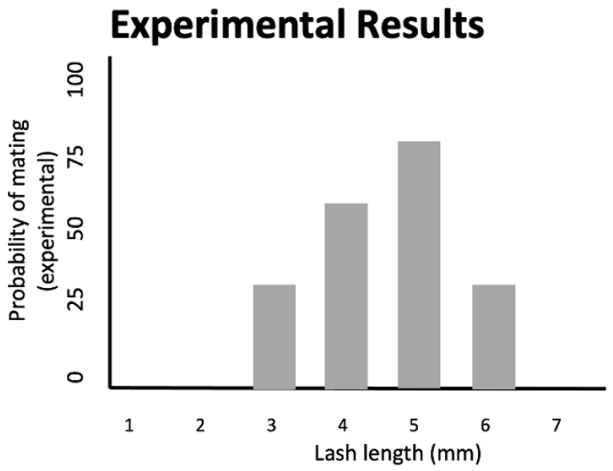
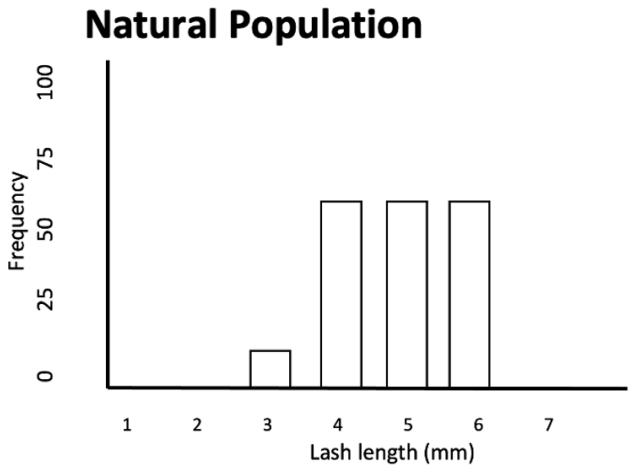
Winter 2022 - LIFESCI7B-4 - MARCOT / PIRES

Started on	Friday, 25 February 2022, 3:57 PM PST
State	Finished
Completed on	Friday, 25 February 2022, 5:57 PM PST
Time taken	1 hour 59 mins
Grade	**81.00** out of 114.00 (**71**%)

Information

[Questions 1-3] Jumping spiders are known for having elaborate mating dances where males will put on an extensive display for females. If the mating dance does not result in mating between two spiders, the female will often eat the male that was displaying. It is unclear whether it is the dance, or ornamentation that may actually affect the mating success of males. *Maevia inclemens* is one species of jumping spider that has a tuft of hairs above their eyes, that appears like a crown. The larger the male, the longer the tufts of hairs. Researchers are trying to determine if the length of the tuft has any effect on male mating success, or if the length of the hairs is potentially limited due to natural selection. You are a researcher that has decided to artificially increase lash length in some males to determine if it affects mating success. You also capture and measure lash lengths of males in the wild. Your data shows the following:





Question **1**

Incorrect

0.00 points out of 3.00

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

Select one:

- True ✖
- False

Learning Objectives

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'.

Question **2**

Complete

Not graded

Lash length is under stabilizing selection in wild populations.

Select one:

- True
- False

Learning Objectives

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'.

Question **3**

Correct

3.00 points out of 3.00

Natural selection acts against males with lash lengths of 6 mm.

Select one:

- True
- False ✔

Learning Objectives

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 1400 kangaroo rats. Within the population, 35% are AA, 40% are Aa, and 25% are aa.

Question **4**

Correct

3.00 points out of 3.00

What is the frequency of allele a in the population?

- a. None of the answer choices are correct
- b. 0.5
- c. 0.45 ✔
- d. 0.4
- e. 0.55

Learning Objectives

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:
0.45

Question **5**

Correct

3.00 points out of 3.00

This population is NOT in HW equilibrium.

- a. True ✔
- b. False

Learning Objectives

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:
True

Question 6

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

Learning Objectives

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

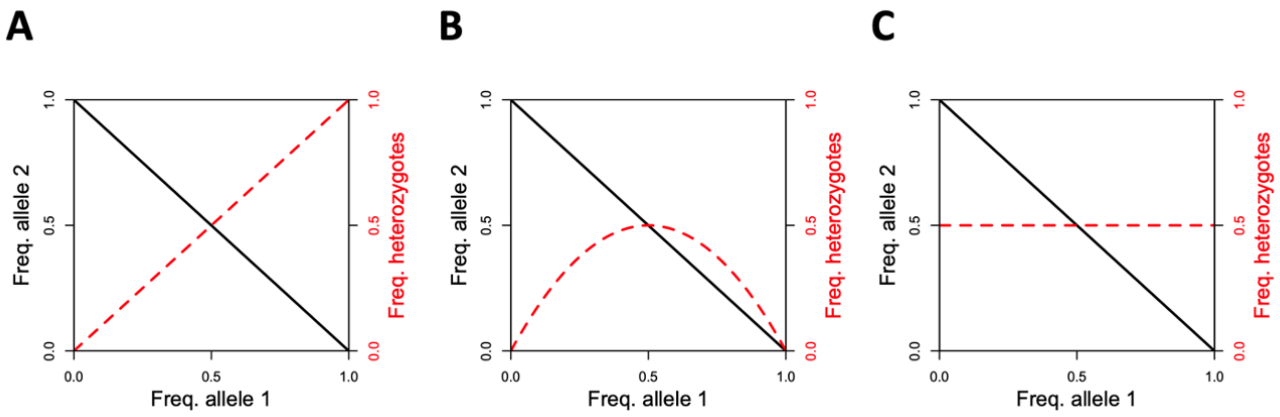
[Question 7] You are a theoretical population geneticist studying the relationship between two alleles and the expected frequencies of homozygotes and heterozygotes in a population that is in Hardy-Weinberg Equilibrium.

Question 7

Correct

3.00 points out of 3.00

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



a. Figure A

b. Figure B ✔

c. Figure C

Learning Objectives

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:
Figure B

Information

[Question 8] You are an evolutionary biologist studying evolution in a population of aphids. There are two alleles for eye color in these aphids, white (W) 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 W and B alleles are equal for each population. 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 W allele	# of generations where all populations are fixed for either W or B allele
N=20	1	1, 5, 4, 9	18
N=20	2	1, 3, 4, 10	70
N=50	3	1, 4, 7, 8, 10	52
N=50	4	1, 3, 4, 7	400
N=120	5	1, 4, 5, 7	520
N=120	6	1, 3, 4, 9	300

Question **8**

Correct

3.00 points out of 3.00

If you ran another experiment with N=20 individuals, then both population 1 and population 4 have an equal starting probability of becoming fixed for the W allele.

Select one:

- True ✔
- False

Learning Objectives

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 9-10] You are studying a gene locus with five distinct alleles (A, B, C, D and E) found in *Daphnia magna*, a species of water flea. Each allele occurs with the same frequency in the population.

Question **9**

Correct

3.00 points out of 3.00

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

Select one:

- True ✔
- False

Learning Objectives

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 **10**

Correct

3.00 points out of 3.00

Your sample reveals the following number of individuals with each genotype

AA = 8 BB = 8 CC = 8 DD = 8 EE = 8

AB = 16 BC = 16 CD = 17 DE = 15

AC = 15 BD = 18 CE = 16

AD = 15 BE = 16

AE = 16

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

Select one:

- True
- False ✔

Learning Objectives

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

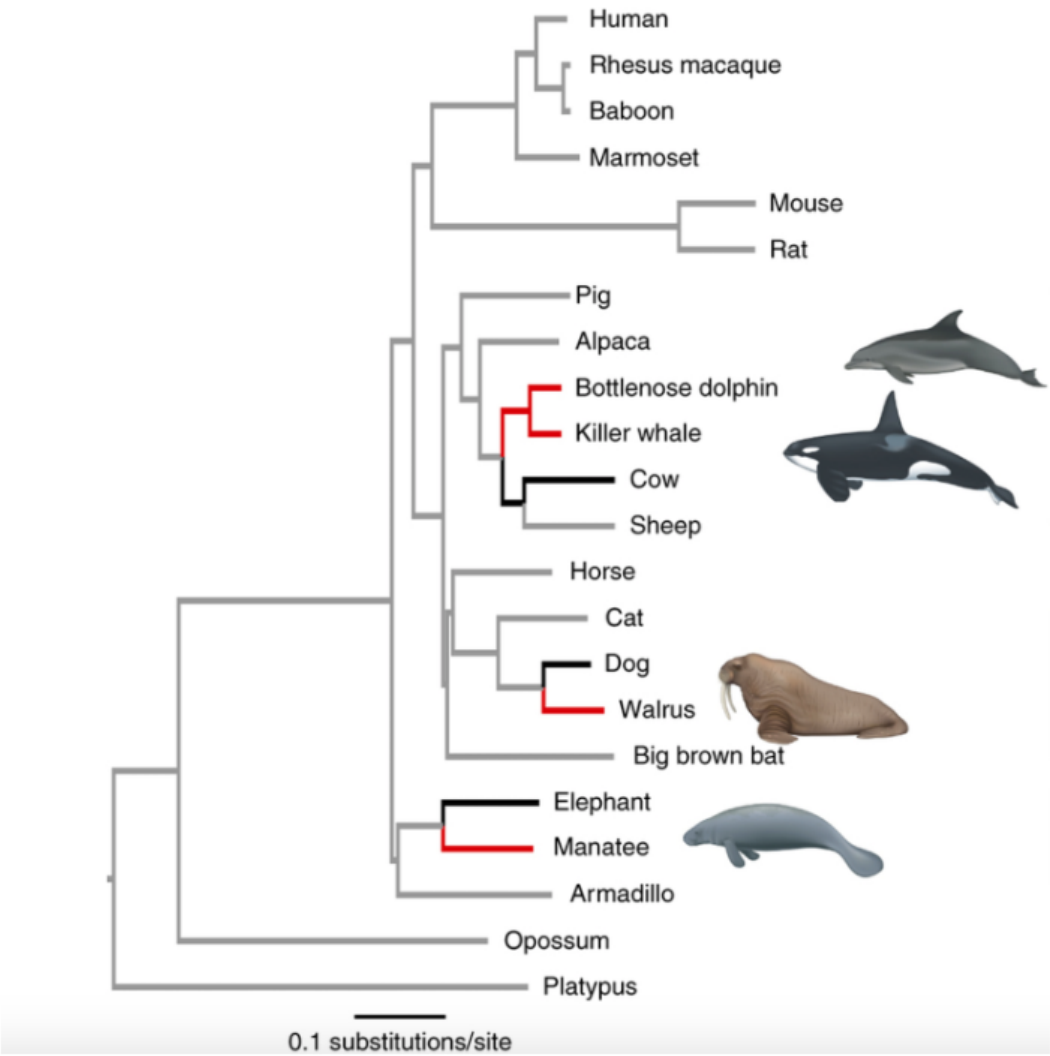
Calculate genotype frequencies expected under HW equilibrium in a population given its allele frequencies

Lab Week 5

The correct answer is 'False'.

Information

[Questions 11 -13] Consider the partial mammalian phylogeny determined from DNA sequence data shown below (marine mammals are shown with a picture next to the name, and shown with red branches):



Question **11**

Correct

3.00 points out of 3.00

This type of phylogeny is called a chronogram

Select one:

- True
- False ✔

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

Recognize how phylogenies are hypotheses of evolutionary relationships

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

The correct answer is 'False'.

Question **12**

Correct

3.00 points out of 3.00

According to the relationships shown on the phylogeny, marine mammals form a monophyletic group that excludes any terrestrial mammals.

Select one:

- True
- False ✔

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

Recognize how phylogenies are hypotheses of evolutionary relationships

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

The correct answer is 'False'.

Question **13**

Incorrect

0.00 points out of 3.00

If you were to compare DNA sequences of the opossum , walrus, and manatee, you would expect a greater number of DNA differences between the opossum and manatee.

Select one:

- True ✖
- False

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

Recognize how phylogenies are hypotheses of evolutionary relationships

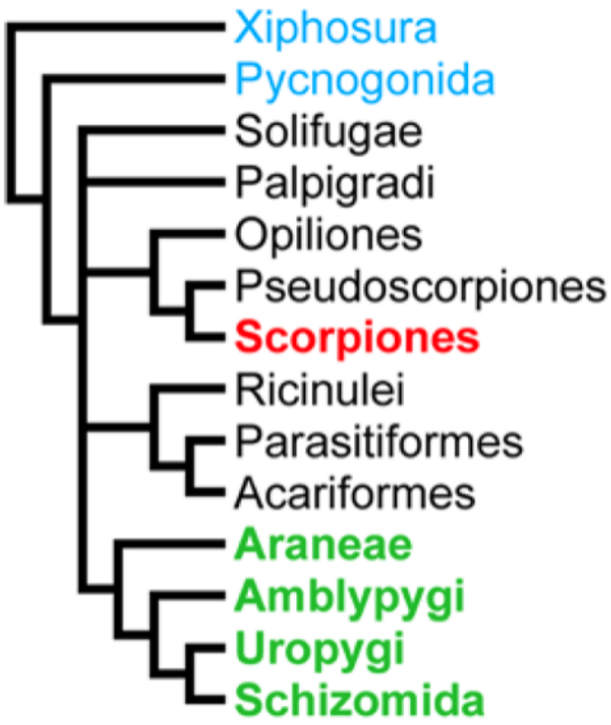
Evaluate the relationships between various groups of organisms based on a phylogeny.

The correct answer is 'False'.

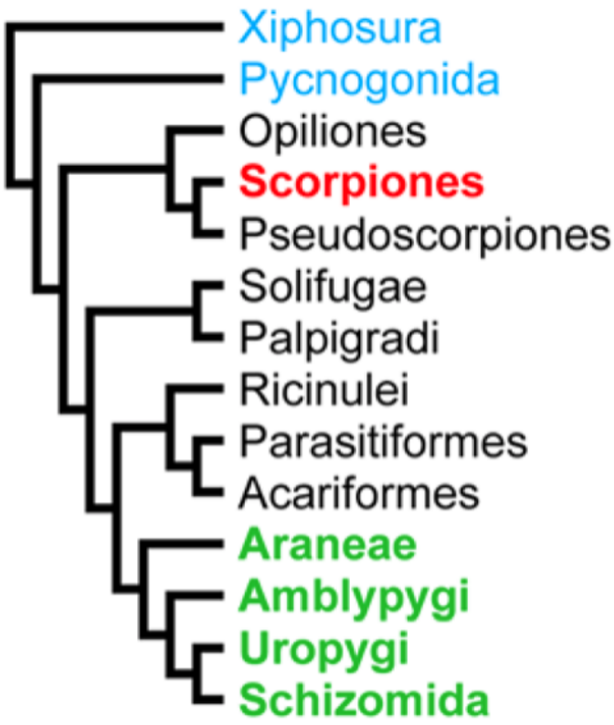
Information

[Questions 14-19] The two phylogenies below represent two hypotheses of evolutionary relatedness for groups of arachnids. Taxon names in blue are marine taxa, and all other groups are terrestrial. Names in red represents scorpions, green represents a group called Tetrapulmonata (includes whip scorpions and spiders), and black represents other groups of terrestrial arachnids. The taxa represented by green and red have four sets of book lungs (what they use to breathe), all other terrestrial groups have two pairs of book lungs.

TREE 1



TREE 2



Question **14**

Correct

3.00 points out of 3.00

Both phylogenetic trees show equivalent evolutionary relationships among the terrestrial arachnids, but not for the other taxa included in the phylogeny.

Select one:

- True
- False ✔

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

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 **15**

Incorrect

0.00 points out of 3.00

Considering only Tree #1, Opiliones are more closely related to Ricinulei than they are to Acariformes.

Select one:

- True ✖
- False

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

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 **16**

Incorrect

0.00 points out of 3.00

Tetrapulmonata and scorpions have four pairs of book-lungs (what they use for breathing). Considering only Tree #1, the presence of four pairs of book lungs in these groups is an ancestral trait of terrestrial arachnids.

Select one:

- True ✖
- False

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

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 **17**

Correct

3.00 points out of 3.00

Assuming that four-pairs of book-lungs is the result of convergent evolution, Tree #1 shows a more parsimonious evolution of this trait Tree #2.

Select one:

- True
- False ✔

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

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 **18**

Correct

3.00 points out of 3.00

If we assume that four pairs of book lungs is a synapomorphy, and is descended from a common ancestor, then Tree #1 and Tree #2 can be considered equally parsimonious.

Select one:

- True ✔
- False

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

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 **19**

Correct

3.00 points out of 3.00

Based on Tree #2, we can conclude that the ancestor of all of these taxa was marine.

Select one:

- True ✔
- False

Learning Objectives

Differentiate between the three common representations of phylogenies and correctly interpret the data presented in them

Recognize how phylogenies are hypotheses of evolutionary relationships

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

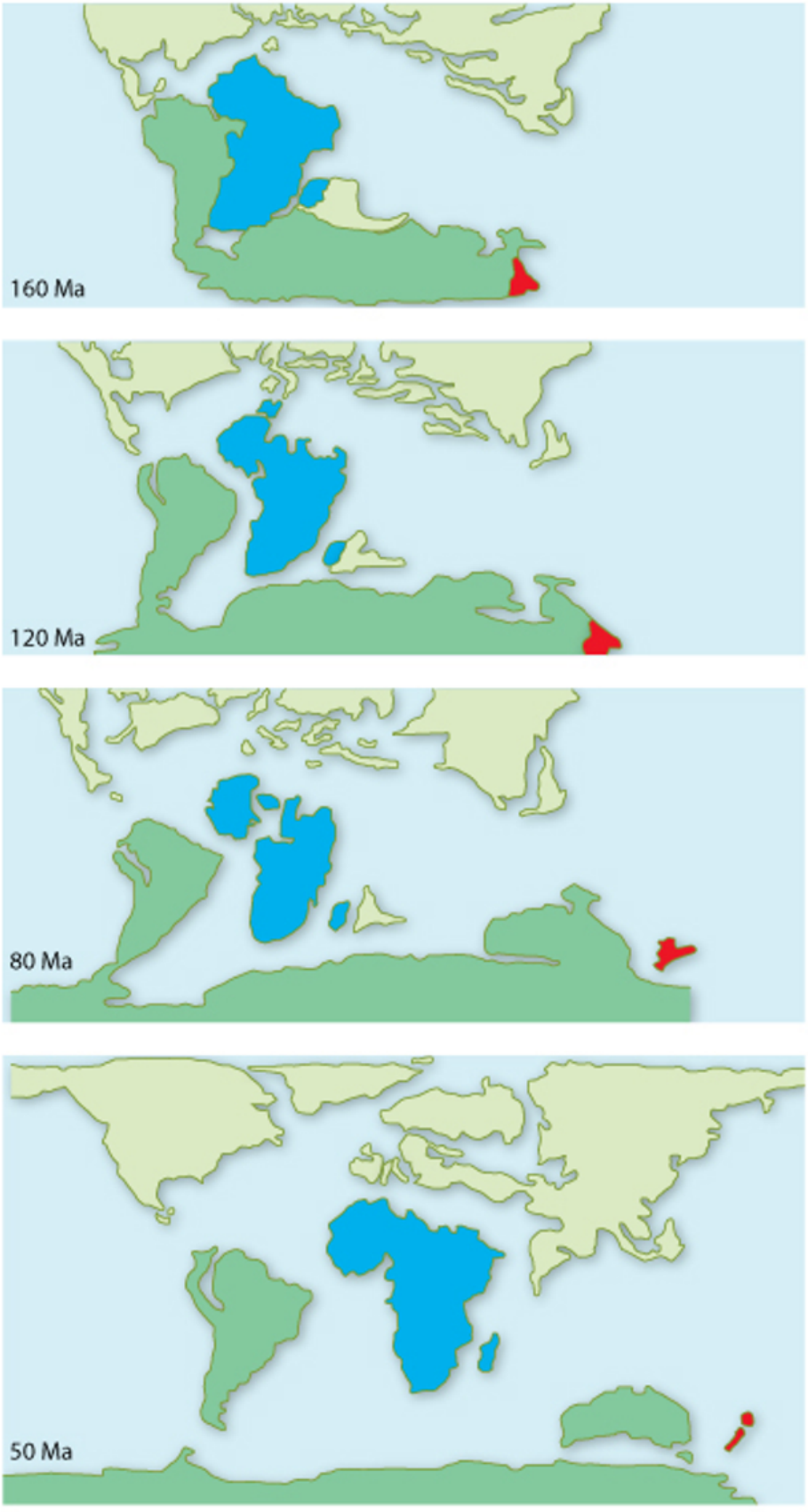
Define the terms synapomorphy, homoplasy, node, sister taxa, monophyletic and paraphyletic group, and phylogenetic tree.

The correct answer is 'True'.

Information

[Question 20-22] Marsupials, pouched mammals, are currently found in North America, South America, Australia, and New Zealand. Fossil records show that marsupial diversity in South America was much higher in the past than what is present today. Please note, there is only one living species of marsupial in North America today, the Virginia opossum. You are trying to better understand what could explain the current geographic distribution of marsupials and have the following information.

You look at continental shifts over time as represented in the following figure(s):



Biology: How Life Works, Second Edition
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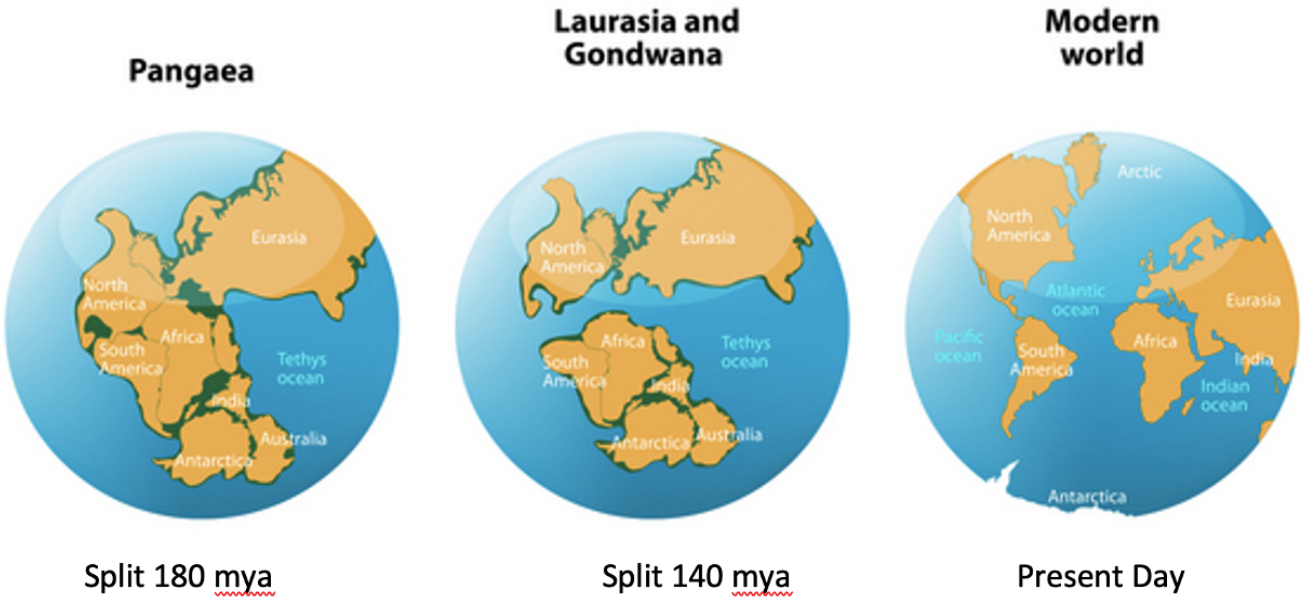


Question **20**

Incorrect

0.00 points out of 3.00

Your hypothesis is that marsupials first originated in Gondwana (the southern supercontinent that included what would later become South America), and then lineages diverged due to vicariance and dispersal as continents became separated, or rejoined, over time. If this is true, then North American marsupials would represent the most recent lineage of marsupials on a phylogenetic tree.

a. True

b. False ✖

LOs

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

Relate evidence from the fossil record to macroevolutionary changes in major lineages of organisms.

Interpret a chronogram and draw conclusions from the data

Relate data from molecular clocks to evolutionary patterns in organismal lineages

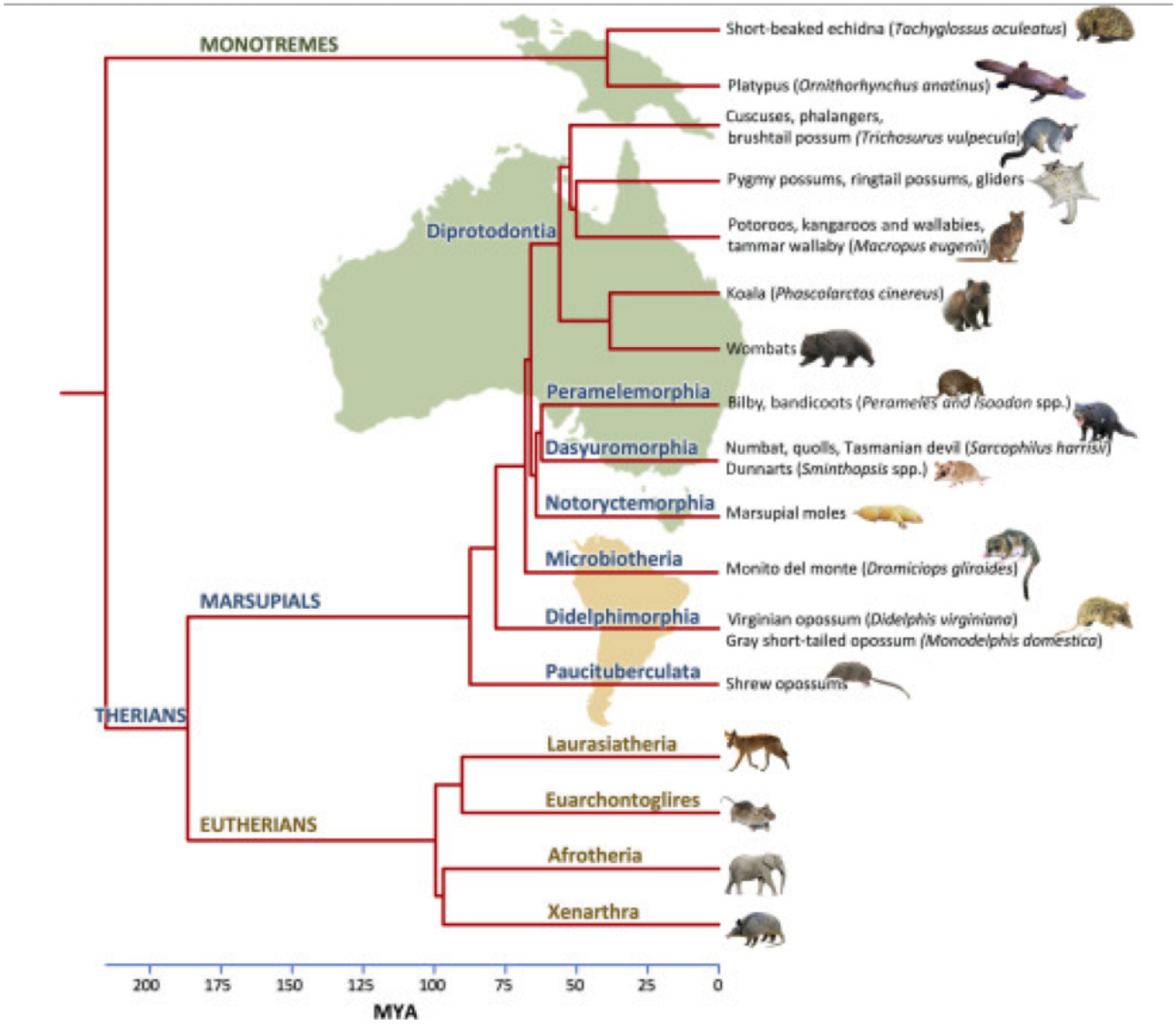
The correct answer is:
True

Question **21**

Correct

3.00 points out of 3.00

As you continue your work, you are able to construct the following phylogeny using data from the fossil record.



Based on the additional information presented, the common ancestor that gave rise to all marsupials was not present until Gondwana formed when it split from Laurentia.

a. True

b. False ✔

LOs

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

Relate evidence from the fossil record to macroevolutionary changes in major lineages of organisms.

Interpret a chronogram and draw conclusions from the data

Relate data from molecular clocks to evolutionary patterns in organismal lineages

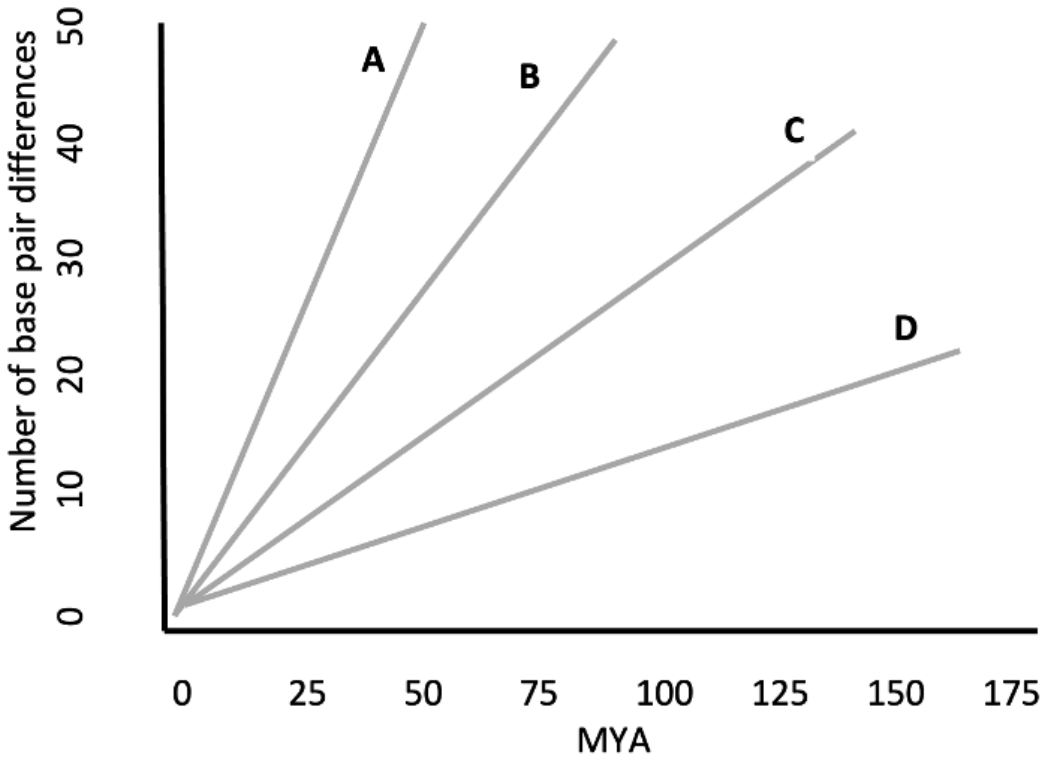
The correct answer is:
False

Question **22**

Correct

3.00 points out of 3.00

You are interested in using other data to confirm the dates of the nodes on your phylogeny. The following molecular clock data from four different genes, A -D, is represented below.



For gene C, you would expect ~35 base pair (more than 30 and less than 40) differences between Virginian opossum (Didelphimorphia) and Shrews opossum (Paucituberculata) sequences.

a. True

b. False ✔

LOs

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

Relate evidence from the fossil record to macroevolutionary changes in major lineages of organisms.

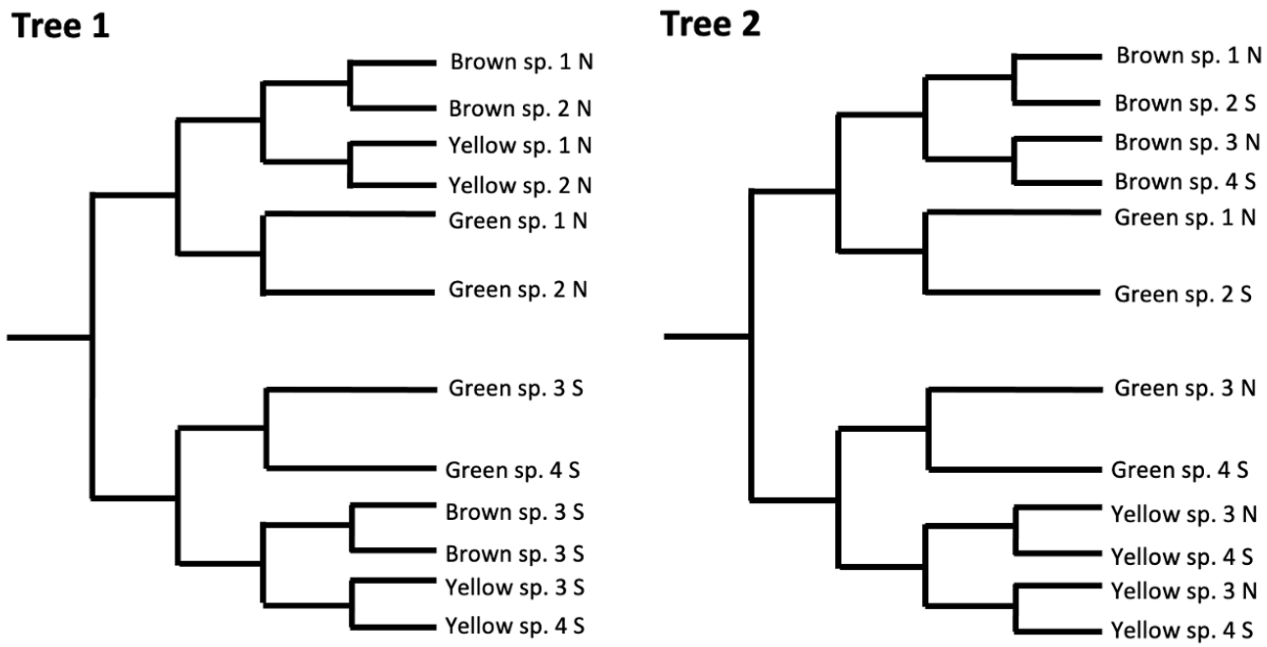
Interpret a chronogram and draw conclusions from the data

Relate data from molecular clocks to evolutionary patterns in organismal lineages

The correct answer is:
False

Information

[Questions 23-25] You are a field biologist studying 12 different species of lizards on either side (North, N, or South, S) of a river running between two different mountains in a forested region of California. You know that in the past there was only a single mountain range, but then the river carved a deep valley through the original mountain, resulting in the two mountains seen today. On both sides of the mountain there are lizard species that are yellow, green, and brown in color. None of the lizards have shown the ability to swim across the river. 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.



Question **23**

Correct

3.00 points out of 3.00

The separation of one mountain into two by the river represents a vicariant event.

Select one:

- True ✔
- False

Learning Objectives

Recognize how phylogenies are hypotheses of evolutionary relationships

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

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

The correct answer is 'True'.

Question **24**

Correct

3.00 points out of 3.00

You hypothesize that historically there was a single species of lizard that was separated by the river's formation, and then there was subsequent diversification.

Tree 1 supports this hypothesis.

Select one:

- True ✔
- False

Learning Objectives

Recognize how phylogenies are hypotheses of evolutionary relationships

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

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

The correct answer is 'True'.

Question **25**

Incorrect

0.00 points out of 3.00

You hypothesize that historically there were six different species of lizards that were all separated by the river, and then there was subsequent diversification.

Tree 2 supports this hypothesis.

Select one:

- True
- False ✖

Learning Objectives

Recognize how phylogenies are hypotheses of evolutionary relationships

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

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

The correct answer is 'True'.

Information

[Question 26] 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.

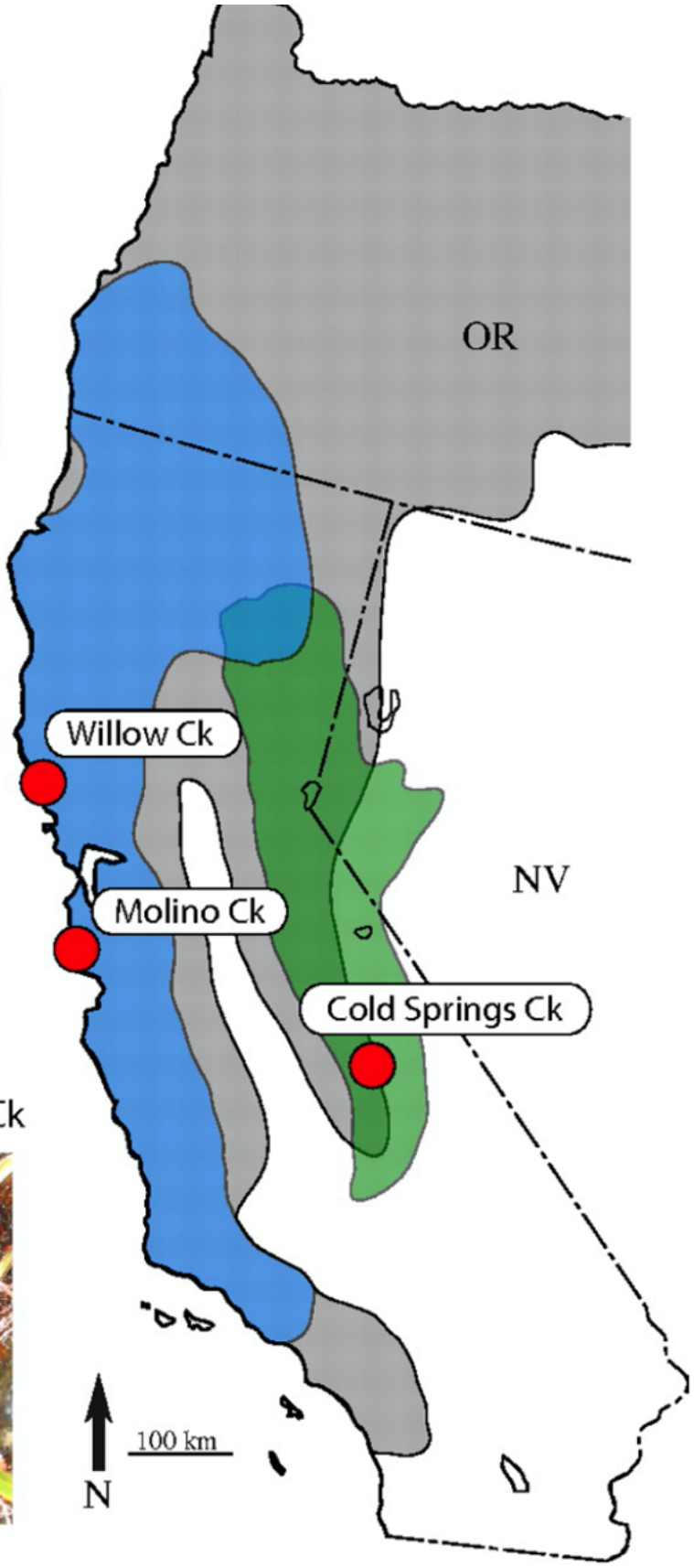
Hypothesis 1: There are different mutations in the gene that allows garter snakes to tolerate TTX for each population.

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



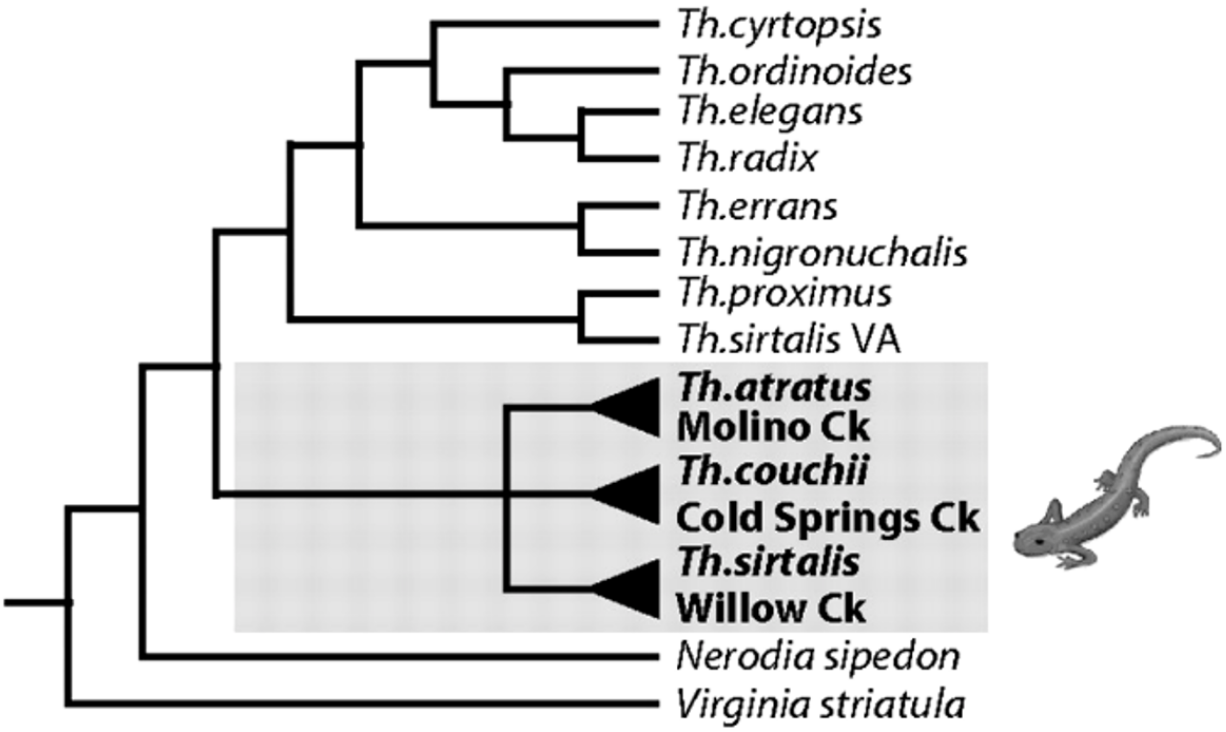
Question **26**

Correct

3.00 points out of 3.00

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 convergent evolution for resistance to TTX.



Select one:

- True
- False ✔

LOs

Recognize how phylogenies are hypotheses of evolutionary relationships

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

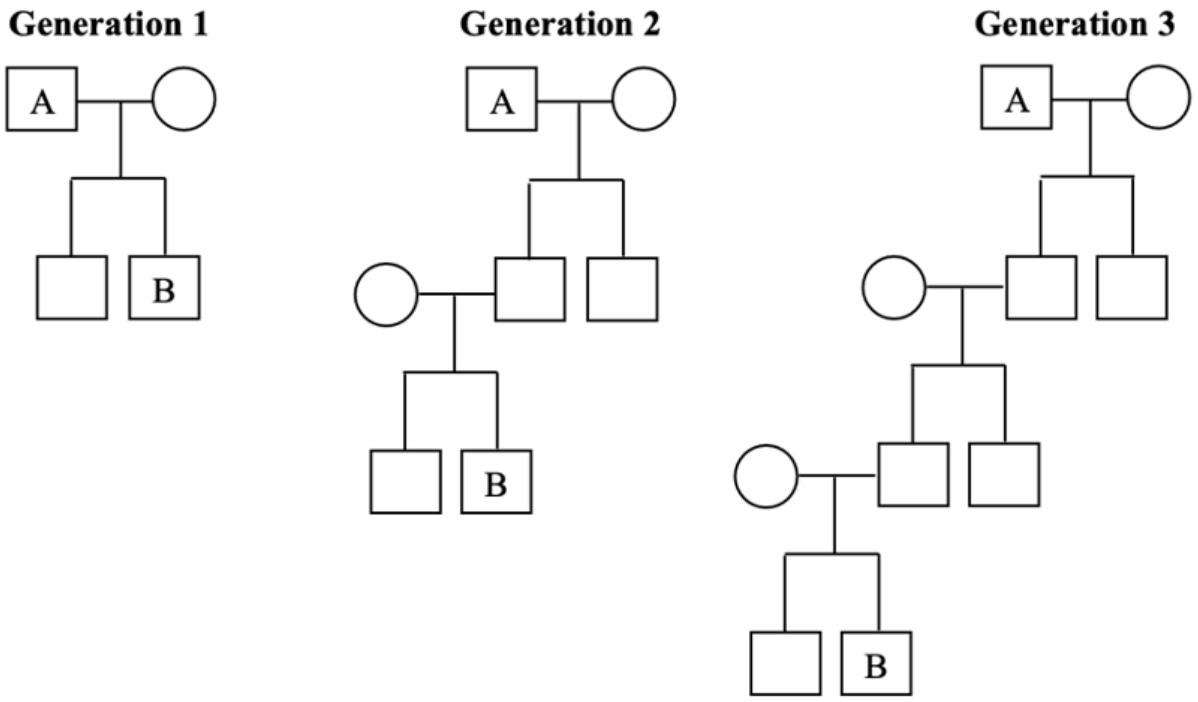
The correct answer is 'False'.

Question **27**

Correct

3.00 points out of 3.00

[Question 27] 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 four offspring. If a beta (B) male helps an alpha (A) male, then beta will only have two offspring. If an alpha is helped by a beta, then alpha will have seven offspring. Please note that in each generation alpha is mating with the same female.



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

a. Generation 1

b. Generation 2 ✔

c. Generation 3

LOs

Differentiate among the terms direct, indirect, and inclusive fitness

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

Information

[Questions 28–31] Construct the most parsimonious phylogeny given the character matrix below. The taxon names are A–F, the characters are numbered 1–9. A (+) in the box means the character is present, a (-) in the box means the character is absent. The outgroup (OG) taxon has none of the characters listed in the matrix.

Taxon	1	2	3	4	5	6	7	8
OG	-	-	-	-	-	-	-	-
A	-	-	-	-	-	+	-	-
B	-	+	+	-	+	+	-	-
C	+	-	-	+	-	+	-	-
D	-	+	+	-	+	+	-	+
E	-	+	+	+	+	+	-	+
F	-	+	+	-	+	+	+	-

Question **28**

Incorrect

0.00 points out of 3.00

Exactly three characters in this data matrix are not useful for resolving the relatedness of taxa to one another.

Select one:

- True
- False ✖

LOs

Construct a phylogenetic tree given a character matrix

Use the principle of parsimony to evaluate phylogenetic hypotheses

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

The correct answer is 'True'.

Question **29**

Complete

Not graded

Taxa B, D, and E form a monophyletic group.

Select one:

- True
- False

LOs

Construct a phylogenetic tree given a character matrix

Use the principle of parsimony to evaluate phylogenetic hypotheses

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

The correct answer is 'False'.

Question **30**

Complete

Not graded

Taxa A and C are sister taxa in the most parsimonious tree.

Select one:

- True
- False

LOs

Construct a phylogenetic tree given a character matrix

Use the principle of parsimony to evaluate phylogenetic hypotheses

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

The correct answer is 'True'.

Question **31**

Correct

3.00 points out of 3.00

According to these data, the most parsimonious tree does not show any characters that could be the result of convergent evolution.

Select one:

- True
- False ✔

LOs

Construct a phylogenetic tree given a character matrix

Use the principle of parsimony to evaluate phylogenetic hypotheses

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

The correct answer is 'False'.

Information

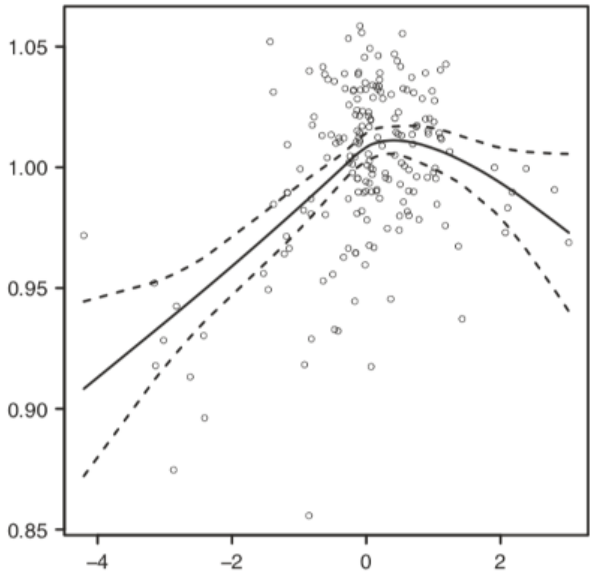
[Questions 32-34] The morphology of tadpoles influences what resources they can eat, determining their trophic position. Tadpoles range from omnivorous (consuming detritus, algae, small crustaceans) to carnivorous (consuming fairy shrimp). Researchers have derived a metric that they can use to quantify the trophic position of individuals; low values = omnivores, high values = carnivores.

Question **32**

Incorrect

0.00 points out of 3.00

The following graph shows the relationship between fitness (y-axis) and trophic position (x-axis) for a particular tadpole population; each dot is a single tadpole. Given these data, we can conclude that the population is experiencing:



a. Stabilizing selection favoring intermediate phenotypes

b. Disruptive selection favoring intermediate phenotypes

c. Stabilizing selection favoring more carnivorous phenotypes

d. Directional selection favoring more omnivorous phenotypes ✖

e. Directional selection favoring more carnivorous phenotypes

f. Disruptive selection favoring extreme omnivorous and carnivorous phenotypes

LO

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

The correct answer is:

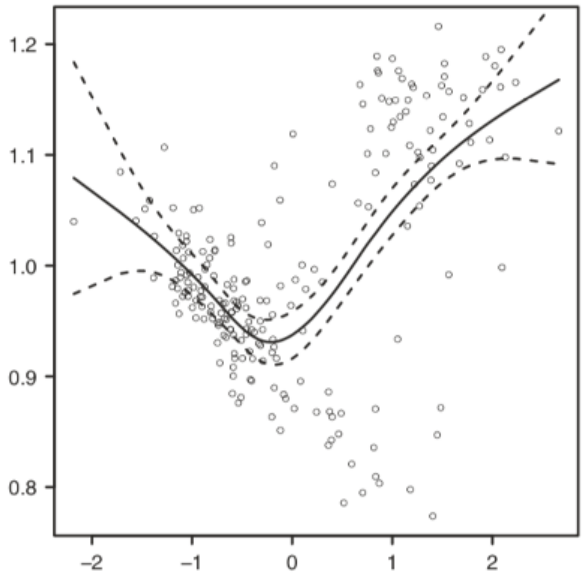
Stabilizing selection favoring intermediate phenotypes

Question **33**

Correct

3.00 points out of 3.00

Consider the following fitness curve, measured for a different, nearby tadpole population:



Strongly carnivorous tadpoles are more fit than strongly omnivorous tadpoles

Select one:

- True ✔
- False

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

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

The correct answer is 'True'.

Question **34**

Incorrect

0.00 points out of 3.00

Consider the graph from Q33. Over a few generations, assuming trophic position is a heritable trait, we would expect that this population's mean trophic position will stay the same and variability in trophic position will increase

Select one:

- True ✖
- False

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

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

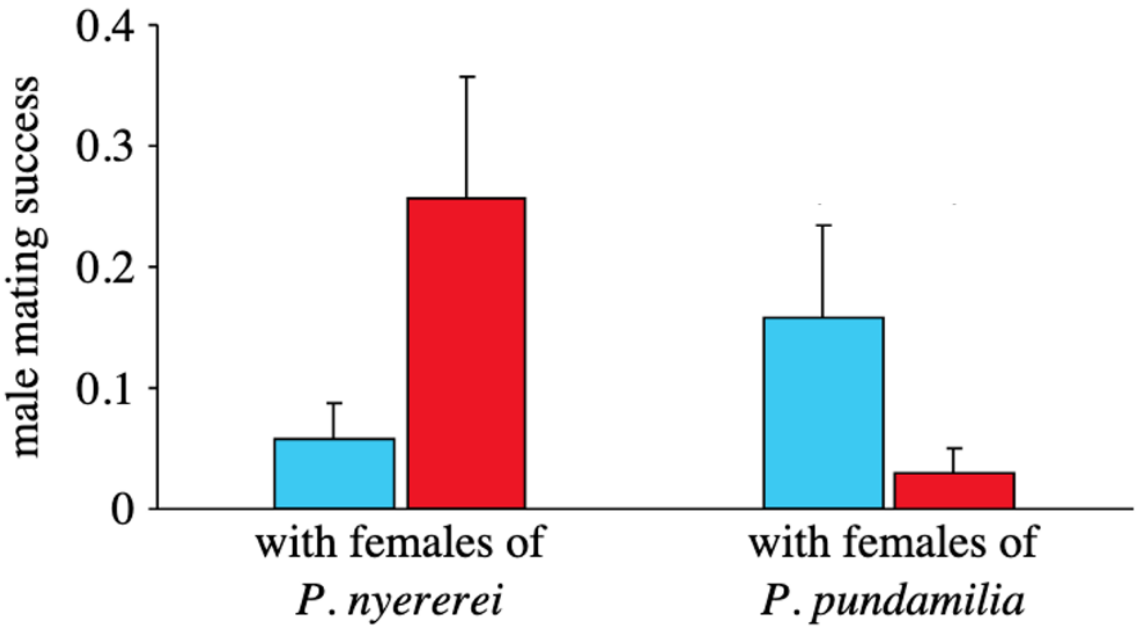
Predict how different modes of selection affect the distribution of phenotypes in a population

The correct answer is 'False'.

Information

[Question 35] Males of two different species of cichlid fish differ in color. Males of *P. nyererei* are typically red and males of *P. pundamilia* are typically blue.

The following graph presents data on the mate preference of females of these two species.



These results suggest that

Question **35**

Incorrect

0.00 points out of 3.00

Post-zygotic isolation mechanisms maintain the separation of these species

Select one:

- True ✖
- False

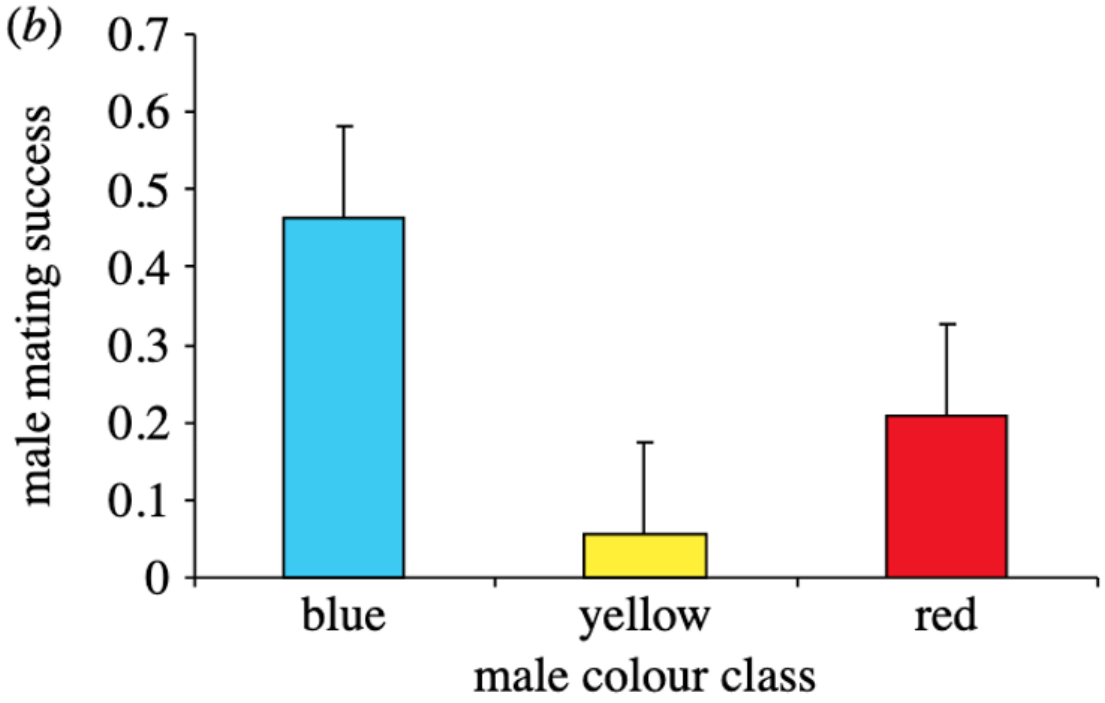
Define sexual selection

Differentiate between pre- and post-zygotic isolating mechanisms.

The correct answer is 'False'.

Information

[Questions 36 and 37] The two species of fish are capable of producing hybrids. Hybrid males vary in color from red to blue, but often take on an intermediate yellow color. These hybrids do not suffer from any intrinsic fitness disadvantage, and are fertile. The graph below presents data on the success of hybrid males (F2 generation, with a range of coloration) in mating with females (also from the F2 generation).



(c)

Question **36**

Correct

3.00 points out of 3.00

These results are most consistent with which scenario of selection:

a. Stabilizing natural selection favoring yellow males

b. Disruptive natural selection favoring yellow males

c. Disruptive sexual selection favoring red and blue males ✔

d. Stabilizing sexual selection favoring red and blue males

e. Disruptive sexual selection favoring yellow males

LOs

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 sexual selection favoring red and blue males

Question **37**

Incorrect

0.00 points out of 3.00

The presented results suggest that sympatric populations of *P. nyererei* and *P. pundamilia* are likely to remain separate species.

Select one:

- True
- False ✖

Define sexual selection

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'.

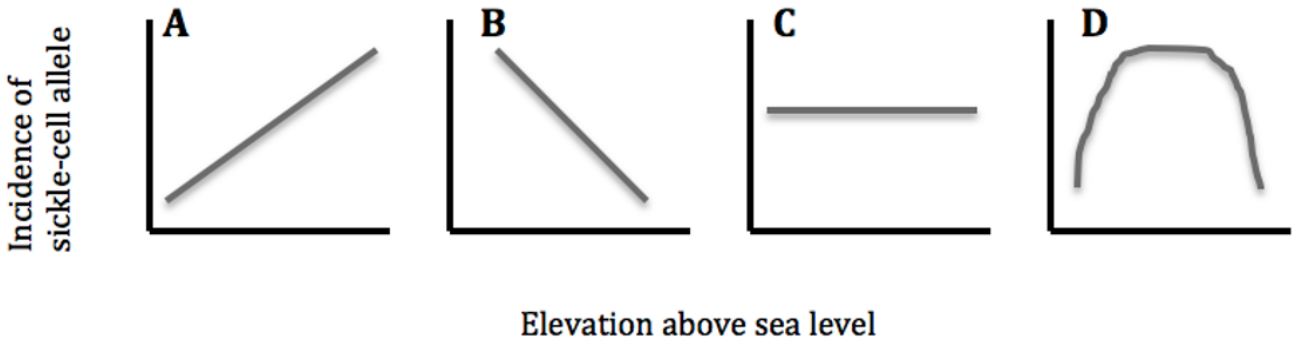
Question **38**

Correct

3.00 points out of 3.00

[Question 38] *Anopheles* mosquitoes, which carry the malaria parasite, cannot live above elevations of 5,900 feet. In addition, oxygen availability decreases with higher altitude. Consider a hypothetical human population that is adapted to life on the slopes of Mt. Kilimanjaro in Tanzania, a country in equatorial Africa. Mt. Kilimanjaro's base is about 2,600 feet above sea level and its peak is 19,341 feet above sea level. If the incidence of the sickle-cell allele in the population is plotted against altitude (feet above sea level), which of the following distributions is most likely, assuming little migration of people up or down the mountain?

For all graphs the X-axis is elevation above sea level, and the Y-axis is incidence of sickle-cell allele.



a. Graph A

b. Graph B ✔

c. Graph C

d. Graph D

The correct answers are:
Graph A,

Graph B,

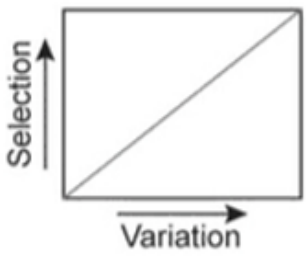
Graph C,

Graph D

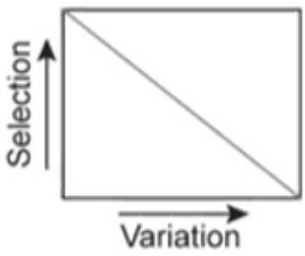
Information

[Question 39] Consider the graphs below that relate strength of selection to the amount of variation in a trait.

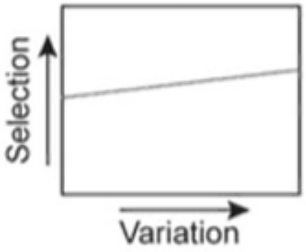
A.



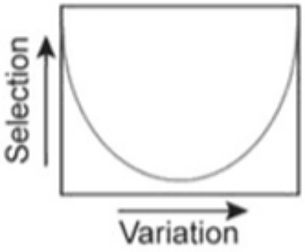
B.



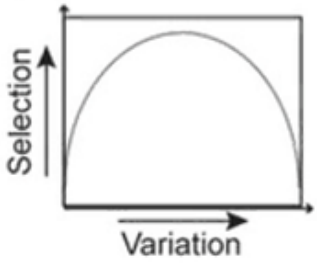
C.



D.



E.



Question **39**

Correct

3.00 points out of 3.00

Which of the graphs best represents the relationship between the intensity of stabilizing selection and the genetic variation present within a population?

a. Graph A

b. Graph B ✔

c. Graph C

d. Graph D

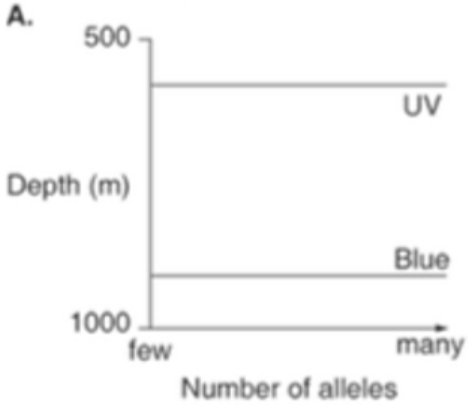
e. Graph E

The correct answer is:
Graph B

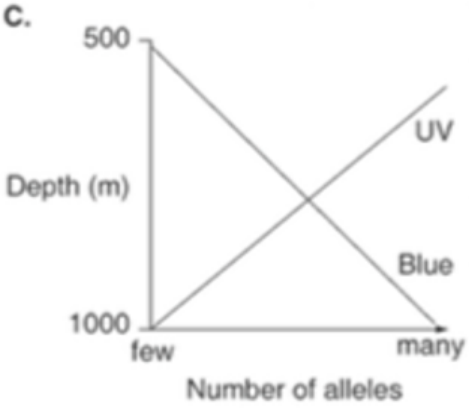
Information

[Questions 40-41] Blue light is that portion of the visible spectrum that penetrates the deepest into bodies of water. Ultraviolet (UV) light, though, can penetrate even deeper. A gene within a population of marine fish that inhabits depths from 500 m to 1,000 m has an allele for a photopigment that is sensitive to UV light, and another allele for a photopigment that is sensitive to blue light.

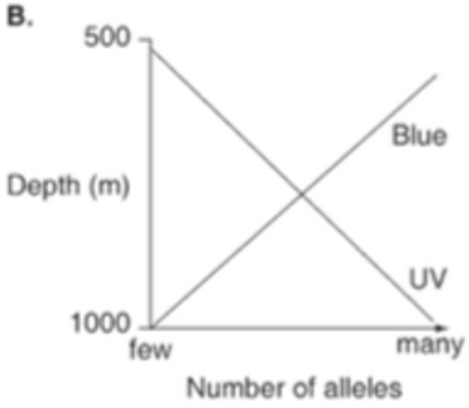
A.



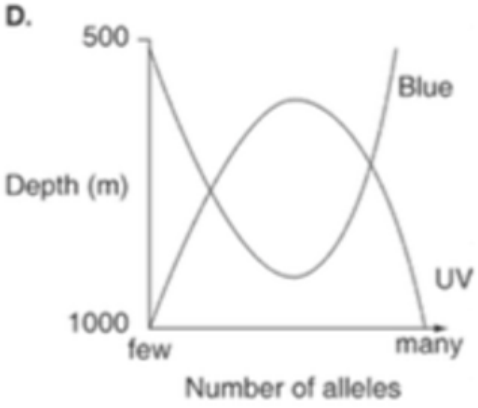
C.



B.



D.



Question **40**

Correct

3.00 points out of 3.00

Which graph best depicts the predicted distribution of these alleles *if* the fish that carry these alleles prefer to locate themselves where they can see best?

a. Graph A

b. Graph B ✔

c. Graph C

d. Graph D

The correct answer is:
Graph B

Question **41**

Correct

3.00 points out of 3.00

These fish prefer to mate with individuals they encounter at the same depth as themselves. This would result in directional selection in the population.

Select one:

True

False ✔

The correct answer is 'False'.

◄ Post-Reflection Mini-Midterm I

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