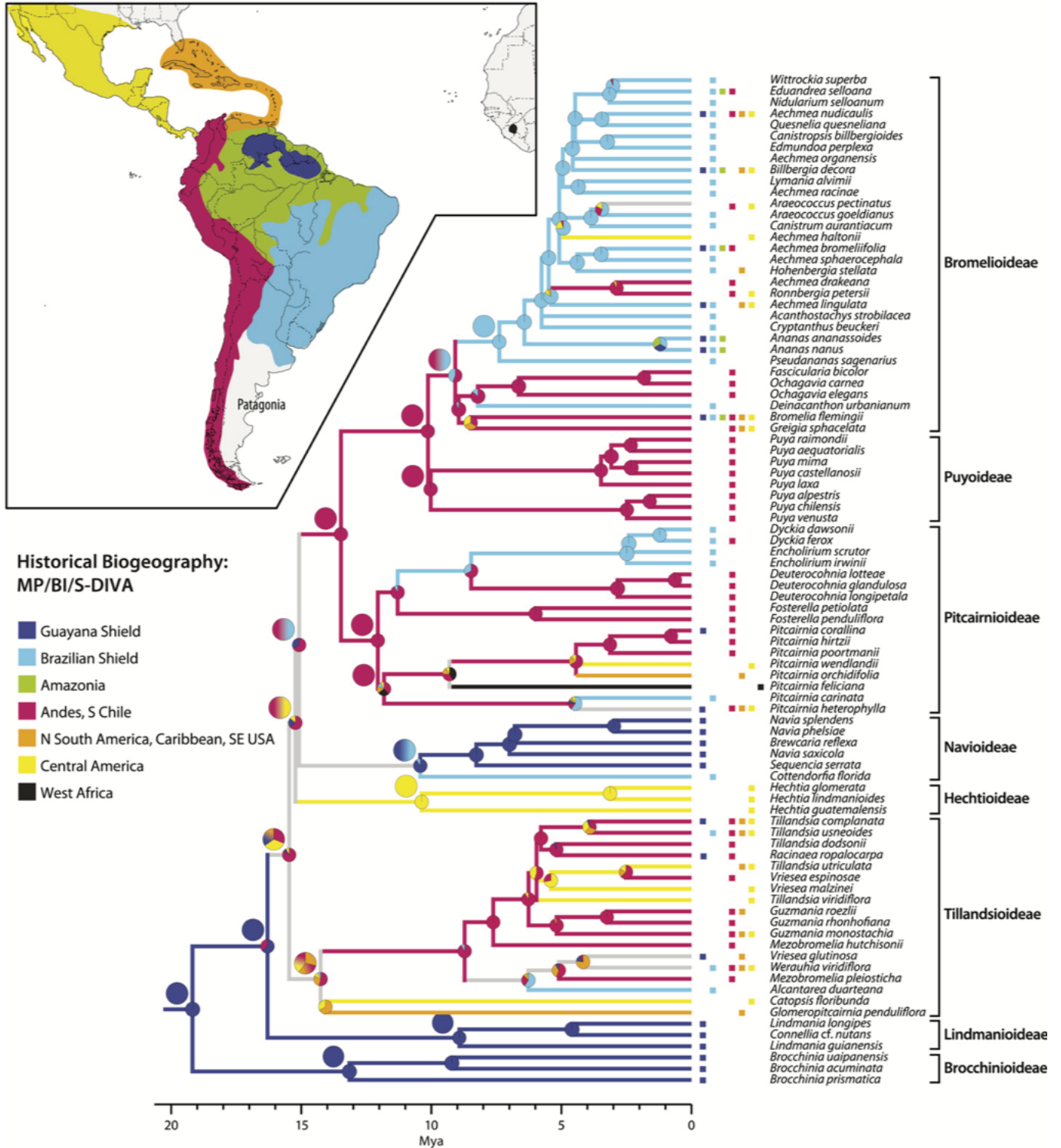
Predict how different modes of selection affect the distribution of phenotypes in a population

The correct answer is:

Little to no correlation exists between neutral mitochondria alleles and habitat color.



[Questions 36-37] This figure shows a phylogeny of the Bromeliad Family of plants and the regions in which the species in this family are located. (Givnish et al. 2011, American Journal of Botany 98(5): 872-895)





Correct

3.00 points out of 3.00

Based on this phylogeny, the common ancestor of all Pitcairnioideae originated in the Andes region.

Select one:

- True ✓
- False

Evaluate data and phylogenetic patterns, and indicate how they are used to test hypotheses about historic and current patterns of biodiversity.

Relate data from molecular clocks to evolutionary patterns in organismal lineages

The correct answer is 'True'.

**Question 37**

Incorrect

0.00 points out of 3.00

You decide to use the gene PETAL as a molecular clock, as you know the gene PETAL accumulates 2 mutations (single base pair changes) every one million years. You would expect ~40 base pair differences between a member of the Puyoideae and Bromelioideae.

Select one:

- True
- False ✗

Evaluate data and phylogenetic patterns, and indicate how they are used to test hypotheses about historic and current patterns of biodiversity.

Relate data from molecular clocks to evolutionary patterns in organismal lineages

The correct answer is 'True'.



**[Questions 38–39]** You have a large population (10,000 individuals) of a species of bird that is found along the mainland coastal region of a continent. There is a single gene that is responsible for wing color in these birds, and there are three alleles at this locus. The alleles are for yellow, blue, and red. The allele frequencies in the coastal region are 0.095, 0.46, and 0.445 respectively. There are three islands of similar size and habitat that are located an equal distance from the aforementioned mainland coastal region. At exactly the same time, three separate groups of 40 individuals leave the mainland coastal region and colonize each of the islands. Immediately after the colonization event, you determine the allele frequencies for each island population and find the following:

Island number	Yellow allele frequency	Blue allele frequency	Red allele frequency
1	0.09	0.46	0.45
2	0.106	0.446	0.448
3	0	0.524	0.476

### Question 38

Incorrect

0.00 points out of 3.00

Genetic drift is the mechanism of evolution that most likely explains these results.

Select one:

- True
- False **×**

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

Explain how natural selection and genetic drift can affect the elimination, maintenance or increase in frequency of various types of alleles (e.g. dominant, recessive, deleterious, beneficial) in a population.

Lab Week 5

The correct answer is 'True'.



Correct

3.00 points out of 3.00

After some time, individuals begin to migrate between islands 2 and 3, but the overall population size remains at 40 individuals on each island. On island 3, you would expect that the red and blue allele frequencies will decrease, but the yellow allele frequency will increase over time.

Select one:

- True ✓
- False

Evaluate each assumption of HW equilibrium and the effect violation of the assumptions may have on changing allele frequencies in a population

Explain how natural selection and genetic drift can affect the elimination, maintenance or increase in frequency of various types of alleles (e.g. dominant, recessive, deleterious, beneficial) in a population.

Lab Week 5

The correct answer is 'True'.




**[Question 40]** There are many different species of garter snakes (genus *Thamnophis*) in California. Some occur in the same regions as newts in the genus *Taricha*. These newts produce a toxin (tetrodotoxin - TTX) that makes them poisonous to most animals. Some garter snakes have shown that they are able to prey upon newts in the genus *Taricha* and not be affected by the toxin. Researchers are curious about the origin of the genes for resistance in *Thamnophis* in California. The map shows the distribution of three species of garter snakes in California. The three dots on the map show where there are populations of garter snake that regularly prey on newts and are resistant to TTX. Researchers have two hypotheses about the origin of resistance.


Hypothesis 1: There are different mutations in the gene that allows garter snakes to tolerate TTX for each population.

Hypothesis 2: There was a single mutation in the gene that allows garter snakes to tolerate TTX and populations that are resistant all share the same mutation.



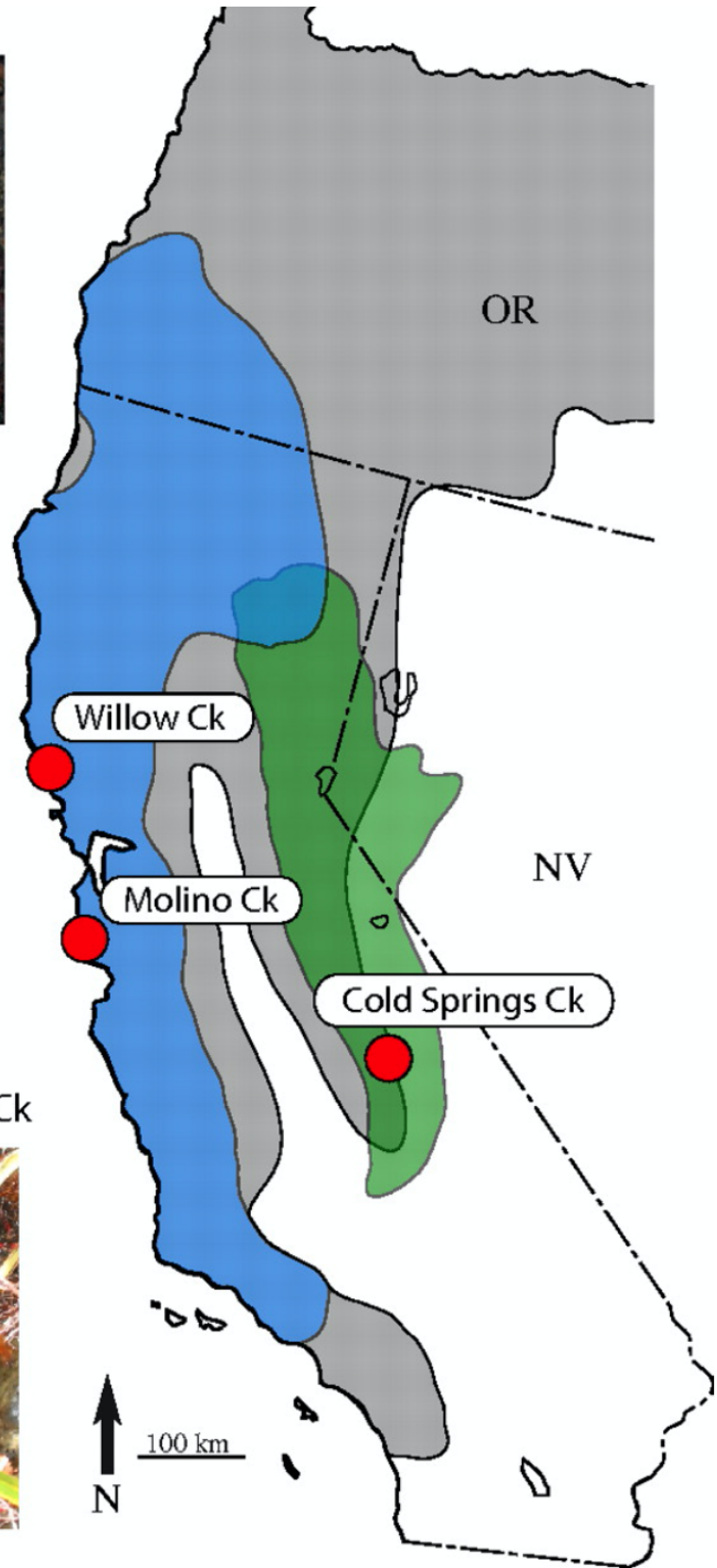
 *Th. sirtalis* Willow Ck



 *Th. atratus* Molino Ck



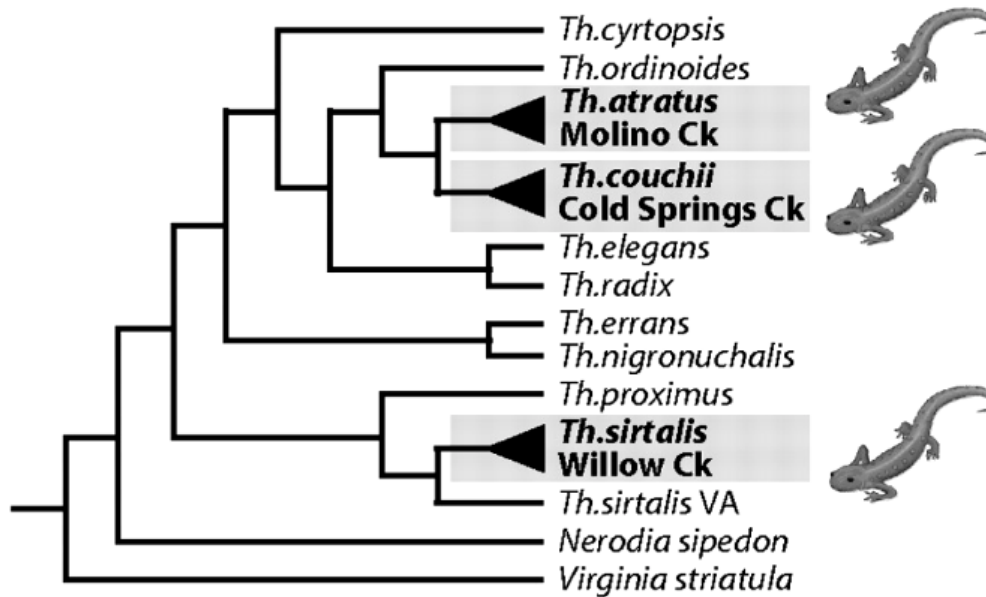
 *Th. couchii* Cold Springs Ck





This phylogeny was created from the sequencing of the gene for a sodium channel that affects resistance to TTX. The grey boxes on the phylogeny represent TTX resistant populations of garter snakes.

True or False: This phylogeny supports a single origin for resistance to TTX.



Select one:

- True
- False ✓

Recognize how phylogenies are hypotheses of evolutionary relationships

Predict phylogenetic tree topologies in the presence or absence of convergent evolution

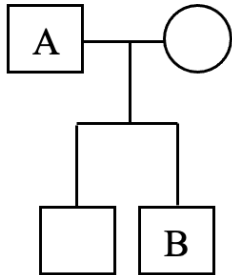
The correct answer is 'False'.



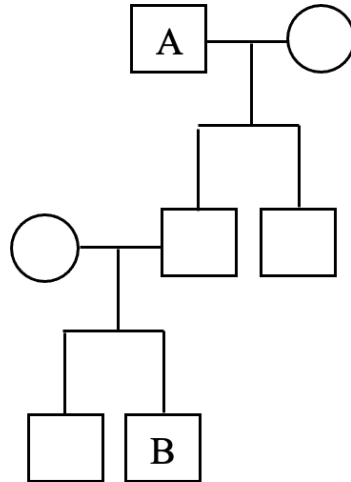


**[Question 41]** Helping kin raise offspring is one way individuals can increase their inclusive fitness. Imagine there is a family of birds. If any male individual breeds alone, they will have three offspring. If a beta (B) male helps an alpha (A) male, then beta will have no offspring. If an alpha is helped by a beta, then alpha will have eight offspring.

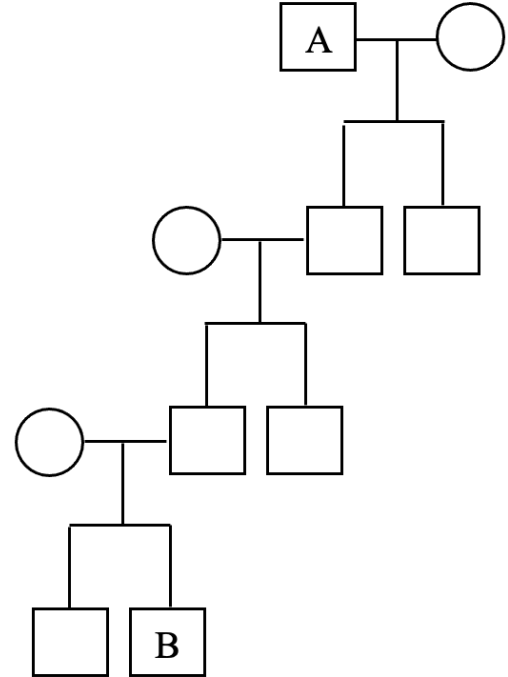
### Generation 1



### Generation 2



### Generation 3



#### Question 41

Incorrect

0.00 points out of 3.00

At which generation does it no longer benefit beta to help alpha?

- a. Generation 1
- b. Generation 2
- c. Generation 3
- d. None of the answer choices are correct. It will always benefit beta to help alpha.



Your answer is incorrect.

Define kin selection

Calculate the relatedness between individuals and how that may influence kin selection and the evolution of certain species' specific behaviors

The correct answer is:

Generation 2



Jump to...