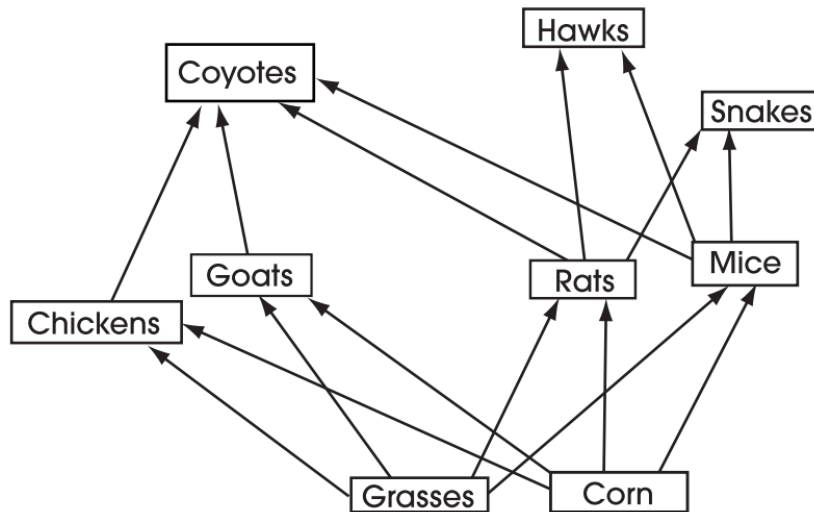


LIFE SCIENCE

All questions appeared on previous OGT Science exams or the public “practice test”.

Use the farmland food web to answer question 1.

Farmland Food Web



1. Many people who raise chickens and other small farm animals consider coyotes to be pests. These people have decreased the coyote population in many parts of the United States.

Which of these is likely a result of the decrease in the number of coyotes in the area? (2005 #9 / LS F)

- A. The mouse population has increased.
- B. The hawk population has decreased.
- C. The grass population has increased.
- D. The goat population has decreased.

Use the information below to answer questions 2 – 5.

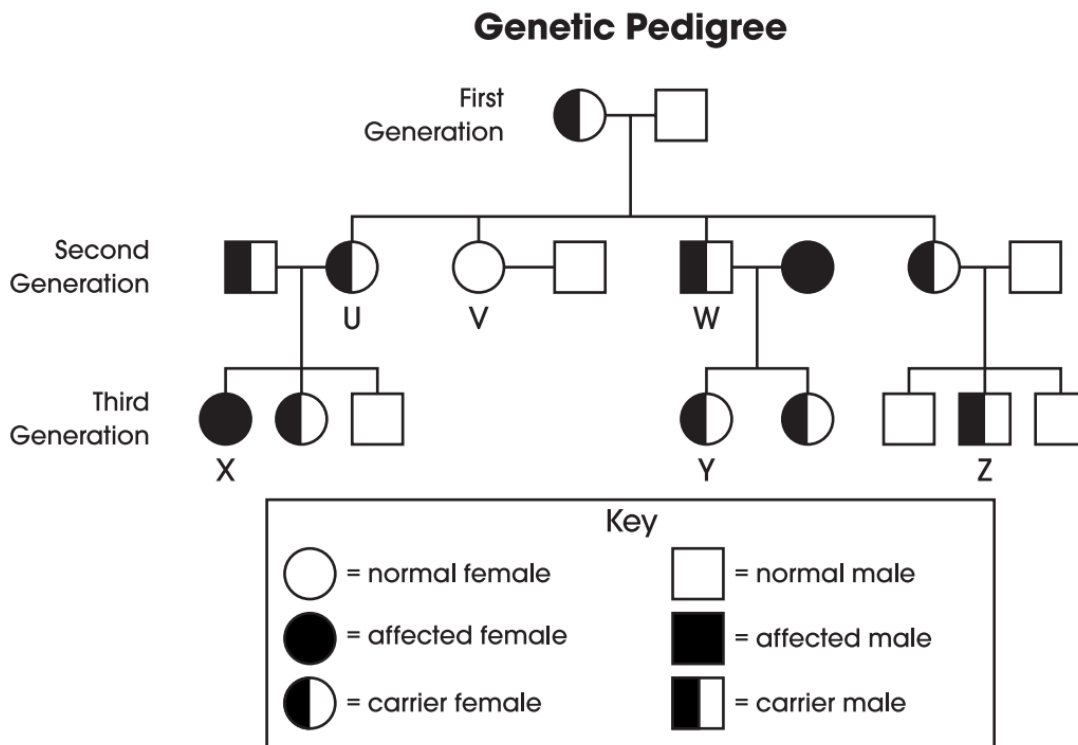
Sickle cell Disease

Sickle cell disease is a group of inherited disorders in which deoxygenated red blood cells become distorted and take on a shape like a sickle. There are two common alleles for this gene. One causes normally shaped red blood cells and the other allele causes the red blood cells to have a sickle shape. The sickled cells can lodge in the smallest blood vessels and reduce the circulation of blood to tissues.

The sickle cell allele is most common in areas where the disease malaria is a significant problem, and among people whose ancestors are from those areas. Evidence shows that having just one sickle cell allele makes a person resistant to malaria.

This genetic condition is a recessive trait. When an individual has only one allele for the sickle cell trait, the person is a carrier.

The pedigree below represents a family in which some members have the sickle cell allele.



2. In the genetic pedigree, person U and her husband are considering having another child.

What is the percent chance that this child will develop sickle cell disease? (2005 #11 / LS C)

- A. 25%
 - B. 50%
 - C. 75%
 - D. 100%
3. Draw a Punnett square or comparable diagram for the couple in the first generation of the pedigree. Use **B** to represent the allele for normal red blood cells and **b** to represent the allele for sickle cell disease. How do the couple's actual children compare to the expected results shown in your Punnett square? Respond in the space provided **below**. (4 points) (2005 #12 / LS C)

4. Although sickle cell disease has negative effects on those who suffer from it, the allele is widespread in many parts of the world. This is because in areas where malaria is a significant danger, the sickle cell allele (2005 #13 / LS C)

- A. ceases to cause symptoms.
- B. attacks the parasite that causes malaria.
- C. spreads rapidly in people weakened by malaria.
- D. conveys a health advantage to those who carry the allele.

5. Which person on the pedigree could not pass the allele for sickle cell disease to his/her offspring? (2005 #14 / LS C)

- A. V
 - B. X
 - C. Y
 - D. Z
-

6. For many years scientists debated whether viruses should be considered living organisms.

Which statement could a scientist use to support the position that viruses are **not** living? (2005 #37 / LS A)

- A. Viruses have genes encoded in DNA.
- B. Viruses require a host cell in order to reproduce.
- C. Viruses infect both plant and animal cells.
- D. Viruses replicate to produce more viruses.

7. What gas does the process of photosynthesis release into the atmosphere? (2005 #38 / LS B)

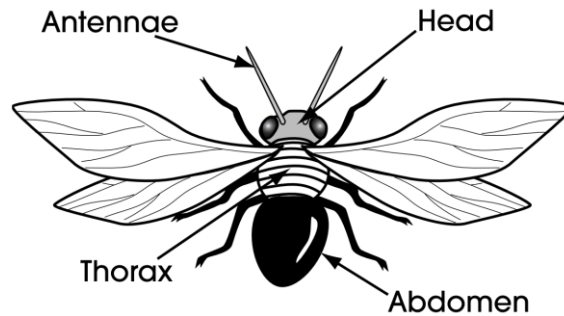
- A. carbon dioxide
- B. hydrogen
- C. nitrogen
- D. oxygen

8. The chart below is a taxonomic key for the fictitious insect genus *Problematica*.

Characteristics of the Genus *Problematica*

1	Thorax and abdomen entirely black	<i>Problematica alva</i>
	Thorax striped and abdomen black	Go to 2
2	Antennae curled	<i>Problematica brancus</i>
	Antennae straight	Go to 3
3	Wings longer than body	<i>Problematica cantrellis</i>
	Wings shorter than body	Go to 4
4	Wings white	<i>Problematica differensis</i>
	Wings black	<i>Problematica fortunatas</i>

A student has been asked to identify the following insect.



To which species does the insect belong? (2005 #43 / LS E)

- A. *Problematica alva*
- B. *Problematica brancus*
- C. *Problematica cantrellis*
- D. *Problematica differensis*

9. A scientist uses a microscope to examine two slides of living bacteria. Each slide contains a different type of bacteria. While the cells on the first slide are moving rapidly, the cells on the second slide are stationary.

Based on these observations, the cells on the second slide most likely have no (2006 #23 / LS A)

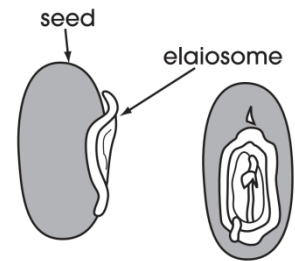
- A. nucleus.
 - B. flagella.
 - C. chloroplasts.
 - D. mitochondria.
10. Aristotle was the first person to classify living organisms and did so using a two-kingdom system involving a plant group and an animal group. The system used today is much more useful to scientists because the two-kingdom system did **not** (2005 #39 / LS J)
- A. recognize the similarities within the plant group.
 - B. separate living things based on characteristics and traits.
 - C. allow for the placement of human beings in its classification.
 - D. include many organisms such as those later discovered with microscopes.
11. Energy produced by cellular processes is stored as (2008 #5 / LS B)
- A. CO₂.
 - B. ATP.
 - C. DNA.
 - D. RNA.

Use the following information to answer questions 12 – 14.

Ants and Seed Dispersal

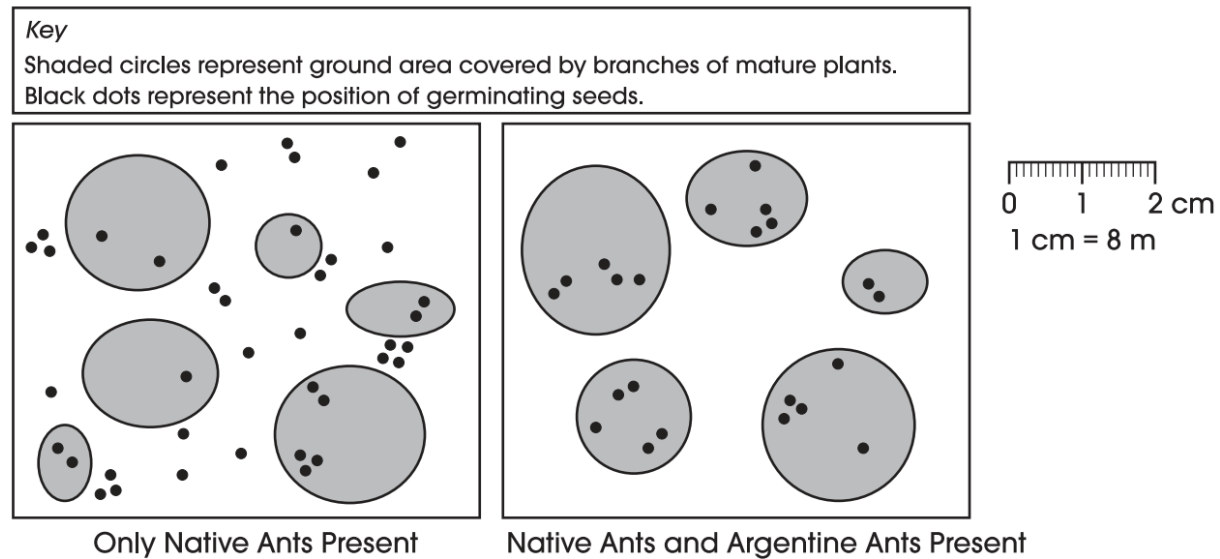
Many species of plants in the family Proteaceae produce seeds with fleshy structures called “elaiosomes”. Elaiosomes are protein-rich “food patches” that are attractive to ants.

In the Cape region of South Africa, native ants carry the Proteaceae seeds back to their nests where they eat the elaiosomes and discard the seeds in underground chambers. A species of Proteaceae seeds, *Mimetes cucullatus* (*M. cucullatus*), will successfully germinate after being placed underground by the native ants.



An ant native to Argentina was accidentally introduced to the Cape’s shrub lands and displaced many of the native ants. The non-native ant also feeds on elaiosomes. However, they discard the seeds on the surface. This allows the seeds to be eaten by rodents or destroyed by brush fires. The effects on the dispersal of the Proteaceae *M. cucullatus* in a typical situation are shown in the diagram below.

Mimetes Cucullatus Seedling Distribution



12. The relationship between the Argentine ants and the native ants is described as (2006 #2 / LS F)
- A. competitive.
 - B. parasitic.
 - C. commensal.
 - D. saprophytic.
13. The relationship between the Proteaceae plants and the native ants is described as (2006 #3 / LS F)
- A. parasitic.
 - B. commensal.
 - C. predatory.
 - D. mutualistic.
14. According to the data, introduction of the Argentine ant has affected *M. cucullatus* by (2006 #4 / LS F)
- A. increasing seedling survival.
 - B. increasing germination rates.
 - C. decreasing seed survival.
 - D. decreasing seed consumption.
-

Use the information to answer questions 15 – 16.

Cataracts

In 2004, wildlife rescuers found a great horned owl nearly dead from starvation. The owl's eyes had formed cataracts, which cloud the natural lens and inhibit the eye's ability to focus and form clear images. Cataracts can be inherited or acquired as a result of aging, disease and/or use of certain medications. Without clear vision, the owl, named Minerva, had been unable to hunt.

Minerva was taken to the Veterinary School at the University of Wisconsin, Madison, after a local veterinarian confirmed the presence of cataracts. A pair of lenses specifically made for owls was implanted in Minerva's eyes. After the surgery and a recovery period, Minerva was moved to a large, enclosed area where small rodents were released and her ability to hunt was to be evaluated. Scientists confirmed that, if she showed a clear ability to hunt, she would be released back into her natural habitat.

15. The mutation for cataracts (c) occurs on a gene represented by the letter E . Owls that are homozygous for the mutation (E^cE^c) exhibit cataracts. Owls that are homozygous for normal eyes are EE and owls that are carriers of the mutation but do not exhibit cataracts are EE^c .

What percentage of the offspring in a cross between parents with the genotypes EE and E^cE^c will exhibit cataracts? (2006 #9 / LS C)

- A. 0%
- B. 25%
- C. 50%
- D. 75%

16. Owls are nocturnal hunters and depend on their acute vision for survival. If Minerva's cataracts are determined to be inherited and she is released back into her natural habitat, she could pass the allele for cataracts on to her offspring.

What process would most likely act against any offspring with an allele for cataracts? (2006 #8 / LS H)

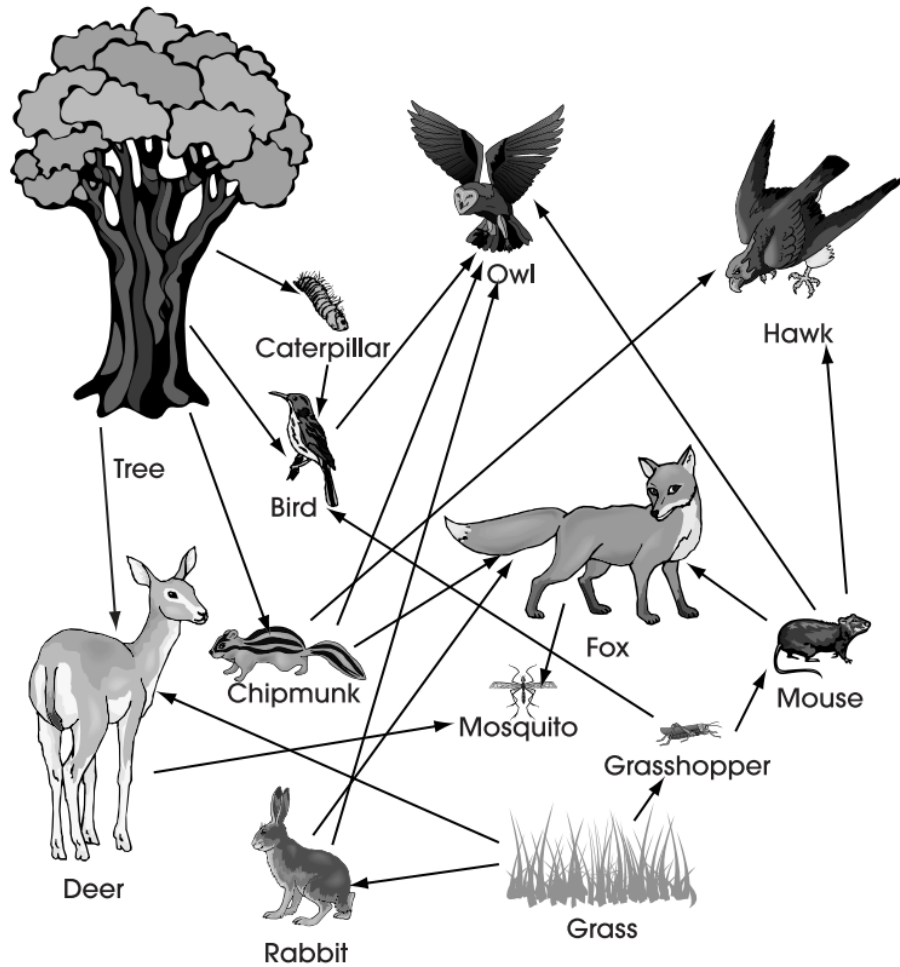
- A. immigration
 - B. genetic drift
 - C. natural selection
 - D. adaptive radiation
-

17. Rising ocean temperatures can cause corals to expel the symbiotic algae on which they depend for survival.

Which human influence could be responsible for an increase in this phenomenon? (2009 #13 / LS G)

- A. shoreline erosion
- B. burning fossil fuels
- C. solar power generation
- D. introduction of non-native species

18. The diagram below illustrates the relationships in a forest food web.



Based on this diagram, an ecologist would most likely conclude that a decrease in the fox population would result in (2006 #15 / LS D)

- A. an increase in the owl population.
- B. a decrease in the rabbit population.
- C. a decrease in the chipmunk population.
- D. an increase in the grasshopper population.

Use the information below to answer questions 19 – 26.

A group of students designs an experiment to test how an herbicide affects pepper plants and weeds. Eight plots are tested, each of which holds 25 pepper plants and a variety of weeds. Plots 1 and 2 are not treated; plots 3-8 are treated with varying amounts of weed-killing herbicide. The weeds are counted in each plot during week 1. The herbicide is applied during week 2, and the weeds are counted again in week 3. The data are shown in the table below.

Effects of Herbicide on Plant Growth				
Plot	Herbicide Dose	Number of Pepper Plants That Die Before Producing Fruit	Week 1 Number of Weeds	Week 3 Number of Weeds
1	No herbicide application	3	30	33
2	No herbicide application	5	35	40
3	50% of recommended dose	3	42	24
4	50% of recommended dose	3	43	14
5	100% of recommended dose	4	47	7
6	100% of recommended dose	6	42	3
7	150% of recommended dose	12	43	2
8	150% of recommended dose	15	45	5

19. Based on the results of this experiment, a farmer has decided to use a 150% application of the herbicide to kill weeds in his fields. Describe one advantage and one disadvantage of using the 150% dose of herbicide. Respond in the space provided **below**. (2 points) (2006 #37 / LS G)

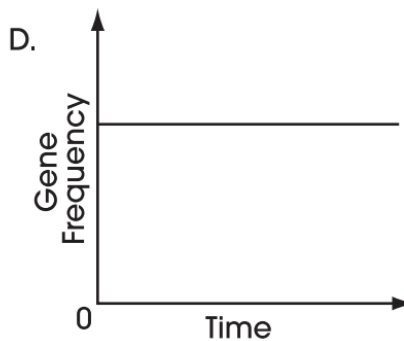
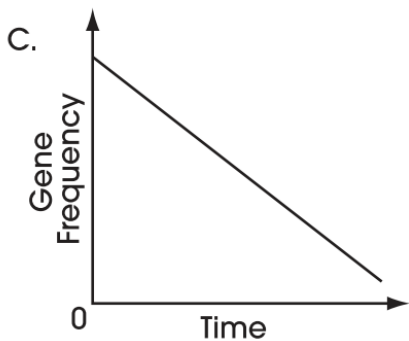
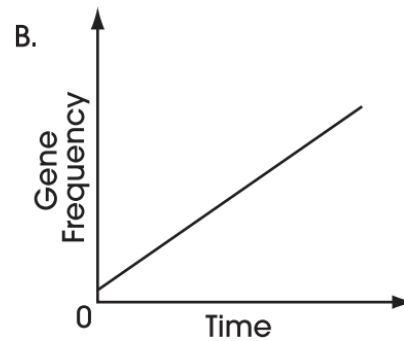
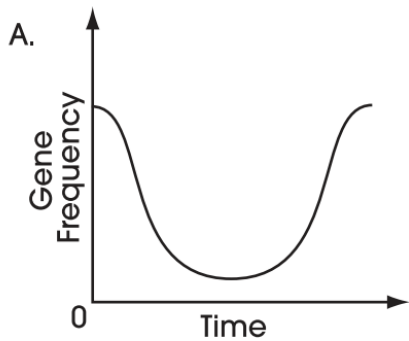
20. Prior to the herbicide application, a student notes that there are two related species of weeds (A and B) that occur in similar numbers in plot 5. Species A reproduces sexually and species B reproduces asexually. After exposing both weed populations to several applications of the herbicide, the student observes that the population of species B has become significantly smaller than the population of species A. Why did species A most likely have a survival advantage over species B? (2006 #35 / LS H)
- A. There was greater genetic variability in species A than there was in species B.
 - B. The percentage of herbicide-resistant weeds decreased in species A but not in species B.
 - C. Asexual reproduction allows the weeds to produce more offspring in a shorter period of time.
 - D. Sexually reproducing weeds are better able to utilize nutrients from the herbicides than asexually reproducing weeds.
21. Which biotic factor could have had an influence on the results of the students' experiment? (2006 #36 / LS F)
- A. the amount of precipitation each plot received
 - B. the presence of plant-eating insects in the plots
 - C. the lack of herbicide application in two of the plots
 - D. the length of time allowed between counting the weeds
22. A student is concerned that the experiments could cause widespread damage to the local ecosystem. A relevant concern may be (2008 #10 / LS G)
- A. increasing the genetic diversity in the weed population.
 - B. runoff or absorption of the herbicide into local water sources.
 - C. the use of atmospheric carbon dioxide gas for photosynthesis.
 - D. the effect of the herbicide on pepper production in the treated plots.

23. What factor most likely accounts for the pepper plants that died in plots 1 and 2 prior to producing peppers? (2008 #11 / LS F)

- A. increased consumption of weeds by insects
- B. competition between weeds and pepper plants
- C. a lack of nutrients in the soil resulting from herbicide application
- D. a reduction in the amount of sunlight received by weeds growing under pepper plants

24. A single weed in plot 6 has a genetic mutation that allows its cells to transport herbicide out through the cell membrane before the weed is harmed. Suppose a student allows weeds to grow in plot 6 and then periodically treats them with herbicide.

Which graph best represents the expected frequency of the mutant gene in the weed population over time? (2006 #38 / LS H)



25. A student takes a herbicide-resistant weed from plot 3 and a herbicide-resistant weed from plot 4. He determines that both plants have dominant mutations in the gene that is responsible for herbicide resistance (H). The genotype of each plant is indicated below.

Weed from plot 3
Hh

Weed from plot 4
HH

In a cross between these two weeds, what percentage of the offspring would be resistant to the herbicide? (2008 #9 / LS C)

- A. 0%
- B. 25%
- C. 50%
- D. 100%
26. In a follow-up study, a student allows weeds to grow in a previously cleared plot for several weeks. The student counts the number of weeds and then treats the plot with the recommended dose of herbicide. The student observes that several weeds survive and their offspring soon replace the weeds that were killed by the initial application of the herbicide.

Propose a hypothesis to explain why several of the weeds survived the herbicide application. Explain how this hypothesis could be tested.

Respond in the space provided **below**. (2 points) (2008 #12 / LS H)

Use the information to answer questions 27 – 30.

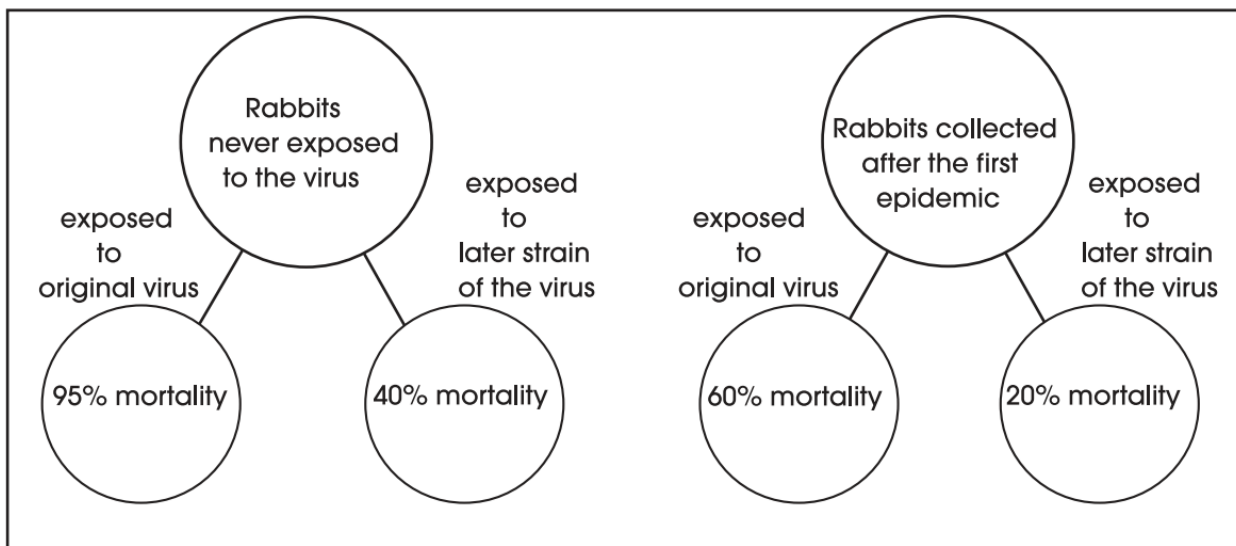
In 1859, European rabbits were introduced into Australia. The rabbits ate agricultural crops and native plants. The wild rabbit population expanded rapidly, numbering in the hundreds of millions. To control the rabbit population, the Australian government introduced the myxoma virus. Transmitted by a mosquito, this virus caused disease in the European rabbits. Each exposure to the virus led to an epidemic, and the following mortality rates were observed in the wild rabbit population.

Chart 1

Epidemic	Wild Rabbit Mortality Rate
1st	99.8%
2nd	90%
3rd	40-60%

Australian scientists kept laboratory populations of the original virus and rabbits that were never exposed to the virus. They also maintained populations of rabbits and strains of the virus collected from the wild at different times after the original introduction of the virus. The scientists then exposed each group of rabbits to a different strain of the virus. The diagram below summarizes their data.

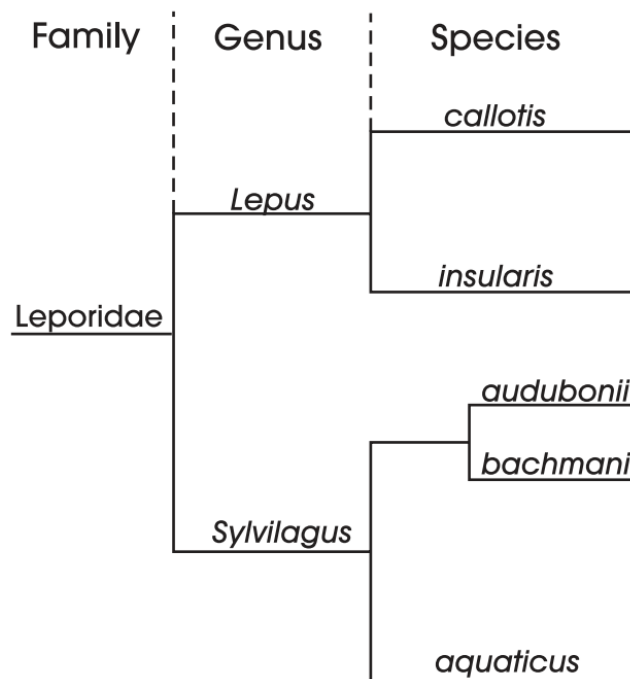
Figure 1



27. What characteristic of the European rabbit allowed it to become a major pest in Australia so quickly? (2007 #2 / LS F)

- A. high reproductive rate
- B. limited diet preferences
- C. relatively short life span
- D. narrow range of habitat

28. This classification system shows genetic relationships between five species of rabbits.



Which species likely harbors the virus infecting *Sylvilagus bachmani*? (2007 #5 / LS E)

- A. *Lepus callotis*
- B. *Lepus insularis*
- C. *Sylvilagus aquaticus*
- D. *Sylvilagus audubonii*

29. Which action may increase the impact of the myxoma virus on the rabbit population today? (2007 #3 / LS G)
- A. spraying to kill mosquitoes
 - B. releasing different strains of the virus
 - C. introducing sterile rabbits into the population
 - D. releasing the virus where the rabbit population is low
30. Surviving rabbits had traits that became more common in the rabbit population because rabbits with these traits (2007 #4 / LS E)
- A. changed habitats.
 - B. ate differently.
 - C. produced offspring.
 - D. developed parasites.
-

31. A simple food chain in a wetland is represented below.

algae → paramecium → mosquito larva → trout → blue heron

An ecologist doing population counts in the wetland observes a drop in the number of trout over an extended period of time.

What change is most likely responsible for the trout decline? (2008 #43 / LS F)

- A. migration of blue herons out of the wetland area
- B. introduction of a predator that feeds on blue heron eggs
- C. application of insecticides to wet areas where mosquitoes breed
- D. implementation of new conservation laws to protect the wetland

Use the information to answer questions 32 – 34.

Phytoplankton and Productivity

Phytoplankton are microscopic aquatic algae capable of photosynthesis.

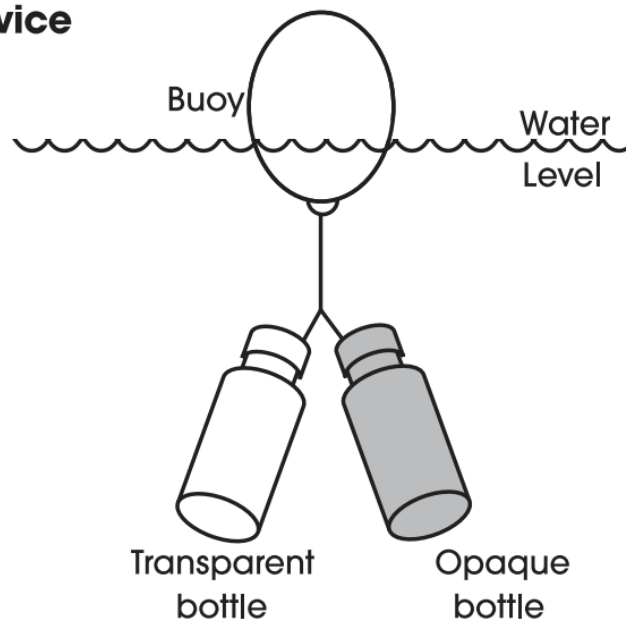
The rate at which light energy is converted to organic compounds by the photosynthetic organisms of an ecosystem is called productivity. Scientists have developed a method to determine the productivity of phytoplankton in an aquatic habitat using the following steps.

Method to Determine Productivity

1. Two bottles, one transparent and one opaque, are filled with equal volumes of water containing phytoplankton from the same depth of a lake.
2. Initial measurements of the concentrations of various dissolved gases for each bottle are determined from a separate water sample taken from the same depth.
3. The two filled bottles are sealed and suspended in the water for 24 hours.
4. After 24 hours, the concentrations of various dissolved gases in each bottle are measured and compared to the initial measurements of dissolved gases.

The diagram below shows the device used in the “Method to Determine Productivity”.

Floating Device



32. A scientist applies the method described in the passage to examine phytoplankton productivity in two ponds of similar size and depth. He observes that the final oxygen concentration values for pond 1 are lower than those for pond 2.

Identify a condition within pond 1 that could account for the lower oxygen concentration values. Explain why this condition affects the oxygen concentration values. Respond in the space provided **below**. (2 points) (2007 #25 / LS F)

33. During the process of photosynthesis, phytoplankton convert the sun's radiant energy into which form of energy? (2007 #26 / LS D)

- A. kinetic
- B. chemical
- C. electrical
- D. mechanical

34. Which process will decrease the amount of dissolved oxygen measured? (2007 #27 / LS D)

- A. mitosis
- B. osmosis
- C. respiration
- D. photosynthesis

Use the information and tables to answer question 35.

Peppered Moths

The British peppered moth, *Biston betularia*, occurs in two colorations: light (mixed black and white) and black. Black coloration was first seen in 18th-century moth collections as a rare, highly prized mutant. Black coloration is controlled primarily by a single, dominant gene.

Before 1850, the overwhelming majority of peppered moths in northern England were light. As the Industrial Revolution swept through northern England, however, light moth populations dwindled as black moth populations grew. Overall, the total peppered moth numbers remained steady.

Peppered Moths in England

Year	Black Moths (%)	Light Moths (%)
1850	10	90
1900	90	10
1996	Fewer than 10	90+

In the same time period, the less industrialized rural England saw no such changes in moth populations. The only predators observed to prey on the moths were local birds. No migratory or population changes of birds occurred during that time.

British naturalist H.B.D. Kettlewell captured, marked and released known numbers of black and light-peppered moths in an unpolluted woodland and two similar groups in a polluted woodland. He later recaptured as many moths as possible. The following are some of Kettlewell's mark-and-recapture data.

Dorset, England (Unpolluted Woodland)

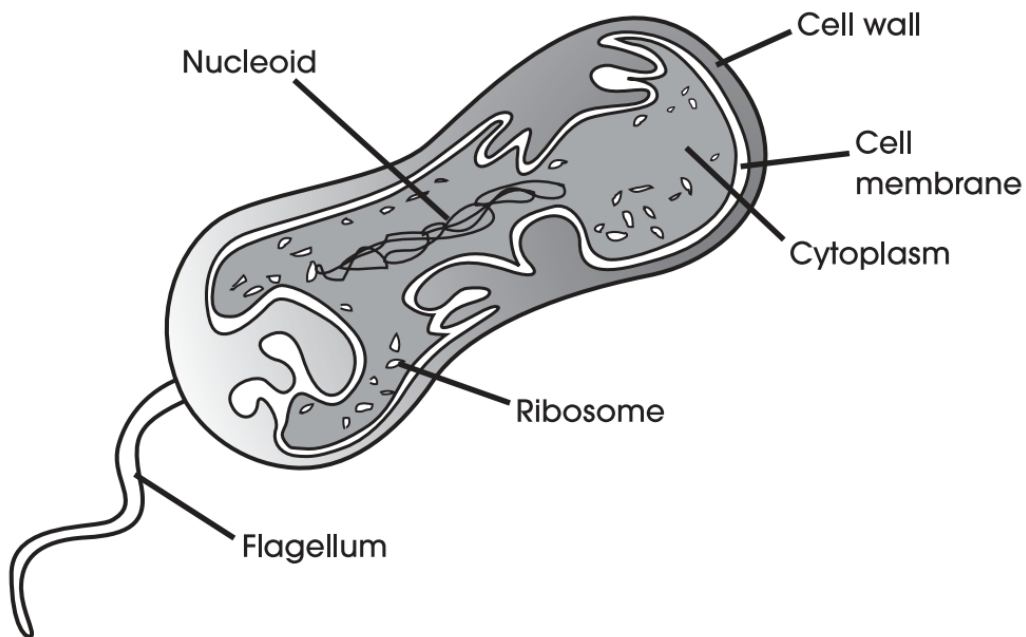
	Black Moths	Light Moths
Marked and Released	473	496
Recaptured	30	62
Percentage Recaptured	6.3%	12.5%

Birmingham, England (Soot-blackened Woodland)

	Black Moths	Light Moths
Marked and Released	447	137
Recaptured	123	18
Percentage Recaptured	27.5%	13.1%

35. Kettlewell's results indicated that black moths in industrialized areas (2007 #30 / LS H)
- A. had greater genetic variation than light moths.
 - B. could out-compete light moths for food and habitat.
 - C. had a higher survival rate than light moths in the same area .
 - D. could change their phenotype when environmental conditions changed.

36. The picture below shows some of the structures in a single-celled organism.



The presence of which structure provides evidence that this organism is capable of locomotion? (2008 #3 / LS A)

- A. cell wall
- B. ribosome
- C. flagellum
- D. cytoplasm

Use the information to answer question 37.

Himalayan Rabbits

Himalayan rabbits are native to the Himalayan Mountains, where a great deal of snow falls annually. These rabbits have white fur over most of their bodies, with black fur on the ears, noses, feet and tails. This color pattern results from temperature differences in different parts of the rabbits' bodies. Areas where the body temperature is below 33°C the fur grows in black.

To demonstrate this color change, a scientist shaved a small area of fur on the backs of adult Himalayan rabbits. Ice packs were kept on the shaved areas long enough for the rabbits' fur to begin growing back. When the ice packs were removed, the fur growing beneath them was black.

Before Experiment



After Experiment



37. During the winter months, the body temperature of Himalayan rabbits is several degrees lower than it is during the summer months. This causes the rabbits' fur to grow in black.

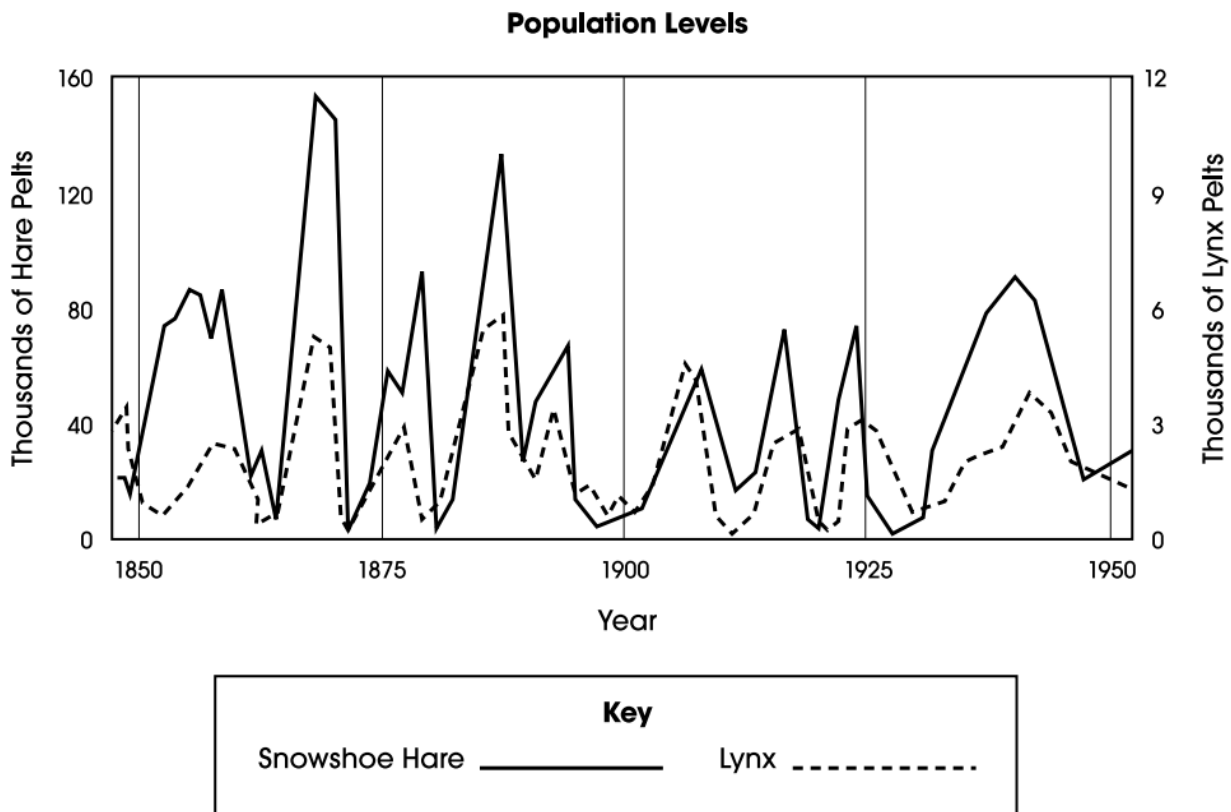
This color change in the winter could negatively affect the rabbits because black fur
(2007 #40 / LS F)

- A. is thinner than the white color fur.
- B. makes them easier for predators to see.
- C. reduces their chances of finding a mate.
- D. does not absorb as much heat as white color fur.

Use the information to answer questions 38 – 39.

Hare and Lynx Populations

In a classic study of predator-prey interactions, the numbers of snowshoe hare pelts and lynx pelts sold to a trading company by trappers were recorded over a period of 100 years. Both lynx and hare populations appear to oscillate in a regular pattern over a period of about ten years. One explanation for this pattern is that heavy predation reduces the snowshoe hare population, which in turn reduces the lynx population. More recently, scientists have proposed that the hare population oscillates due to diseases caused by overcrowding or by the effects of its own feeding activities on vegetation.



38. Based on the information in the passage, the snowshoe hares are (2007 #42 / LS D)

- A. carnivores.
- B. decomposers.
- C. herbivores.
- D. producers.

39. What would prevent the lynx population from declining along with the hare population? (2007 #44 / LS F)

- A. an extremely harsh winter
 - B. an influx of other hare predators
 - C. an abundant alternate food source
 - D. an outbreak of disease among hares
-

40. Mosquitoes carry malaria and other diseases. In order to control mosquito populations, a powerful pesticide called DDT was used for many years. DDT entered lakes, ponds, and rivers and accumulated in the tissues of fish. When birds, such as eagles, consumed the fish, they produced eggs with very thin shells. The thin-shelled eggs broke when the parents sat on them and the populations of eagles and other birds suffered. The U.S. government banned the use of DDT in 1972.

How did the banning of DDT most likely affect the population of bald eagles in the United States? (2009 #2 / LS G)

- A. The eagle population rapidly declined after the banning of DDT.
- B. The eagle population was not affected by the banning of DDT.
- C. The eagle population slowly increased after the banning of DDT.
- D. The eagle population increased and then rapidly decreased after the banning of DDT.

Use the information to answer questions 41 – 43.

Butterflies

The monarch is a bright orange butterfly with black stripes. It acquires toxins from the milkweed plants it eats as a caterpillar. Adult monarchs retain these chemicals. Experiments have shown that blue jays that eat poisonous monarchs become sick within 15 to 30 minutes. The viceroy is also an orange, black-striped butterfly, which is difficult to distinguish from a monarch. Viceroy larvae consume primarily non-toxic poplar or willow tree leaves.



Monarch Butterfly



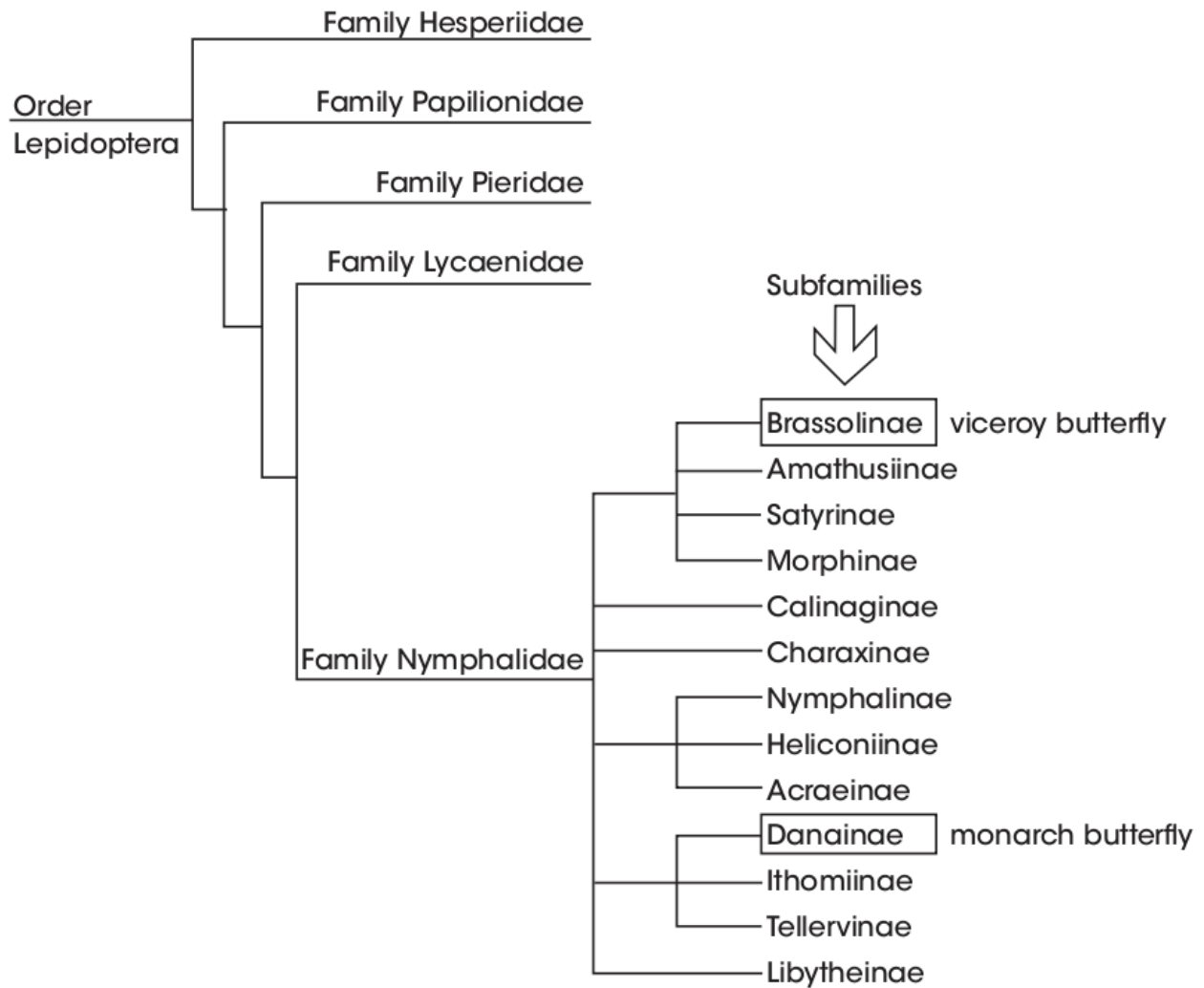
Viceroy Butterfly

Scientists have long suggested that viceroys have avoided predation by mimicking the monarch's coloration pattern. New evidence indicates that this may not be the case. Descriptions of two sets of experiments with monarchs and viceroys are given below.

Experiment 1 (1958): Blue jays that were raised in captivity were offered viceroys. The hungry jays devoured the viceroys. The same jays were offered monarchs. After eating one or two monarchs, the blue jays refused to eat monarchs or viceroys. All butterflies' wings were intact when given to the birds.

Experiment 2 (1991): Researchers fed the wingless abdomens of monarch, viceroy, queen, and non-toxic control butterflies to red-winged blackbirds and monitored the percentage of each type eaten. While 98% of control butterflies and 70% of queen butterflies were eaten, only 40% of viceroys and 40% of monarchs were eaten.

41. The diagram below shows a partial classification scheme for monarch and viceroy butterflies.



Based on this diagram, monarchs and viceroys belong to the same. (2008 #32 / LS E)

- A. genus.
- B. family.
- C. species.
- D. subfamilies.

42. What statement regarding the similarities between monarchs and viceroys best agrees with Charles Darwin's theory of natural selection at the time of its publication in 1859? (2008 #33 / LS H)
- A. Monarch butterflies are an older species than viceroy butterflies.
 - B. Similarities between monarch and viceroy butterflies result from their diets.
 - C. Viceroy butterflies avoid predation due to their resemblance to monarch butterflies.
 - D. Variations in DNA sequences are responsible for the similarity between monarch and viceroy butterflies.

43. A scientist studying a large population of a particular species of bird concludes that monarch butterflies are toxic to that bird species. However, upon studying a second, smaller population of the same bird species, he discovers that the second population is able to eat monarchs without becoming sick.

How could the scientist best explain his findings? (2008 #34 / LS I)

- A. The larger bird population has a small gene pool.
- B. Monarchs are only toxic if eaten in large quantities.
- C. Genetic drift has occurred in the smaller population.
- D. Natural selection has increased populations of non-toxic butterflies.

-
44. The feature that identifies an organism as a prokaryote is (Practice Test #3 / LS A)

- A. the presence of ribosomes.
- B. the absence of chlorophyll.
- C. the presence of a cell membrane.
- D. the absence of a nuclear membrane.

45. In 1864, Louis Pasteur was asked to investigate diseases afflicting the wine in Arbois, France. He discovered that these diseases were caused by micro-organisms that could be killed by heating the wine to 55C for a period of time.

What is this process called today that applies to milk? (2008 #37 / LS J)

- A. homeostasis
- B. fermentation
- C. differentiation
- D. pasteurization

46. What structure is absent in the cells of fungi thereby preventing them from performing photosynthesis? (2009 #5 / LS A)

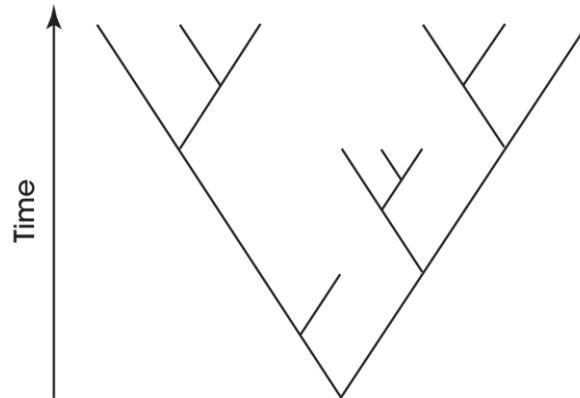
- A. cilia
- B. nuclei
- C. chloroplasts
- D. mitochondria

47. Most bacteria reproduce asexually. Mammals reproduce sexually. Describe how these two methods of reproduction differ with respect to the genetic makeup of the offspring produced.

Respond in the space provided **below**. (2 points) (2009 #29 / LS C)

48. Color blindness is a sex-linked trait that is carried on the X chromosome. If a boy is born color-blind, what would have to be true? (2009 #20 / LS C)
- A. His father had normal vision.
 - B. His grandmother was color-blind.
 - C. His mother carried at least one gene for color blindness.
 - D. His grandfather passed on the color-blind trait to his father.
49. A student is studying several species that belong to the plant kingdom. Which two are most closely related? (2009 #25 / LS E)
- A. *Ficus benjamina* and *Ficus lyrata*
 - B. *Castilla elastica* and *Ficus elastic*
 - C. *Bromus japonicus* and *Ipomoea violacea*
 - D. *Fermaldia pandurata* and *Ficus pandurata*
50. A student has set up an artificial ecosystem for a class project. This ecosystem has producers, first-level consumers, second-level consumers, and third-level consumers. By accident, a chemical enters the ecosystem and kills all of the first-level consumers.
- Which group(s) of organisms will most likely survive? (2009 #33 / LS F)
- A. producers
 - B. second-level consumers
 - C. second-level and third-level consumers
 - D. third-level consumers and producers

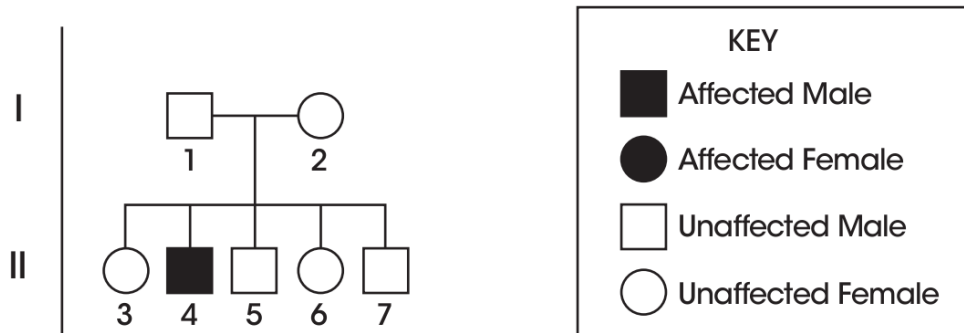
51. The following diagram is found in an evolutionary biology textbook.



This branching tree diagram is most likely used to represent the theory that suggests (2009 #31 / LS I)

- A. new species arise throughout time following rounds of mass extinction.
 - B. all species share a common ancestor and that change occurs through time.
 - C. speciation occurs very quickly with long periods of no change in between.
 - D. all species originated during the same period and some have subsequently gone extinct.
52. Geneticists have determined that the majority of individuals in an isolated island population have blood type B. Type A blood is found to be more common in the mainland population from which the island was settled.
- How could a geneticist best explain the dominance of blood type B in the island population? (2009 #41 / LS I)
- A. Random mutations have occurred in the island population.
 - B. Genetic drift has reduced the frequency of type A individuals.
 - C. Natural selection has only occurred in the mainland population.
 - D. Environmental conditions on the island are less favorable for type B individuals.

53. The pedigree below shows the inheritance pattern of a recessive allele (z) that results in a genetic disease.



Based on the inheritance pattern, what are all the possible genotypes for individual 6? (2009 #39 / LS C)

- A. Zz
- B. ZZ and zz
- C. ZZ and Zz
- D. ZZ, Zz, and zz
54. Due to a loss of habitat, hunting, drought, disease, and inbreeding, the cheetah population has declined in number and is close to extinction. The current cheetah population has very little genetic variation.

Which is a result of the limited genetic variation in the current cheetah population compared to earlier cheetah populations with more variation? (2009 #44 / LS H)

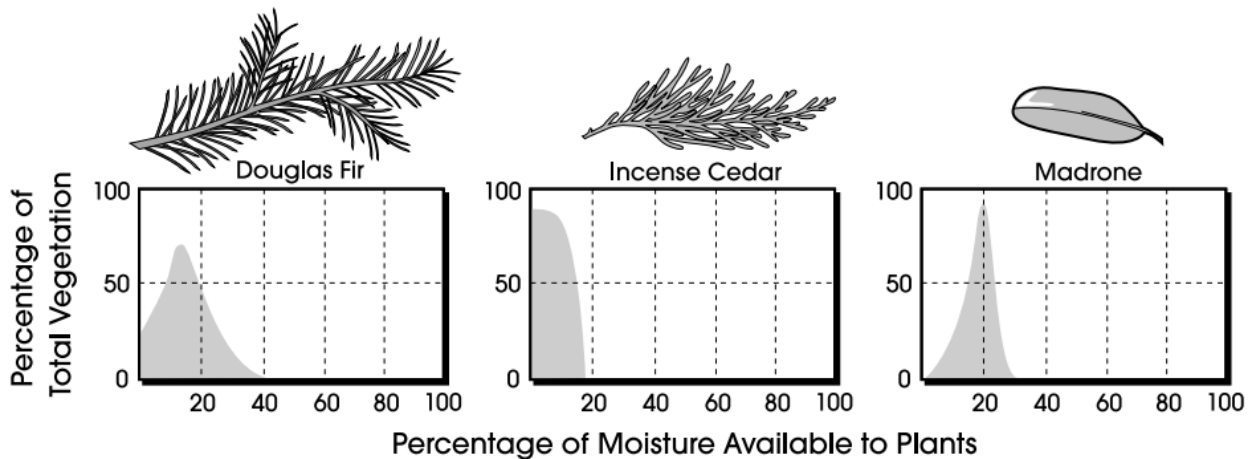
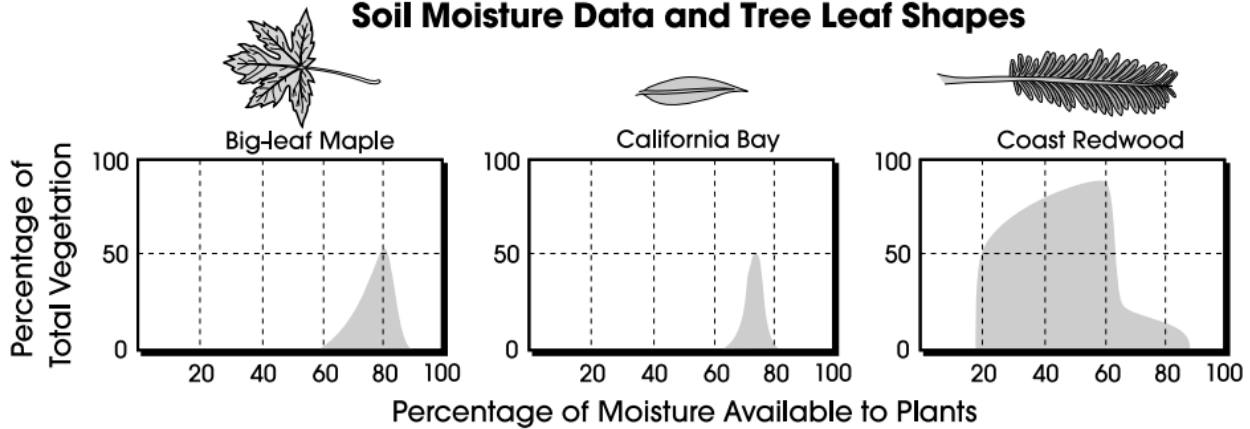
- A. Current populations of cheetahs are more resistant to diseases.
- B. The survival rate of young cheetahs is increased in current populations.
- C. Current populations of cheetahs are less likely to be able to adapt to environmental changes.
- D. Current populations of cheetahs are able to interbreed with other species, increasing genetic variation.

Use the information and map to answer question 55.

Plant Distribution

The distribution of plant species depends on many factors, including climate, topography, soil conditions and biological interactions. Data on moisture availability were collected along the coast of Northern California. In this area, each plant community has a dominant tree. The graphs below illustrate a dominant tree's percentage of the total vegetation compared to the percentage of soil moisture available. Each tree species studied has a distinct preference for a certain kind of habitat.

Soil Moisture Data and Tree Leaf Shapes



55. A scientist observes that Douglas fir trees survive better than broadleaf species such as big-leaf maple in a certain area. Which is the best explanation for her observation? (Practice Test #9 / LS F)
- A. Big-leaf maple trees require less soil moisture than Douglas fir trees.
 - B. Douglas fir trees are better at conserving water than big-leaf maple trees.
 - C. Douglas fir trees and big-leaf maple trees are often found in overlapping habitats.
 - D. The big-leaf maple trees are experiencing competition with California Bay trees.
-
56. A student is constructing a classification scheme to explain the biological relationships between common local animals. What characteristic would be most helpful to the student in classifying the animals? (Practice Test #14 / LS E)
- A. eye color
 - B. body covering
 - C. performs respiration
 - D. performs photosynthesis
57. Two processes that allow cells to release energy from food are (Practice Test #17 / LS D)
- A. mitosis and meiosis.
 - B. excretion and diffusion.
 - C. fermentation and cellular respiration.
 - D. osmosis and spontaneous generation.

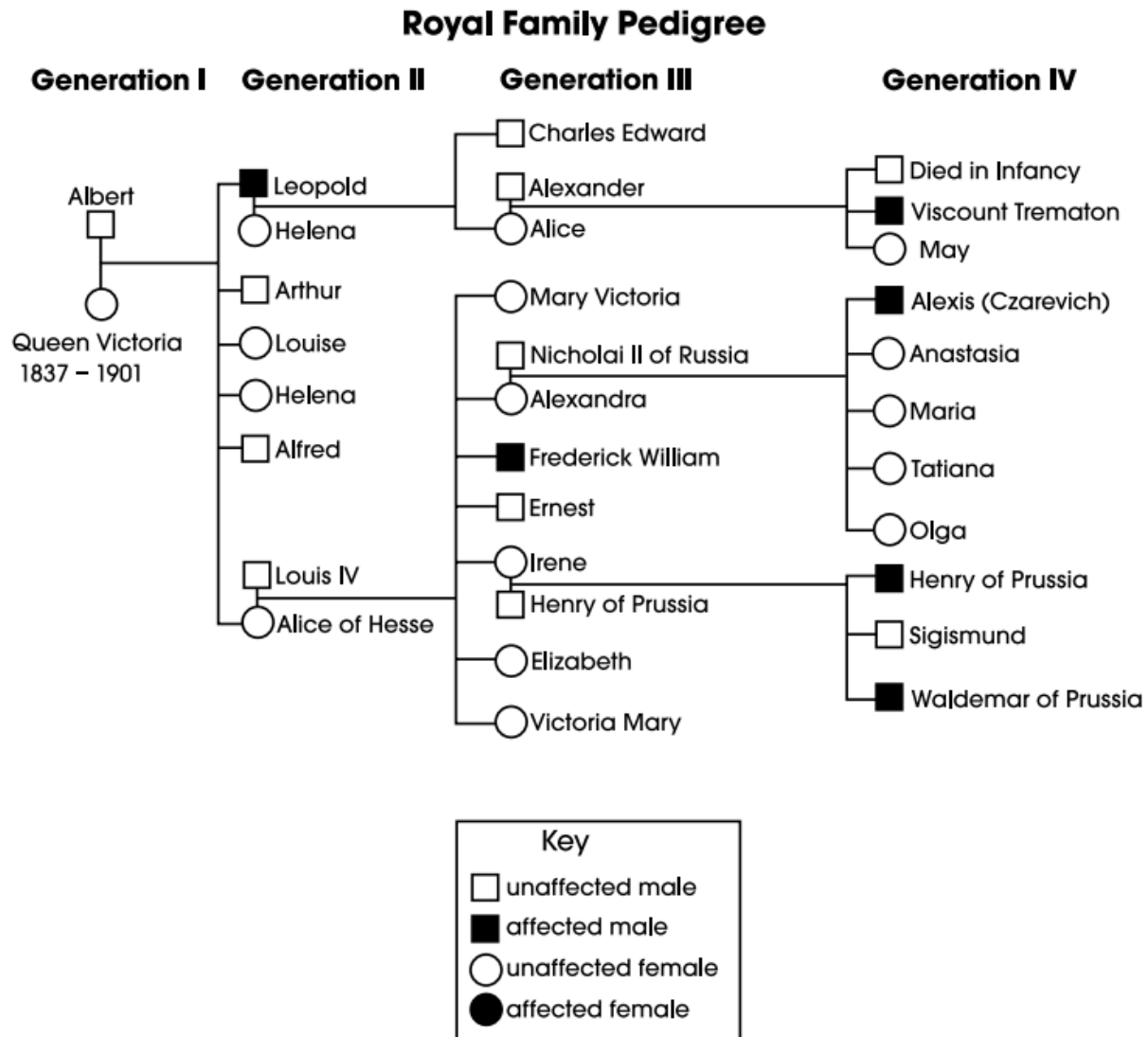
58. What energy transformation occurs in green plants during photosynthesis? (Practice Test #19 / LS B)
- A. Thermal energy is converted to electrical energy.
 - B. Thermal energy is converted to light energy.
 - C. Chemical energy is converted to mechanical energy.
 - D. Light energy is converted to chemical energy.
59. Yeast cells obtain energy under anaerobic conditions through the process of (Practice Test #22 / LS D)
- A. photosynthesis.
 - B. cell differentiation.
 - C. cell differentiation.
 - D. alcoholic fermentation.
60. A population of deer existed for centuries in a hilly region of England. The landowners decided to introduce sheep into the same area. Deer and sheep eat some of the same kinds of plants. After the sheep were introduced, the deer population began to decline. How could the decline in the deer population be explained? (Practice Test #34 / LS F)
- A. Sheep competed with the deer.
 - B. The sheep were smaller than the deer.
 - C. The food web became too complex.
 - D. Sheep are at a higher trophic level than deer.

Use the information to answer questions 61 – 64.

Hemophilia in the Family

Hemophilia is a disease characterized by excessive bleeding because the blood clots very slowly. This phenotype results from a sex-linked recessive allele which is located on the X chromosome. A male (XY) can only receive the hemophilia allele from his mother (XX). Since males have only one X chromosome, they have a 50% chance of having hemophilia if their mother is a carrier.

The following diagram shows part of the British royal family's pedigree. All hemophilic males are represented by shaded squares and normal males by unshaded squares. Females are represented by circles, and female carriers of hemophilia are not identified.



61. In generation IV, Alexis has hemophilia. If Alexis married a woman who was a carrier of the hemophilia allele, which proportion of his children (including both males and females) would be expected to have hemophilia? (Practice Test #29 / LS C)
- A. 25%
 - B. 50%
 - C. 75%
 - D. 100%
62. Some human traits are sex-linked but are inherited on the Y chromosome, unlike hemophilia, which is inherited on the X chromosome. If a man carrying a dominant allele for a disease gene on his Y chromosome has eight children, four boys and four girls, predict the gender and proportion of his offspring that will have the disease gene. Explain how this type of inheritance differs from sex-linked inheritance from a father affected with an X-linked disease. Respond in the space provided **below**. (2 points) (Practice Test #30 / LS C)

63. Which set of grandparent-parent-child relatives must have all had at least one hemophilia allele on an X chromosome? (Practice Test #31 / LS C)
- A. Albert-Helena-Alice
 - B. Louis IV-Irene-Sigismund
 - C. Leopold-Alice-Viscount Trematon
 - D. Queen Victoria-Leopold-Charles Edward
64. Irene and Henry of Prussia (generation III) do not have hemophilia, yet two of their three offspring are hemophilic. What must be true regarding the genotypes of Irene and Henry? (Practice Test #32 / LS C)
- A. Irene carries the allele on both X chromosomes, but Henry does not.
 - B. Irene and Henry both carry the allele on one of their X chromosomes.
 - C. Irene carries the allele on one of her X chromosomes, but Henry does not.
 - D. Irene carries the allele on one of her X chromosomes and Henry carries the allele on his Y chromosome.