

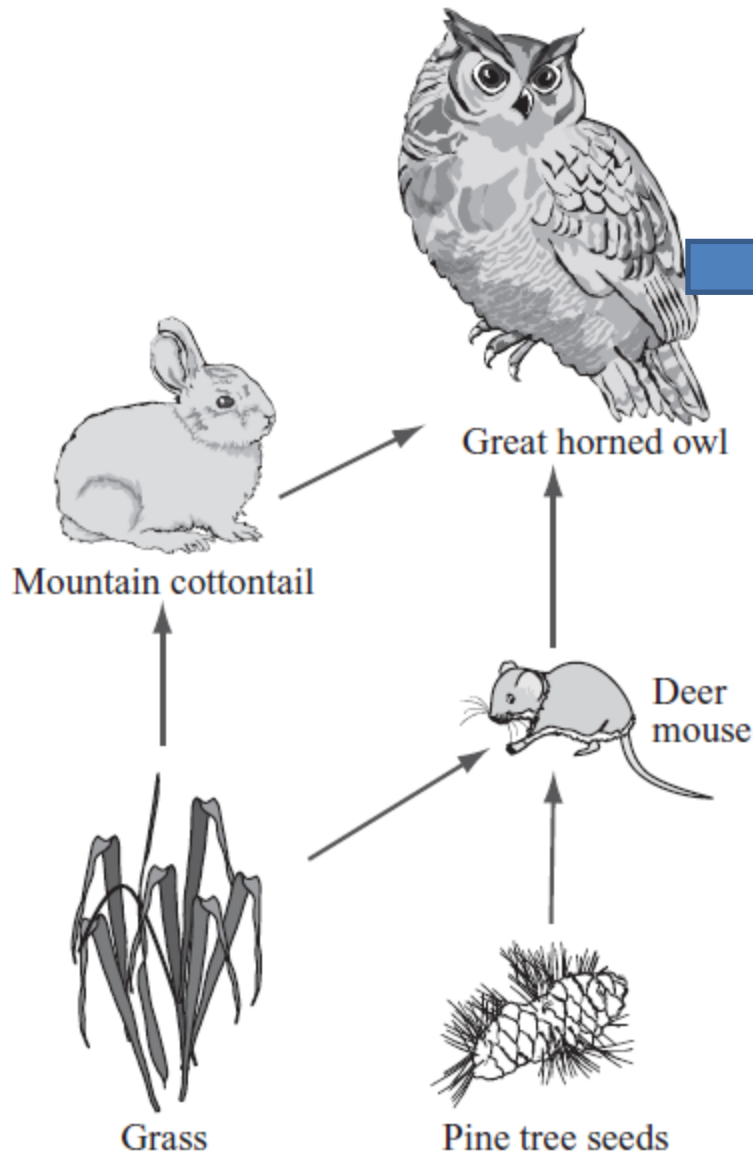


MCAS Review Ecology

Mr. Lee

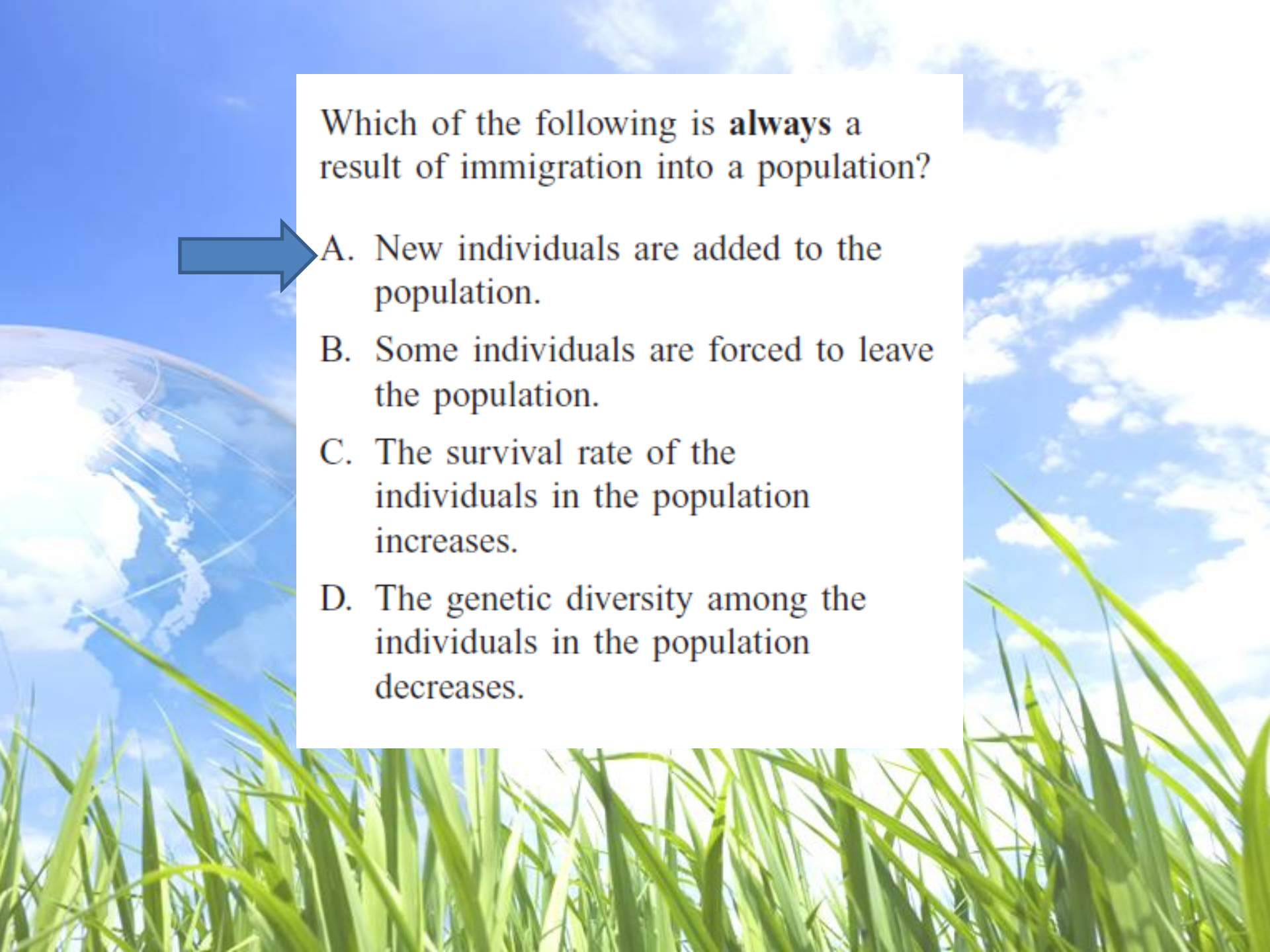
Room 320

A simple food web is shown below.




Which of the following is most likely to lead to the **greatest** decrease in the deer mouse population?

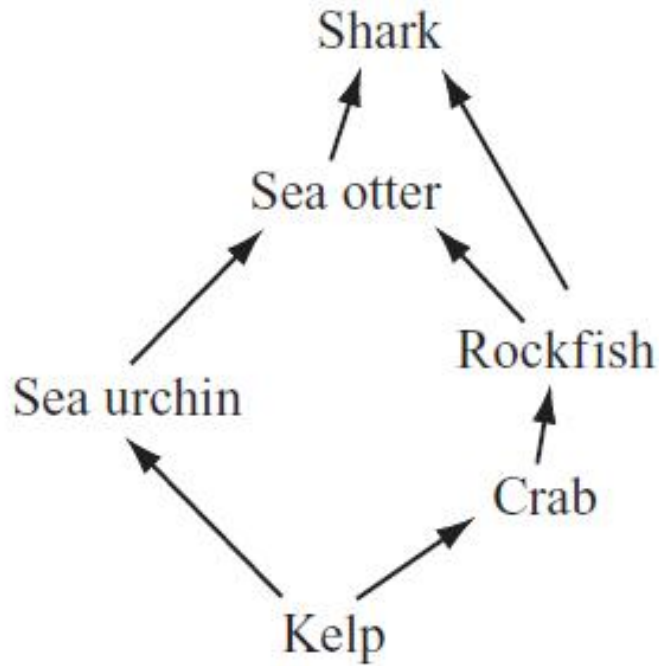
- A. an increase in the owl population
- B. an increase in the grass population
- C. an increase in the pine tree population
- D. an increase in the cottontail population



Which of the following is **always** a result of immigration into a population?

- 
- A. New individuals are added to the population.
 - B. Some individuals are forced to leave the population.
 - C. The survival rate of the individuals in the population increases.
 - D. The genetic diversity among the individuals in the population decreases.

Part of a food web for a marine kelp forest is shown below.

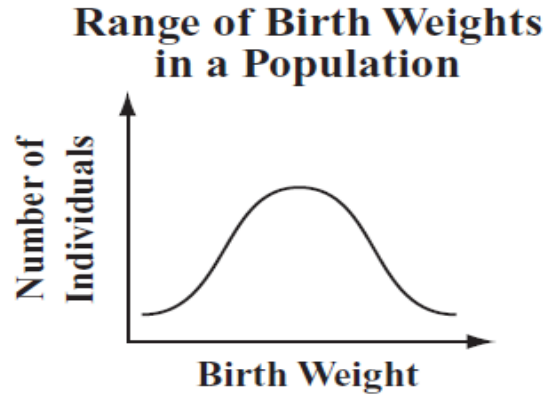


Which of the following statements correctly describes the transfer of energy that **initially** enters this system?

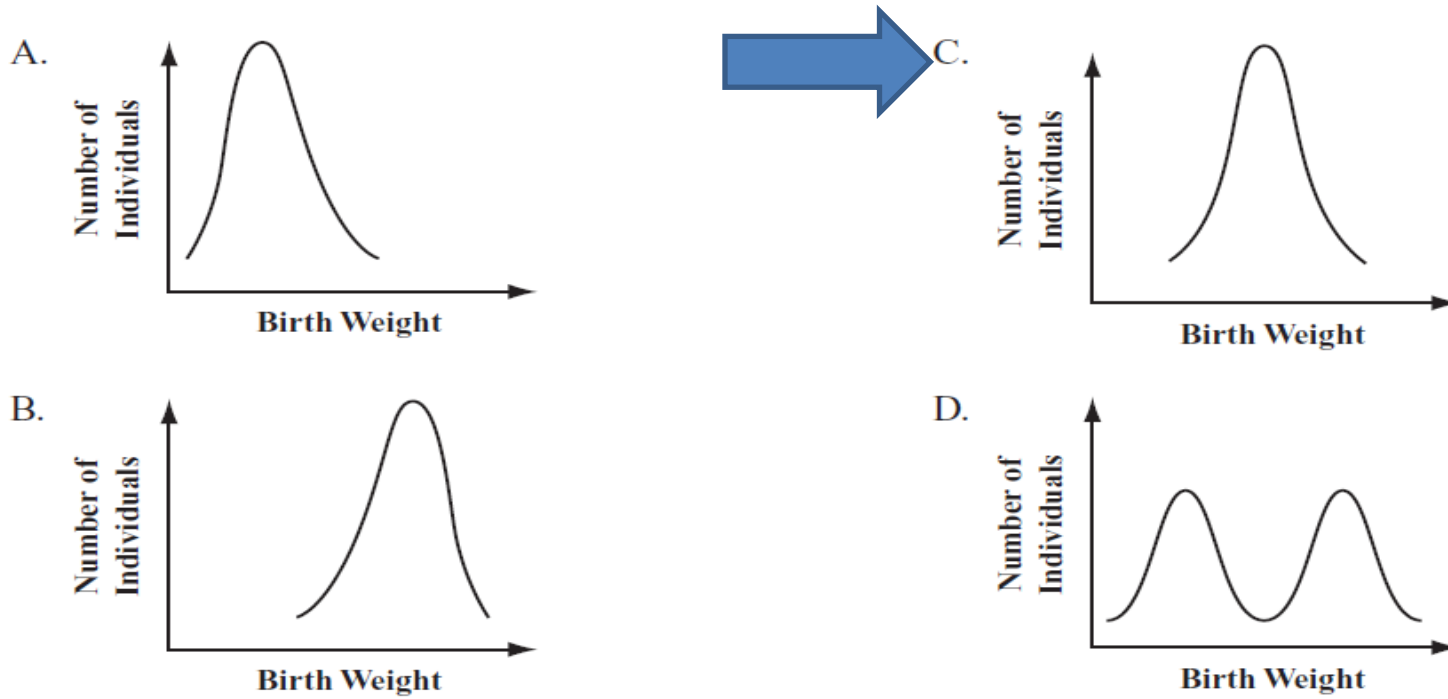
- A. The sea urchin gets energy from the sea otter.
- B. The shark receives most of the energy that enters the ecosystem.
- C. The crab transfers less energy to the next trophic level than does the rockfish.
- D. The kelp converts energy into a form that can be used by other organisms.

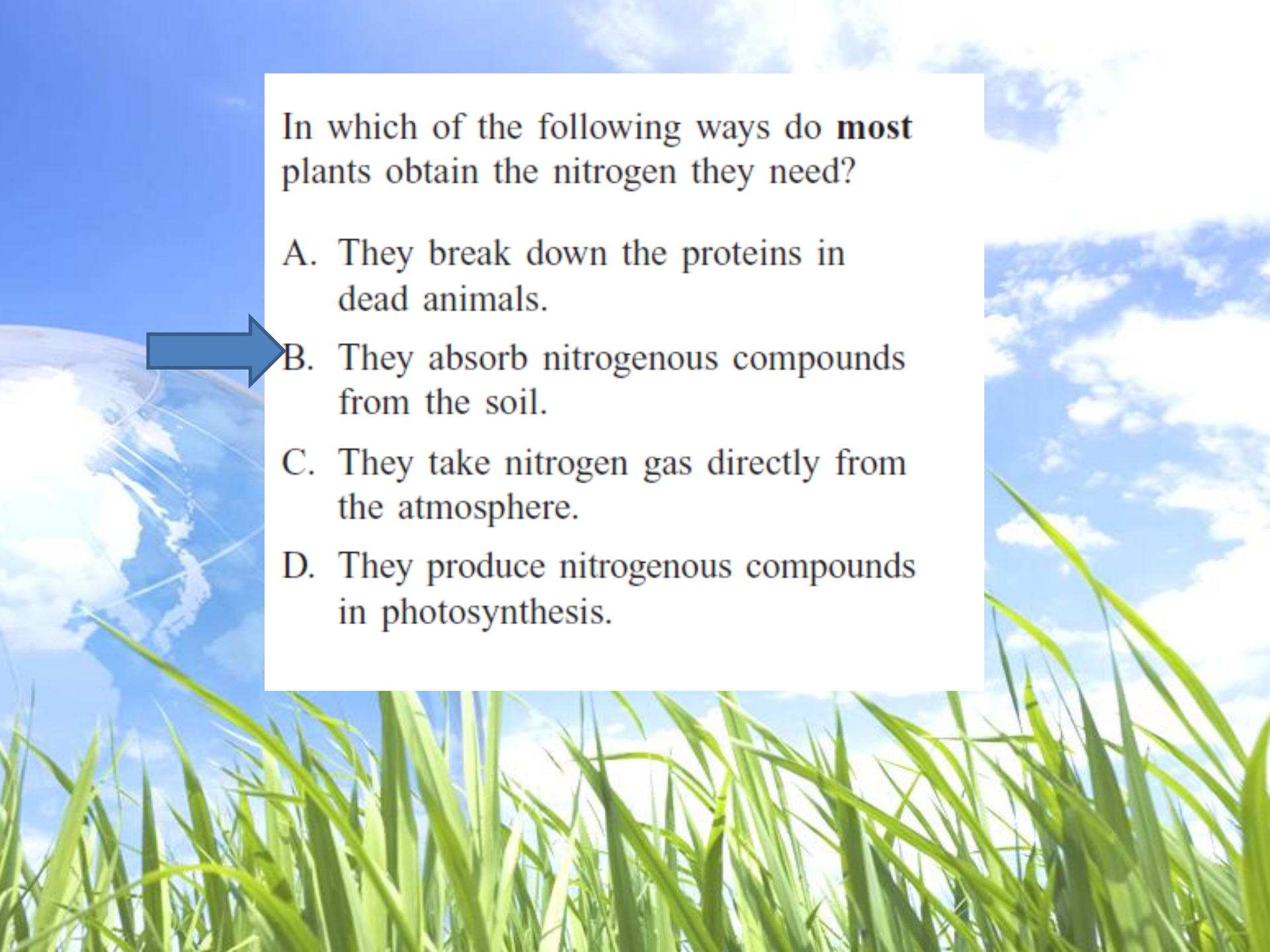


The graph below represents the range of birth weights for offspring in a mammal population.




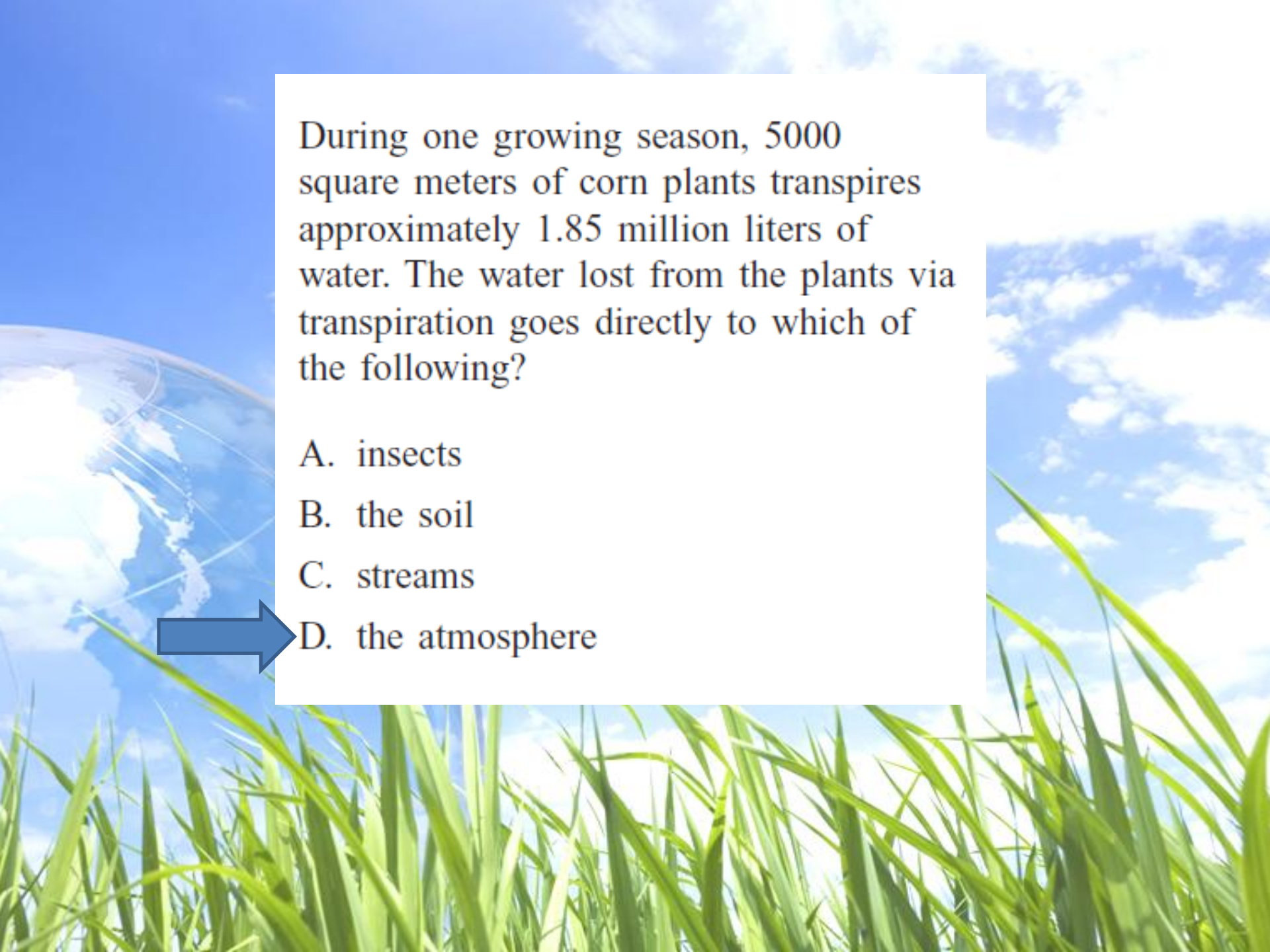
As is typical in many mammal populations, offspring with an average weight at birth have a higher survival rate than offspring with a very low or very high birth weight. Based on this information, which of the following graphs is the **best** prediction of what will happen to the range of birth weights in this population over time?



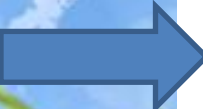


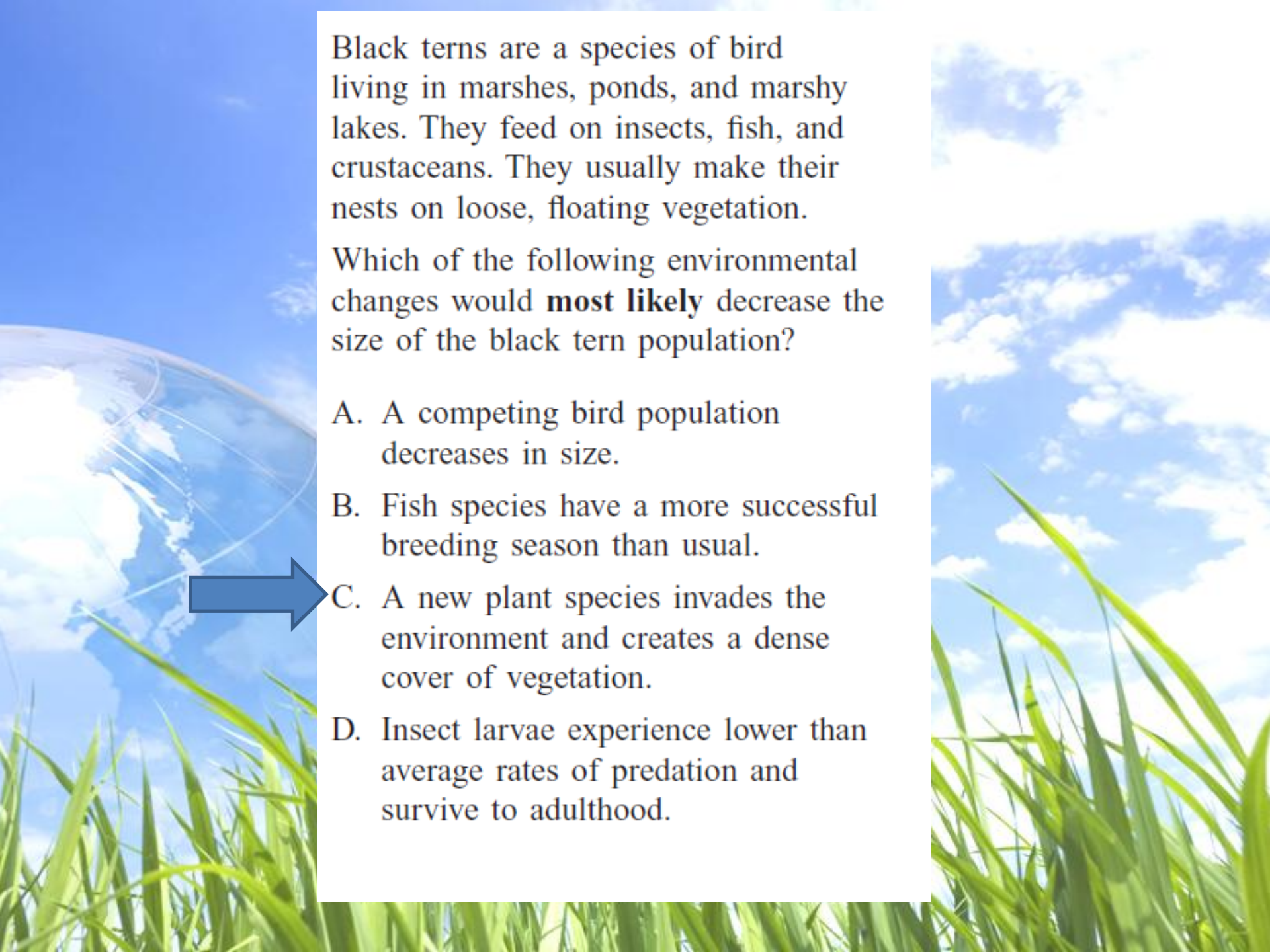
In which of the following ways do **most** plants obtain the nitrogen they need?

- A. They break down the proteins in dead animals.
-  B. They absorb nitrogenous compounds from the soil.
- C. They take nitrogen gas directly from the atmosphere.
- D. They produce nitrogenous compounds in photosynthesis.




During one growing season, 5000 square meters of corn plants transpires approximately 1.85 million liters of water. The water lost from the plants via transpiration goes directly to which of the following?

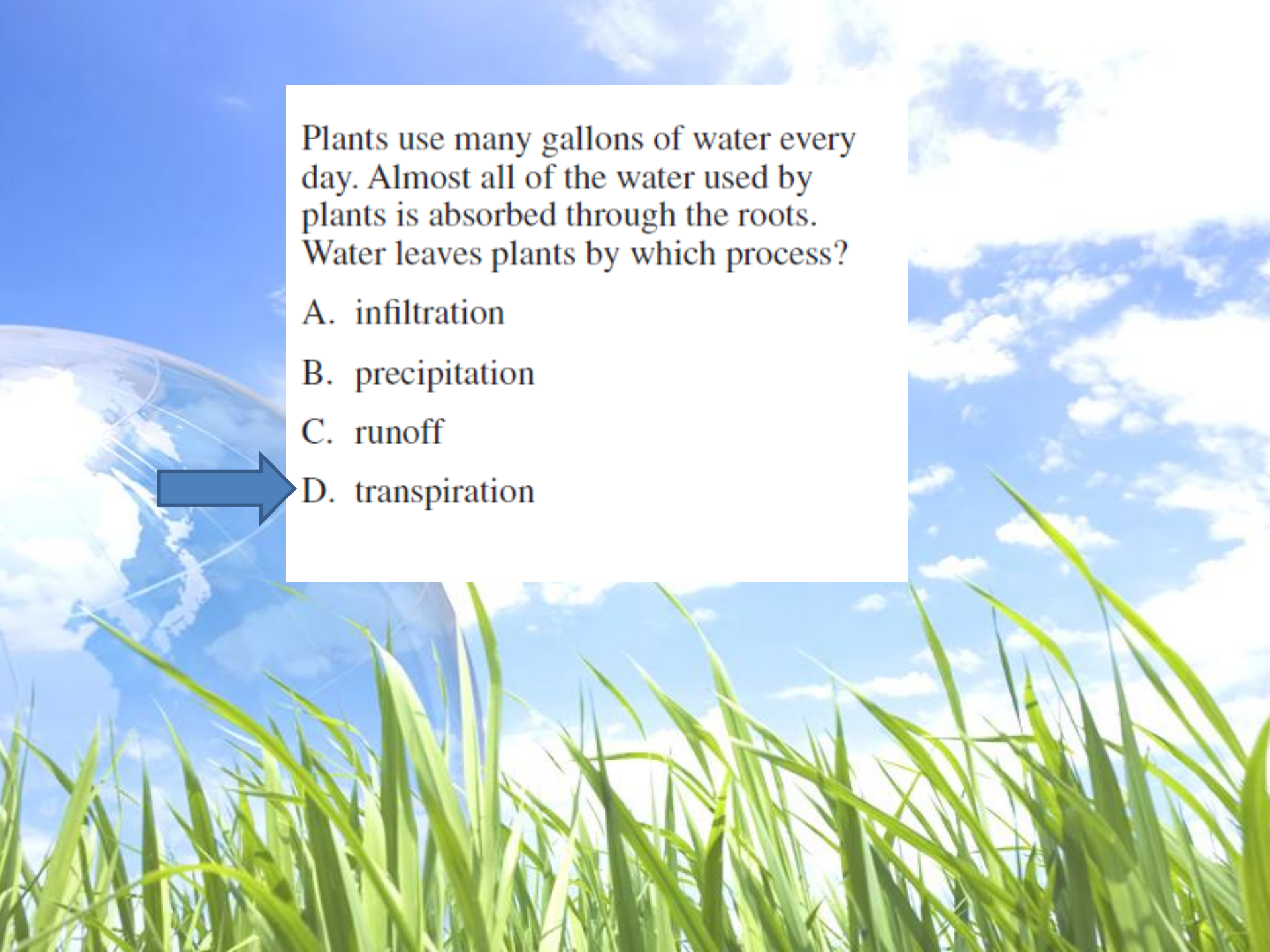
- A. insects
- B. the soil
- C. streams
- D. the atmosphere



Black terns are a species of bird living in marshes, ponds, and marshy lakes. They feed on insects, fish, and crustaceans. They usually make their nests on loose, floating vegetation.

Which of the following environmental changes would **most likely** decrease the size of the black tern population?

- A. A competing bird population decreases in size.
- B. Fish species have a more successful breeding season than usual.
-  C. A new plant species invades the environment and creates a dense cover of vegetation.
- D. Insect larvae experience lower than average rates of predation and survive to adulthood.

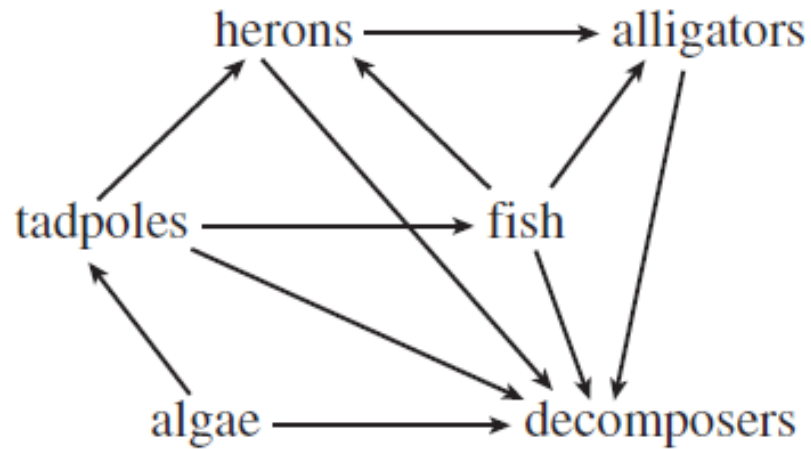


Plants use many gallons of water every day. Almost all of the water used by plants is absorbed through the roots. Water leaves plants by which process?

- A. infiltration
- B. precipitation
- C. runoff
- D. transpiration

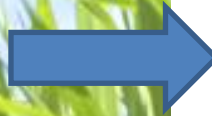


The diagram below shows a food web.

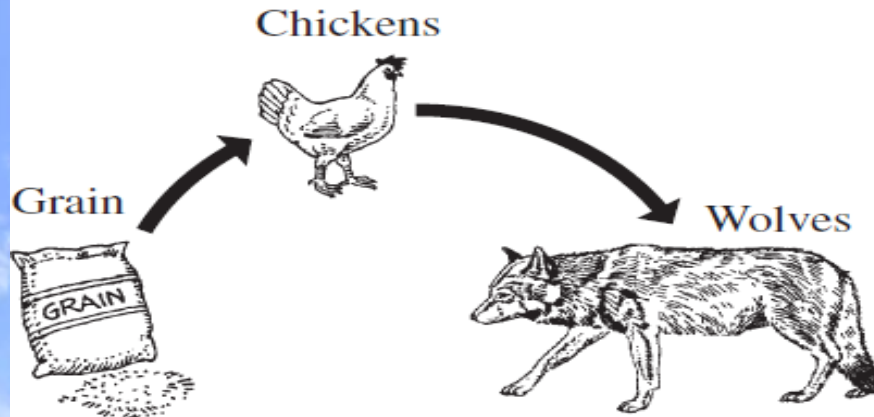


Which population would **probably** increase if the tadpole population decreased?

- A. herons
- B. alligators
- C. fish
- D. algae



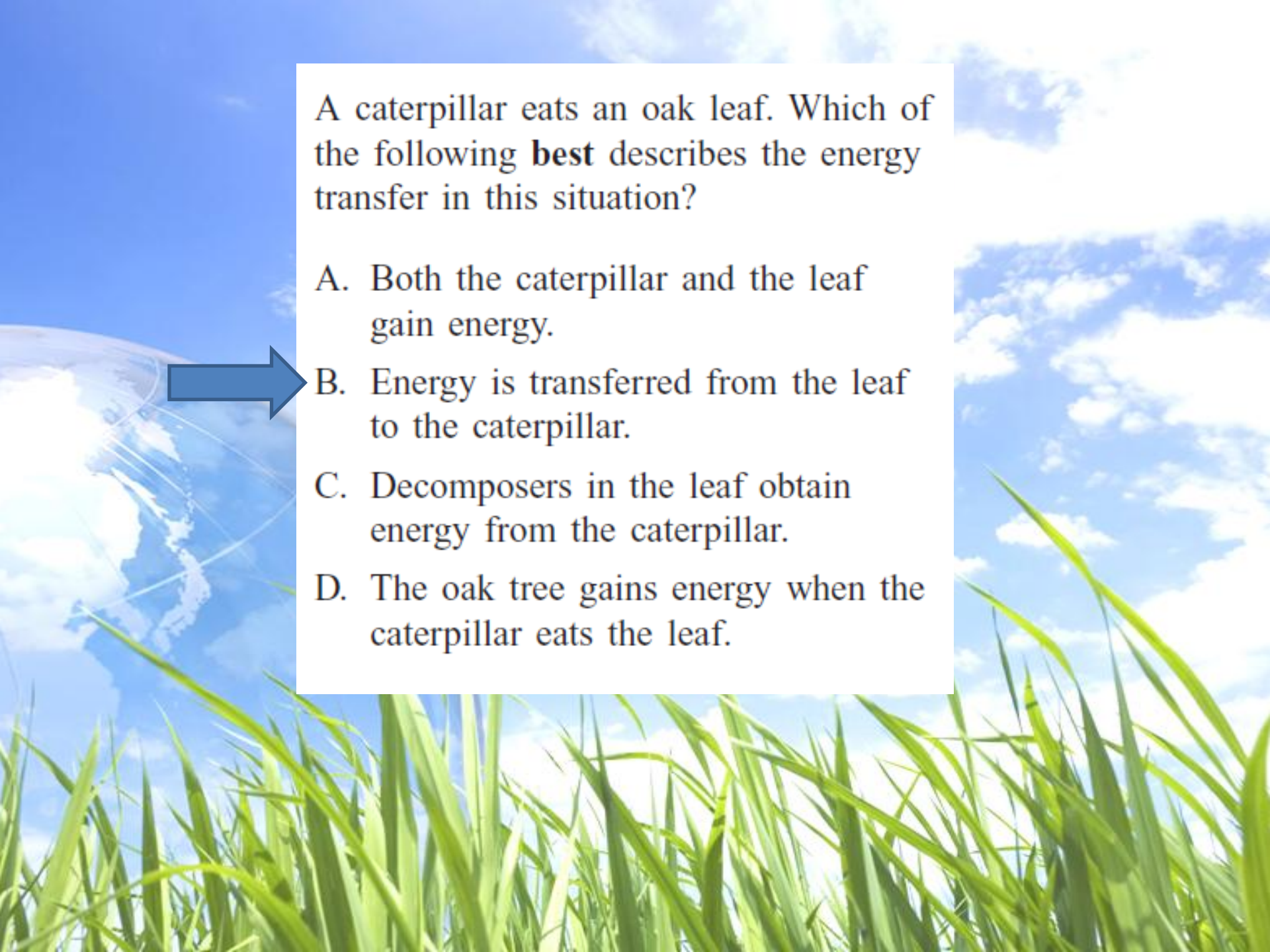
The figure below represents the flow of food energy through a system.



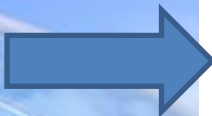
In an experiment, chickens were fed grain that contained a chemical marker in its proteins. The presence of the marker can be detected in organisms.

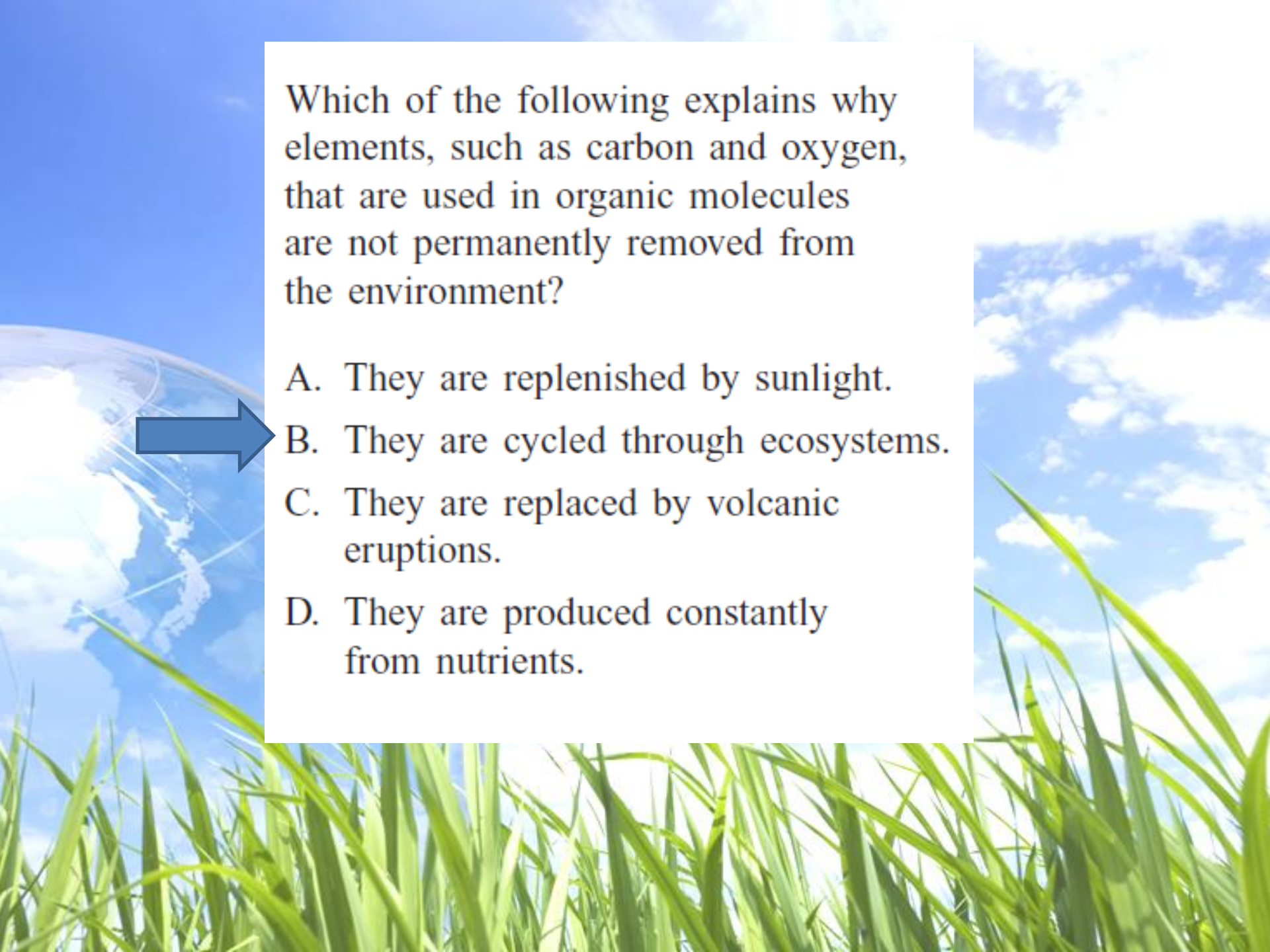
Which of the following is the **most** reasonable prediction from this experiment?

- A. The marker will only be found in the grain.
- B. Both chickens and wolves will have the marker.
- C. Wolves will have the marker, but chickens will not.
- D. The marker will only be found in the animals' wastes.

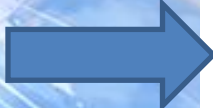


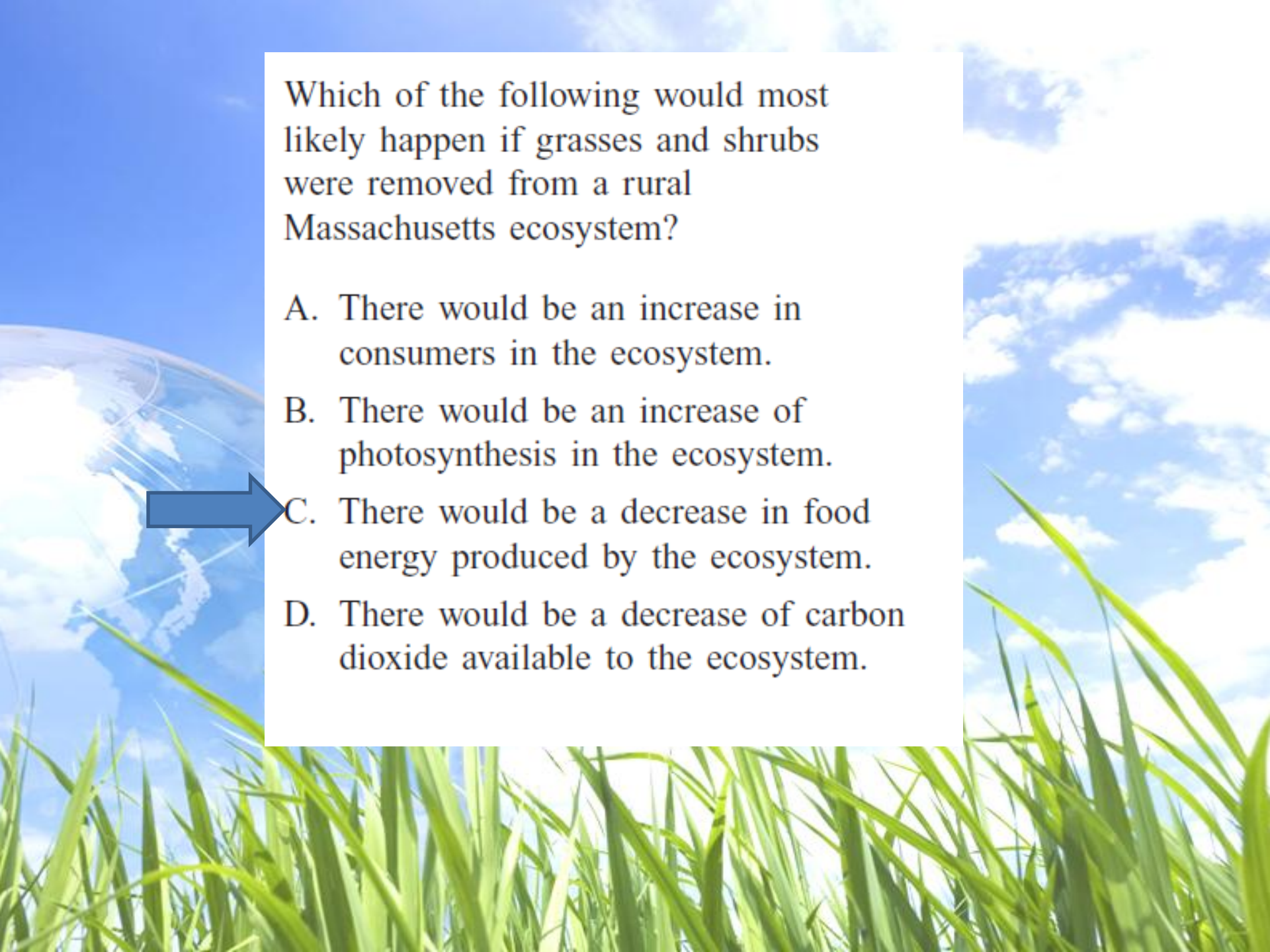
A caterpillar eats an oak leaf. Which of the following **best** describes the energy transfer in this situation?

- A. Both the caterpillar and the leaf gain energy.
-  B. Energy is transferred from the leaf to the caterpillar.
- C. Decomposers in the leaf obtain energy from the caterpillar.
- D. The oak tree gains energy when the caterpillar eats the leaf.




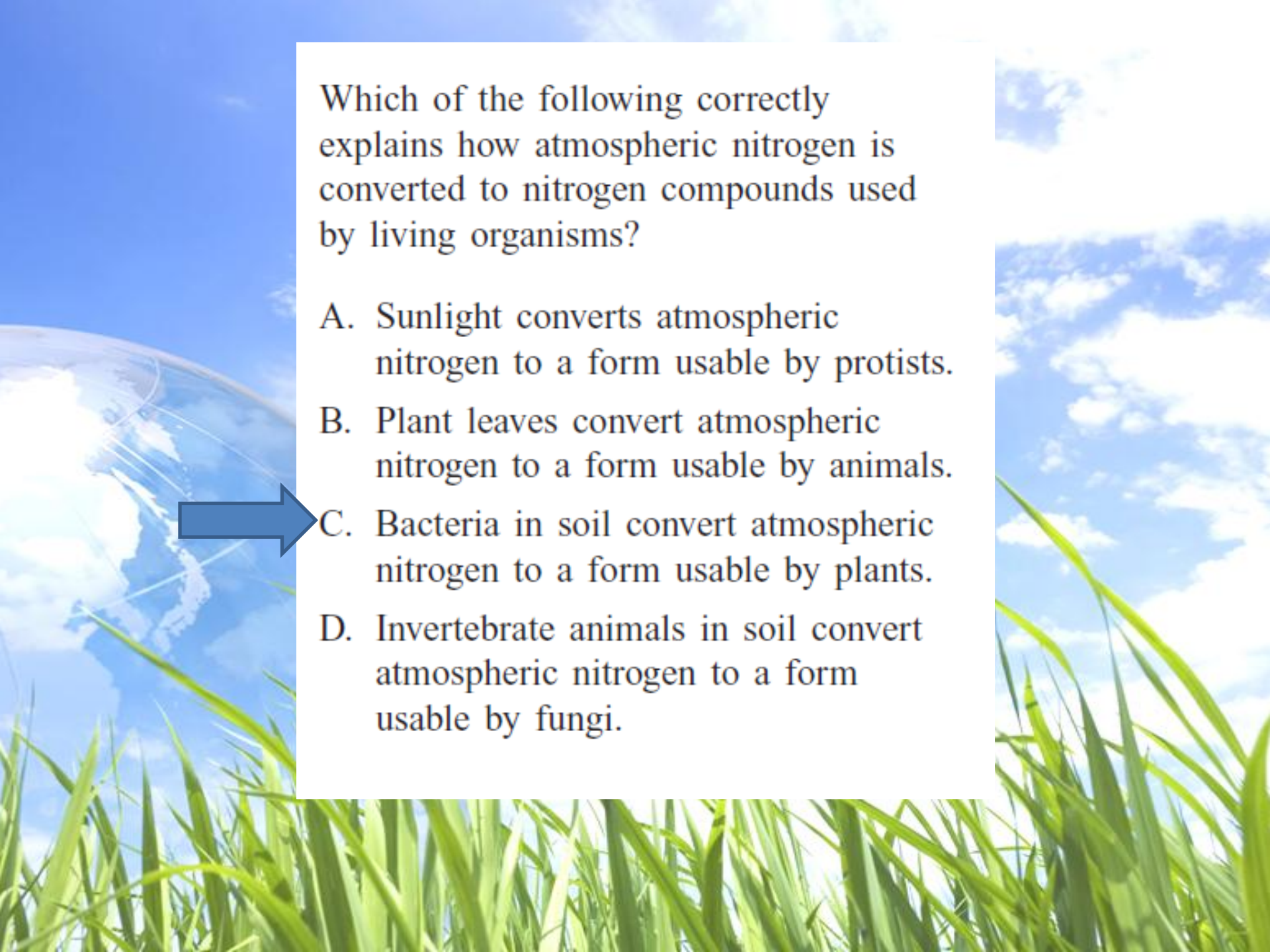
Which of the following explains why elements, such as carbon and oxygen, that are used in organic molecules are not permanently removed from the environment?

- A. They are replenished by sunlight.
-  B. They are cycled through ecosystems.
- C. They are replaced by volcanic eruptions.
- D. They are produced constantly from nutrients.




Which of the following would most likely happen if grasses and shrubs were removed from a rural Massachusetts ecosystem?

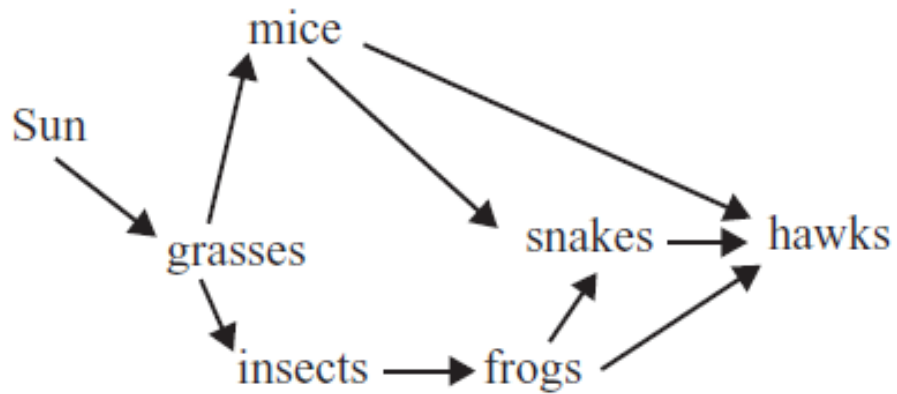
- A. There would be an increase in consumers in the ecosystem.
- B. There would be an increase of photosynthesis in the ecosystem.
-  C. There would be a decrease in food energy produced by the ecosystem.
- D. There would be a decrease of carbon dioxide available to the ecosystem.



Which of the following correctly explains how atmospheric nitrogen is converted to nitrogen compounds used by living organisms?

- A. Sunlight converts atmospheric nitrogen to a form usable by protists.
- B. Plant leaves convert atmospheric nitrogen to a form usable by animals.
-  C. Bacteria in soil convert atmospheric nitrogen to a form usable by plants.
- D. Invertebrate animals in soil convert atmospheric nitrogen to a form usable by fungi.

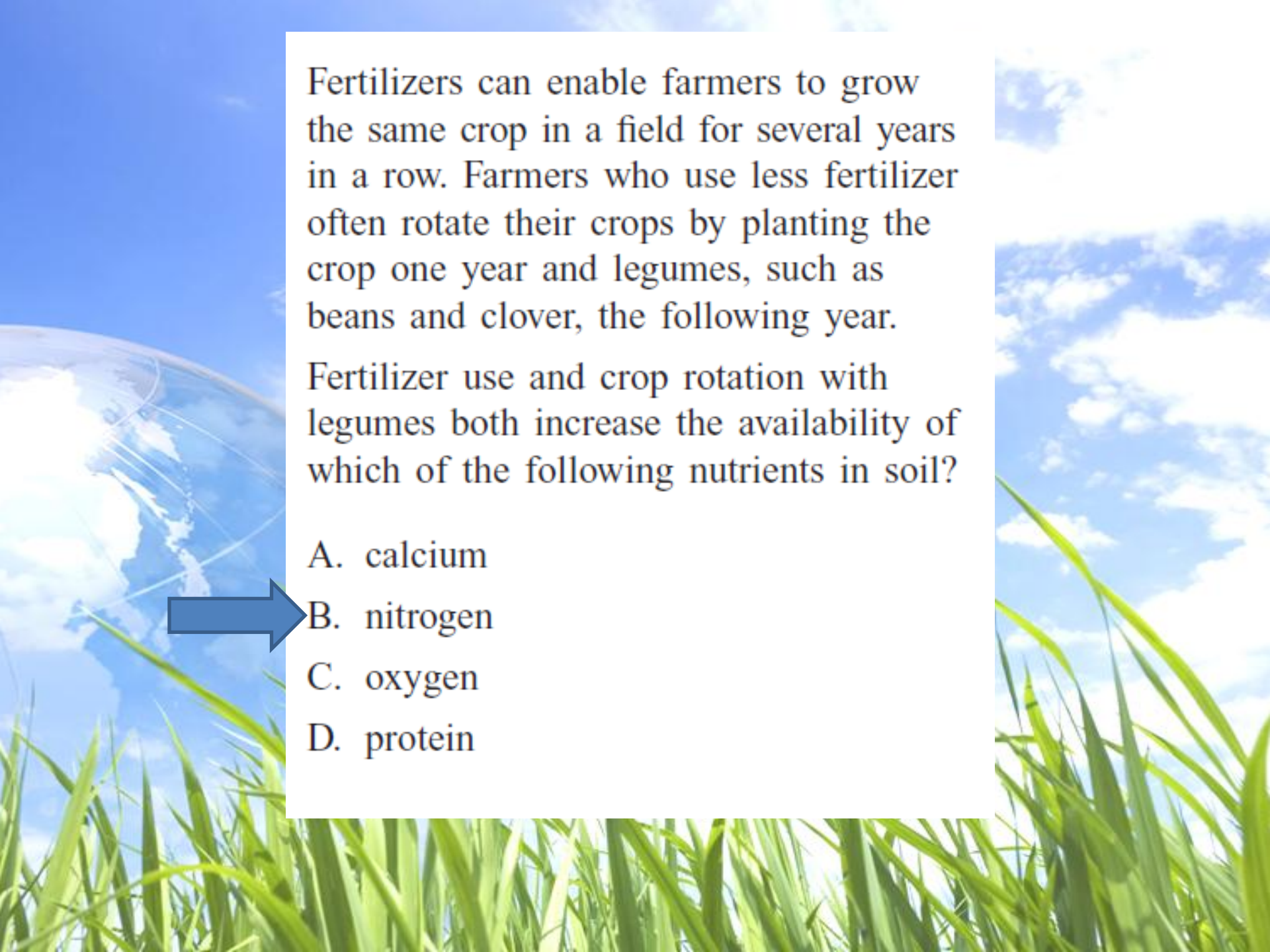
A food web is shown below.



In this food web, the trophic level with the **least** energy includes which of the following organisms?

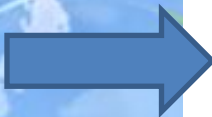
- A. grasses
- B. mice
- C. snakes
- D. hawks





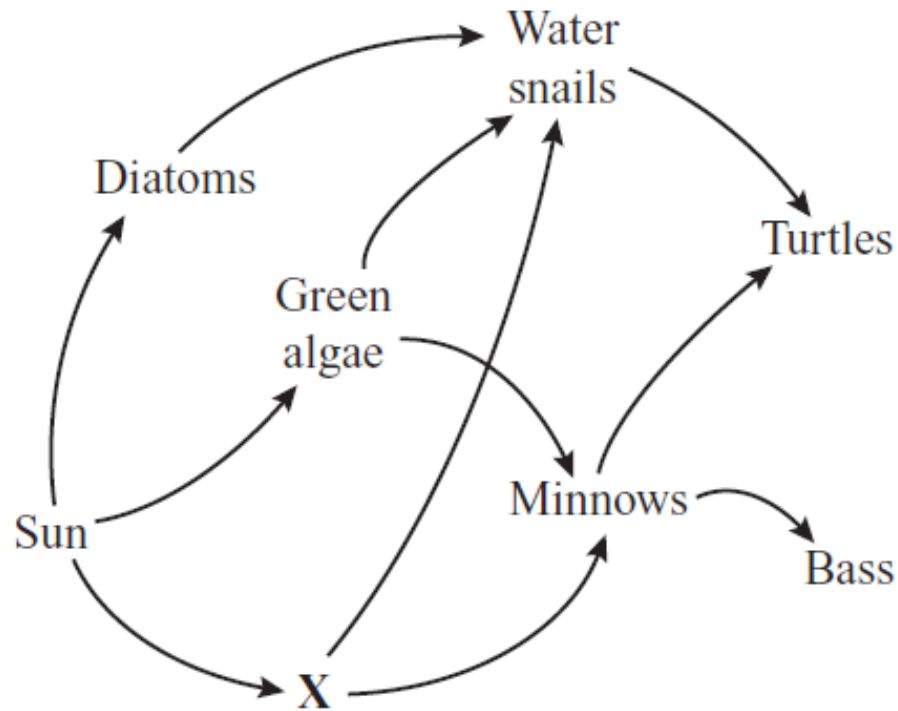
Fertilizers can enable farmers to grow the same crop in a field for several years in a row. Farmers who use less fertilizer often rotate their crops by planting the crop one year and legumes, such as beans and clover, the following year.

Fertilizer use and crop rotation with legumes both increase the availability of which of the following nutrients in soil?

- A. calcium
-  B. nitrogen
- C. oxygen
- D. protein

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A freshwater food web is shown below.



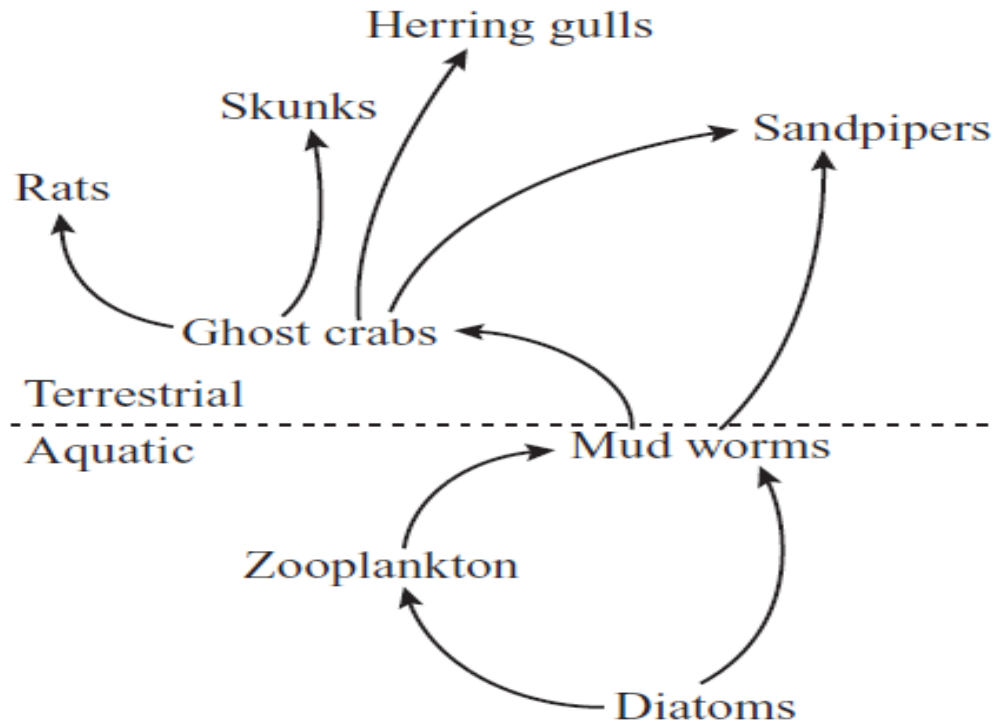
The **X** in this food web **most likely** represents which of the following?

- A. dragonfly larvae
- B. *Elodea* plants
- C. frog eggs
- D. *Paramecium* species



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A partial food web for a marsh ecosystem is shown below.



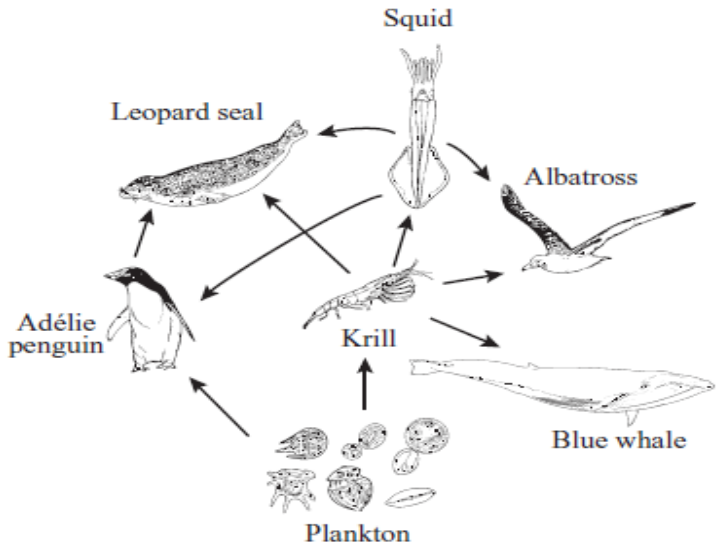
The removal of which of the following organisms would **most** reduce the transfer of energy from aquatic organisms to terrestrial organisms?

- A. herring gulls
- B. sandpipers
- C. rats
- D. ghost crabs

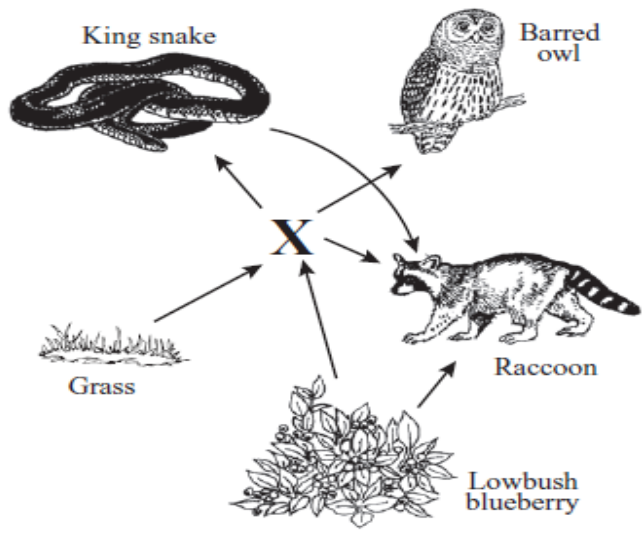


5 The diagrams below show a marine food web and an incomplete terrestrial food web.

Marine Food Web



Terrestrial Food Web



The organism in the terrestrial food web that corresponds to the krill in the marine food web is labeled X. Which of the following organisms is most likely organism X?

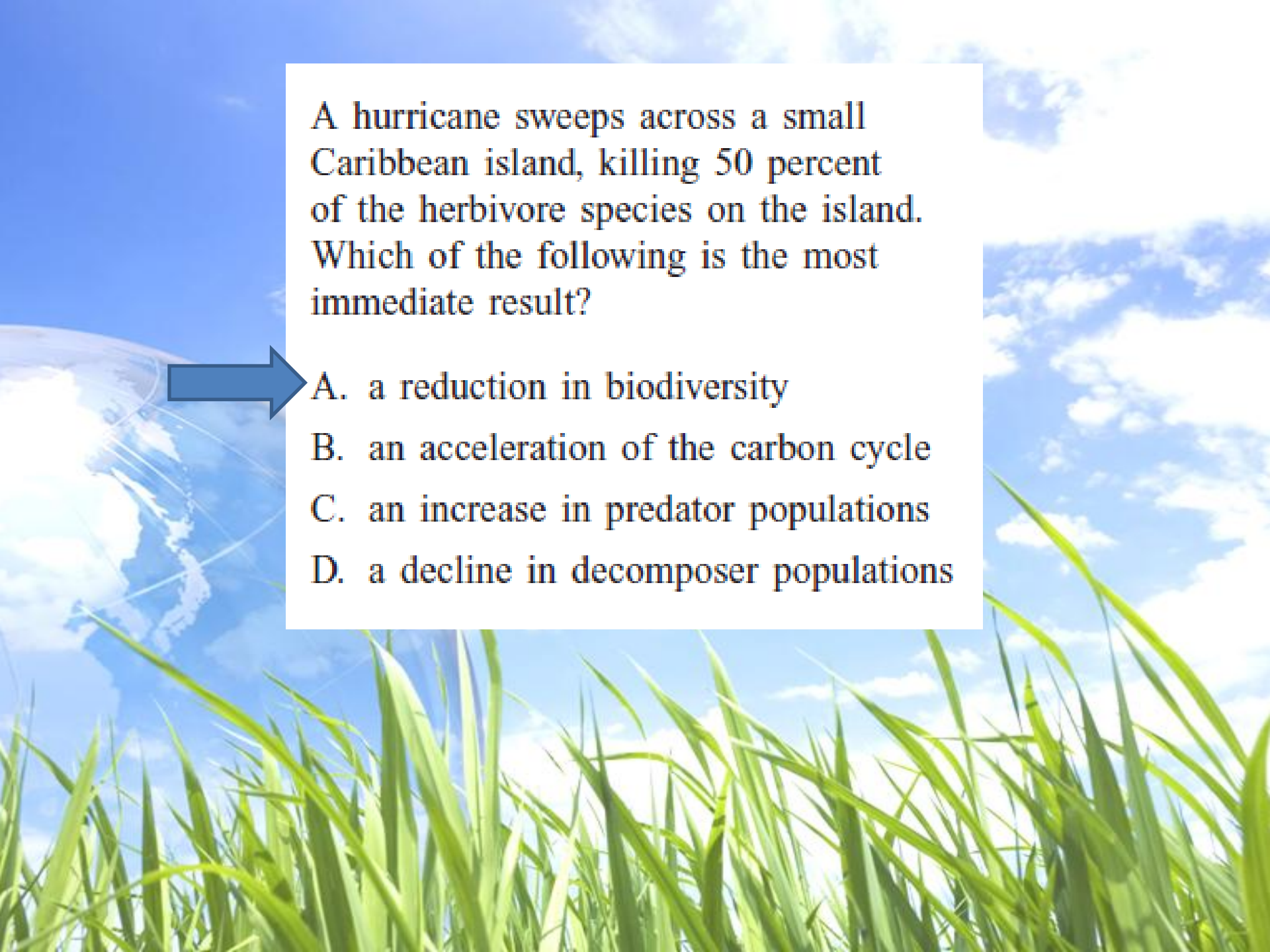


A. Mouse

C. Oak tree

B. Fox

D. Hawk



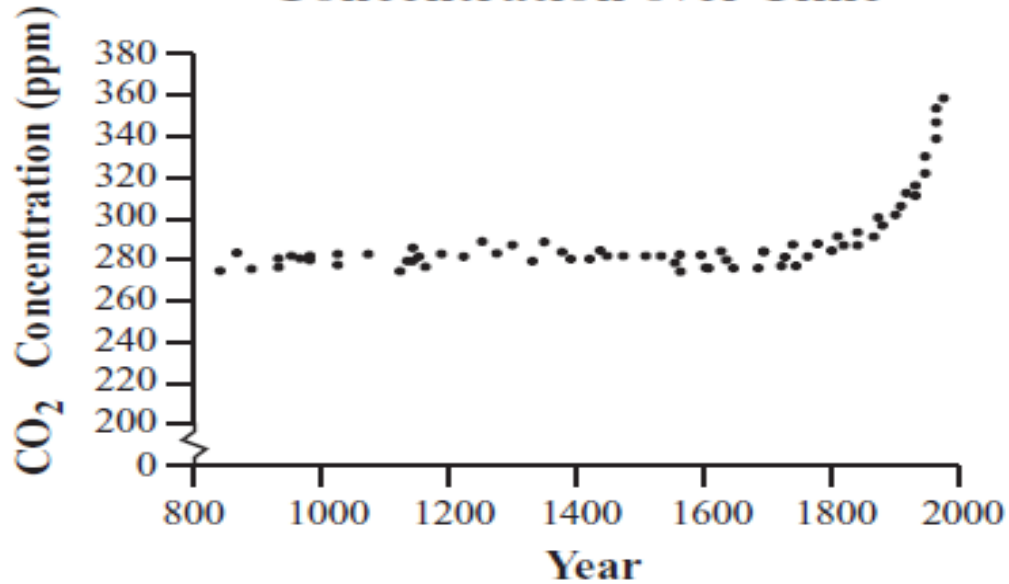
A hurricane sweeps across a small Caribbean island, killing 50 percent of the herbivore species on the island. Which of the following is the most immediate result?

- A. a reduction in biodiversity
- B. an acceleration of the carbon cycle
- C. an increase in predator populations
- D. a decline in decomposer populations

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A graph of atmospheric carbon dioxide concentration over time is shown below.

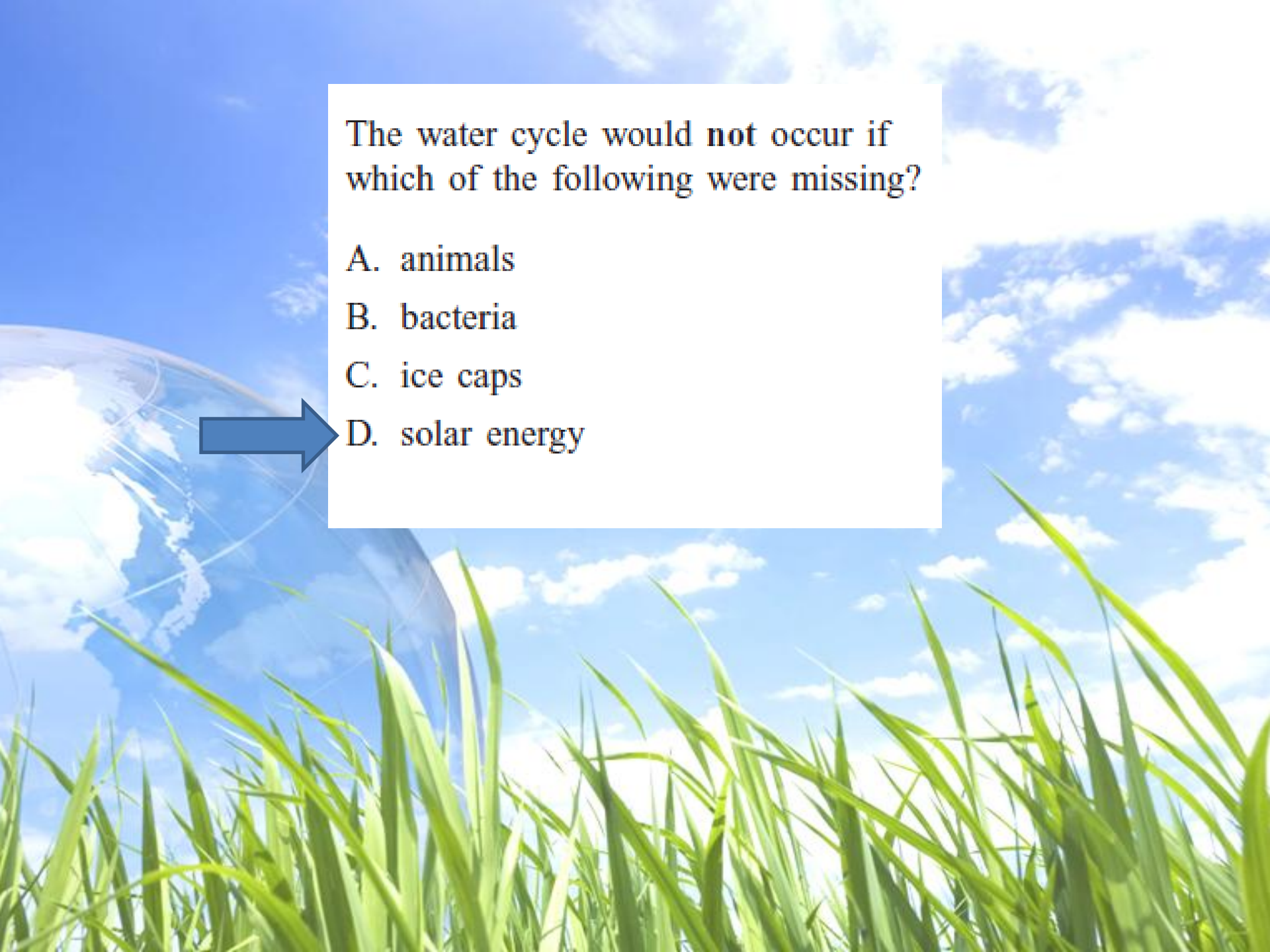
Change in Atmospheric CO₂ Concentration over Time



Scientists are investigating the cause of the large increase in atmospheric carbon dioxide concentration since about 1800. Which of the following provides the best explanation for the increase?

- A. eruptions of large volcanoes
- B. use of fossil fuels by humans
- C. natural fluctuations of climate
- D. photosynthesis by phytoplankton

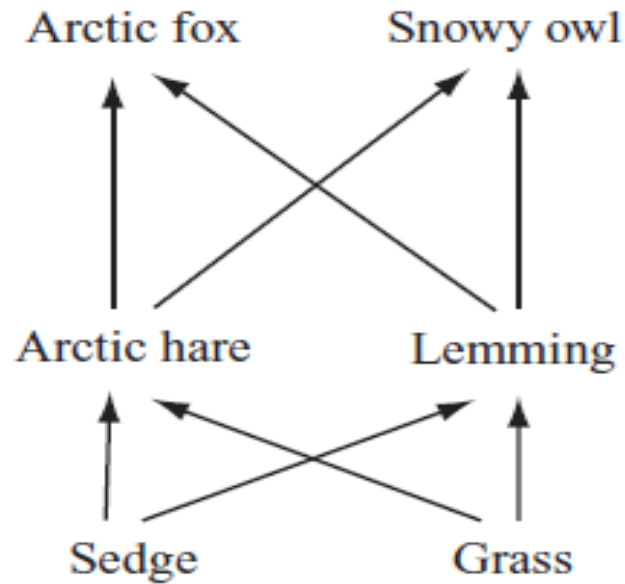




The water cycle would **not** occur if which of the following were missing?

- A. animals
- B. bacteria
- C. ice caps
- D. solar energy

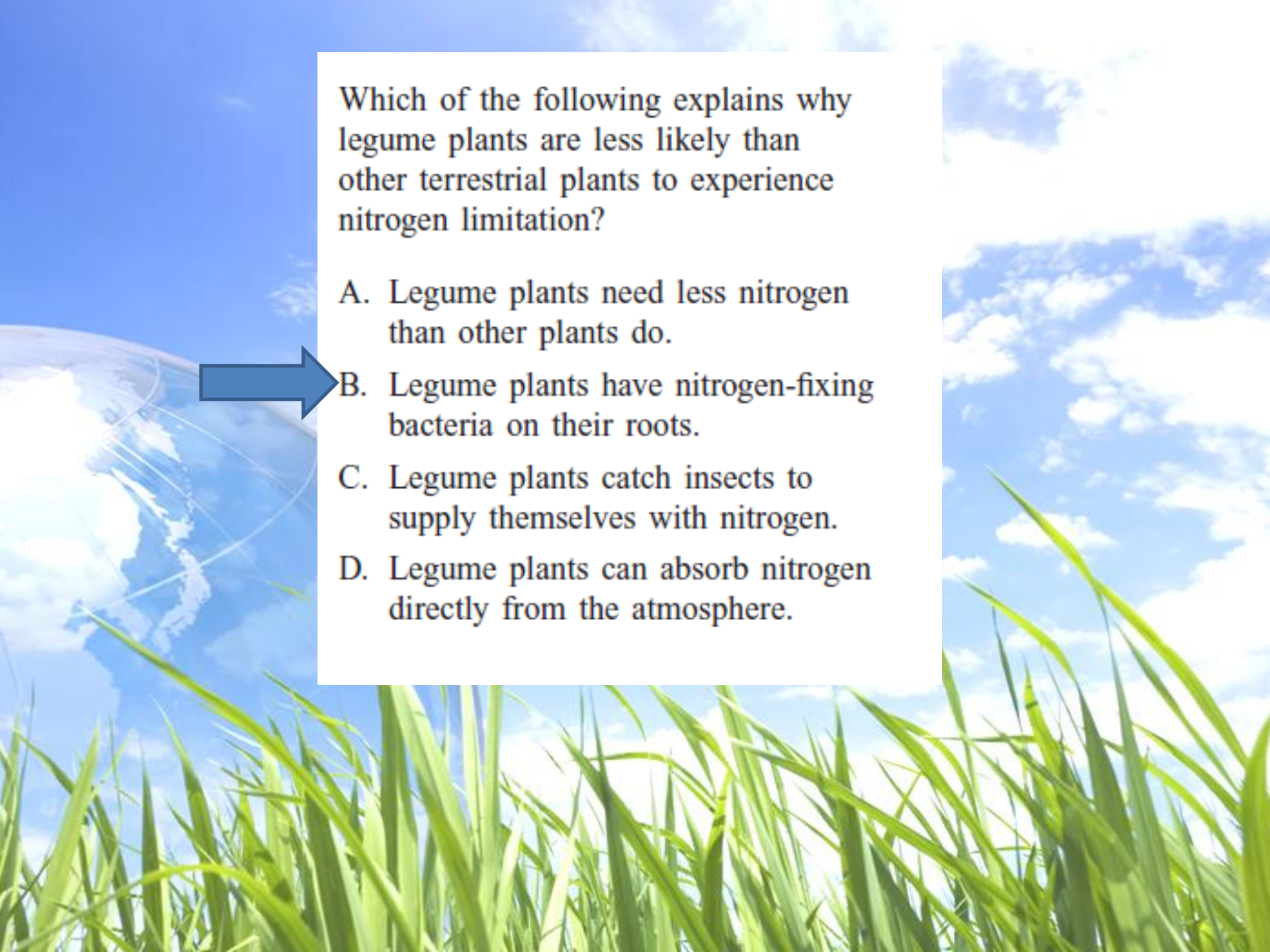
Part of a tundra food web is shown below.




Which of the following describes the relationship between the sedge and the arctic hare?

- A. competition
- B. host-parasite
- C. mutualism
- D. producer-consumer

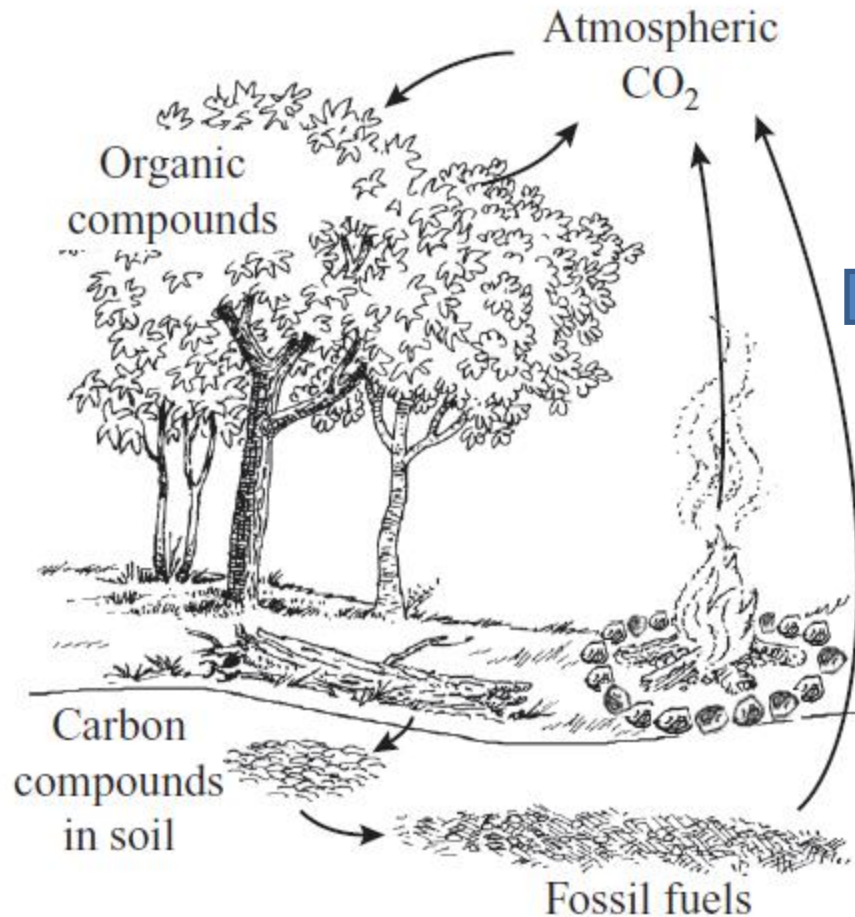




Which of the following explains why legume plants are less likely than other terrestrial plants to experience nitrogen limitation?

- A. Legume plants need less nitrogen than other plants do.
-  B. Legume plants have nitrogen-fixing bacteria on their roots.
- C. Legume plants catch insects to supply themselves with nitrogen.
- D. Legume plants can absorb nitrogen directly from the atmosphere.

18 The diagram below shows part of the carbon cycle.

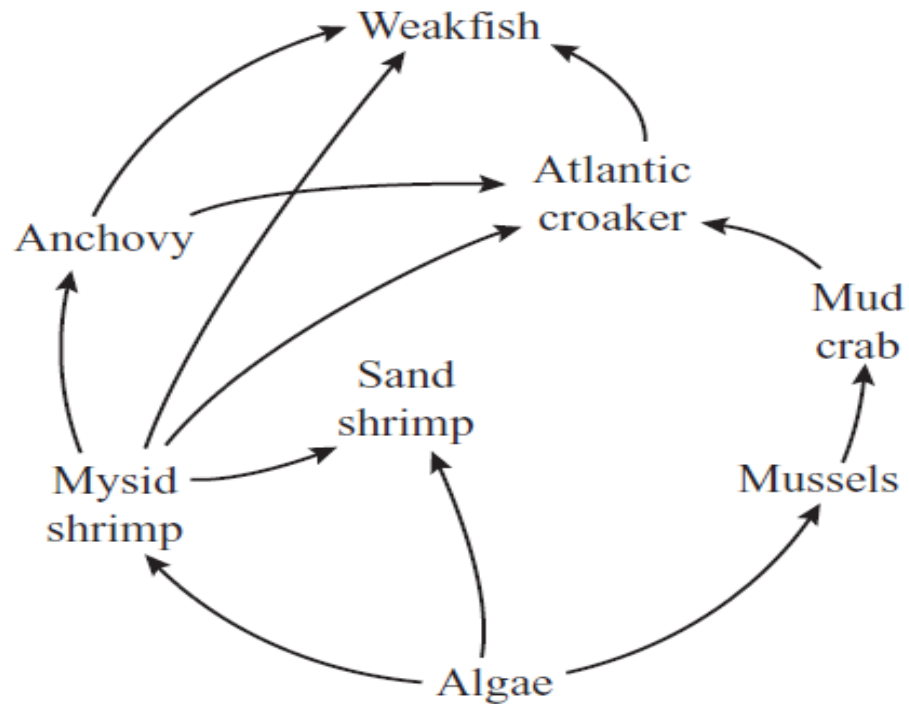


If many trees are removed from a forest by logging, what is the most immediate effect on the carbon cycle in that forest?

- A. increased rates of decomposition
- B. decreased use of atmospheric CO₂
- C. decreased combustion of fossil fuels
- D. increased production of organic compounds

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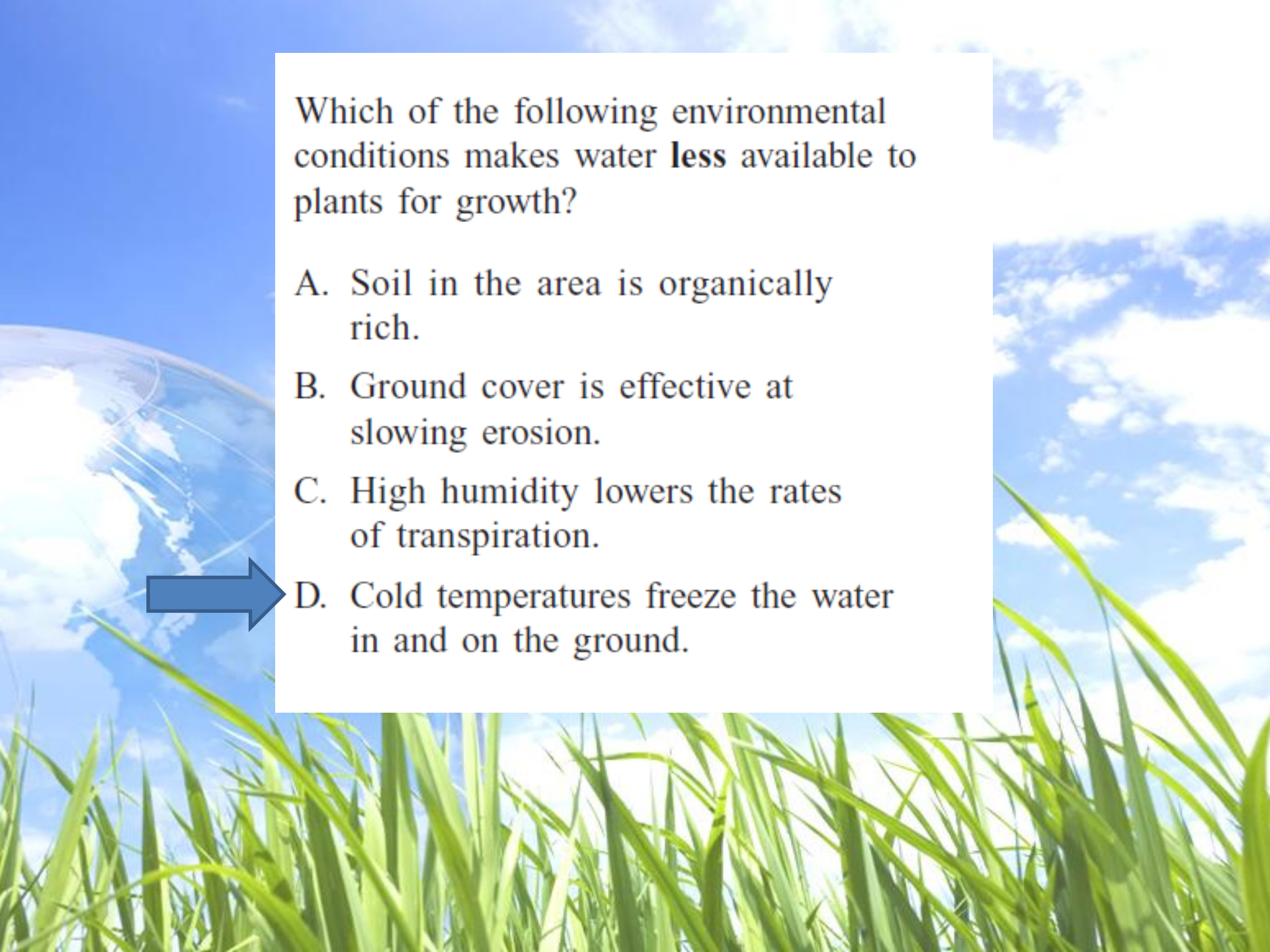
A partial food web for a coastal ecosystem is shown below.



Which of the following organisms in this food web obtains energy from both producers and consumers?

- A. anchovy
- B. mysid shrimp
- C. weakfish
- D. sand shrimp





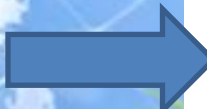
Which of the following environmental conditions makes water **less** available to plants for growth?

- A. Soil in the area is organically rich.
- B. Ground cover is effective at slowing erosion.
- C. High humidity lowers the rates of transpiration.
- D. Cold temperatures freeze the water in and on the ground.

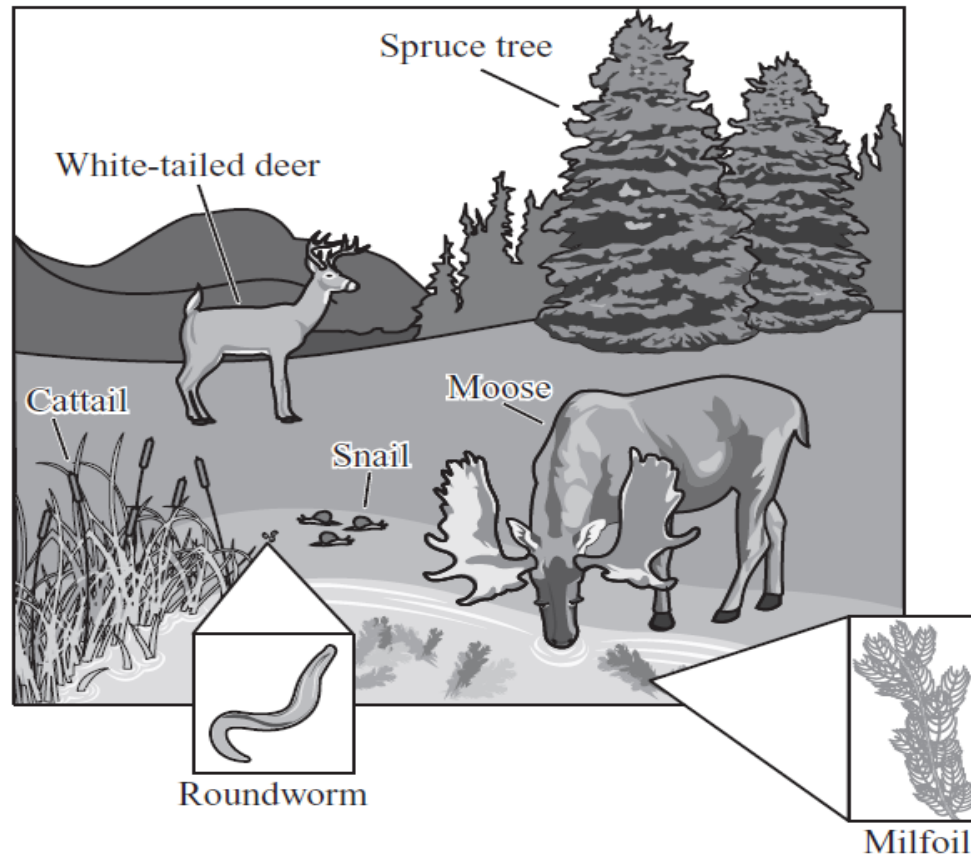


On remote islands, immigration and emigration usually do not have a large effect on population sizes. A bird population on a remote island remains at a relatively constant size year after year.

Which of the following **most likely** describes the birthrate and the death rate for this population?

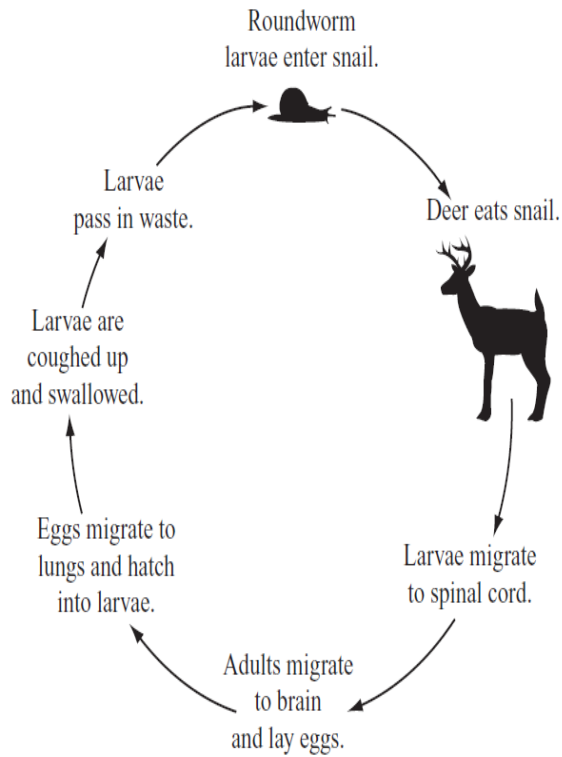
- A. Birthrate and death rate are both zero.
-  B. Birthrate and death rate are close to equal.
- C. Birthrate is significantly less than death rate.
- D. Birthrate is significantly greater than death rate.

Forest and wetland ecosystems in Canada and parts of the northern United States are home to moose, *Alces alces*. The illustration below shows a moose and some of the plants and other animals found in its typical habitat.



One serious problem for moose is a disease called moose brainworm. Effects of the disease include aimless walking in circles, poor coordination and balance, weakness, and paralysis of the legs. Many cases of the disease result in death. The disease is caused by a parasitic roundworm, *Parelaphostrongylus tenuis*. The life cycle of this roundworm involves snails, white-tailed deer, and moose, as shown in the diagrams on the next page. Of these organisms, only the moose gets sick from infection by the roundworm.

Roundworm Life Cycle Diagrams



Roundworm larvae enter snail.



Moose eats snail.



Larvae migrate to spinal cord and brain.

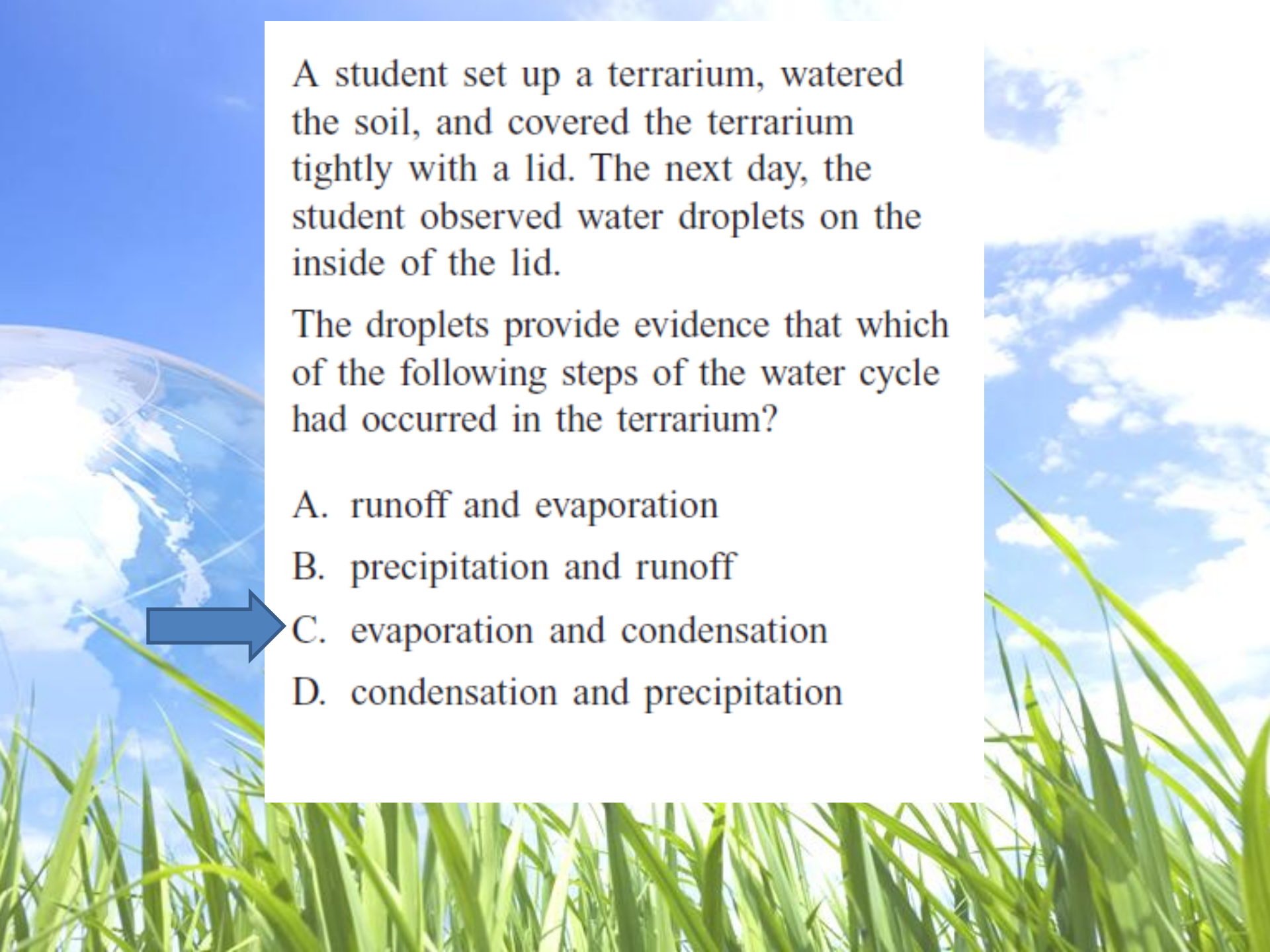
Moose brainworm disease symptoms begin.

The moose belongs to which trophic level in an ecosystem?

- A. producer
- B. consumer
- C. scavenger
- D. decomposer

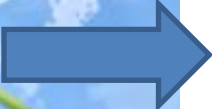
Damage to which of the following body systems causes the symptoms observed in moose infected by the roundworm?

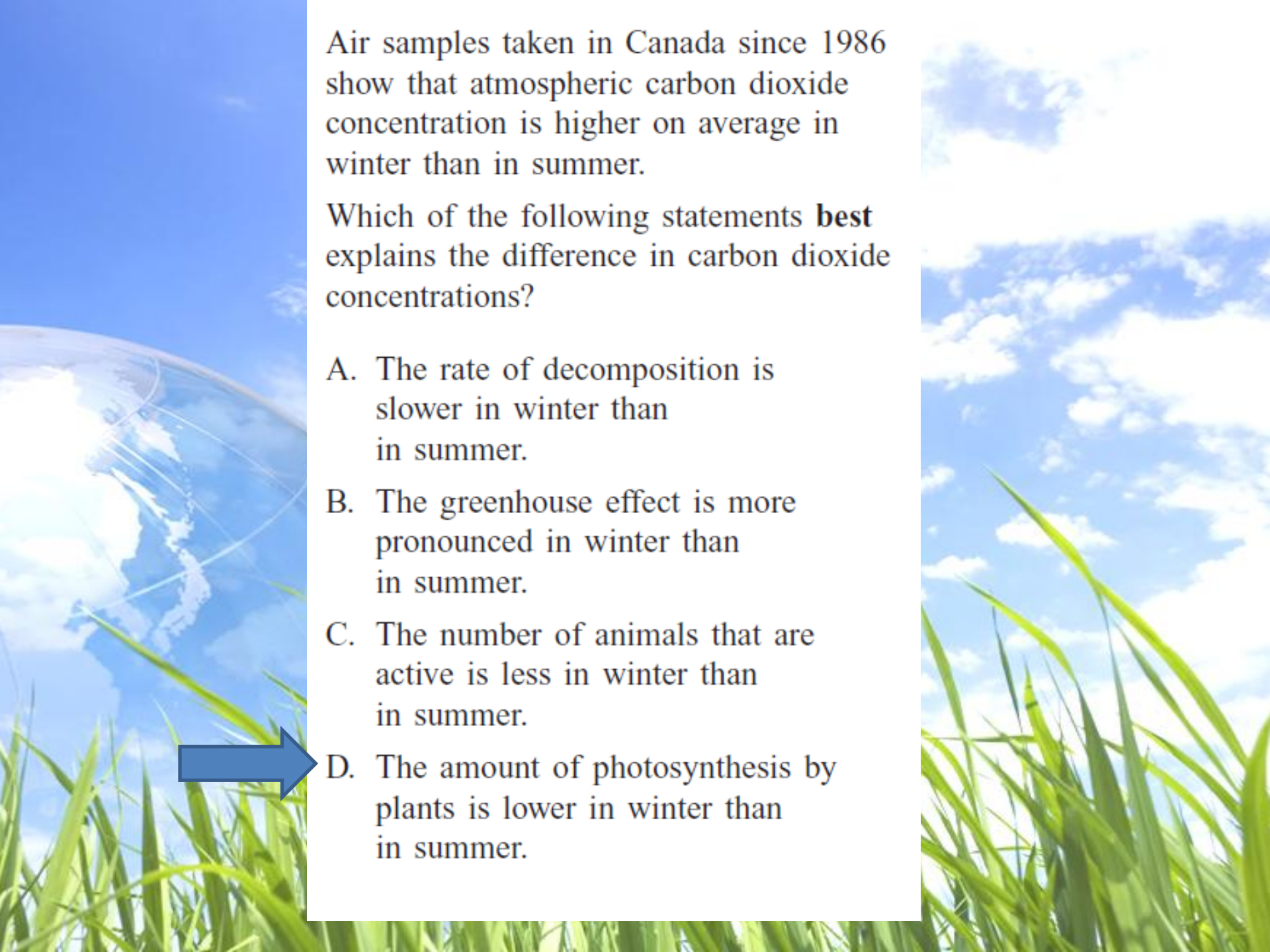
- A. circulatory
- B. digestive
- C. nervous
- D. respiratory



A student set up a terrarium, watered the soil, and covered the terrarium tightly with a lid. The next day, the student observed water droplets on the inside of the lid.

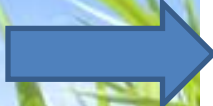
The droplets provide evidence that which of the following steps of the water cycle had occurred in the terrarium?

- A. runoff and evaporation
- B. precipitation and runoff
-  C. evaporation and condensation
- D. condensation and precipitation



Air samples taken in Canada since 1986 show that atmospheric carbon dioxide concentration is higher on average in winter than in summer.

Which of the following statements **best** explains the difference in carbon dioxide concentrations?

- A. The rate of decomposition is slower in winter than in summer.
- B. The greenhouse effect is more pronounced in winter than in summer.
- C. The number of animals that are active is less in winter than in summer.
-  D. The amount of photosynthesis by plants is lower in winter than in summer.

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The table below shows data on reproduction for mouse populations at various population densities.

Average Number of Mice per Cubic Meter	Average Percent of Pregnant Females	Average Number of Mice per Litter
34	58.3	6.2
118	49.4	5.7
350	51.0	5.6
1600	43.3	5.1

Based on the data, which of the following statements **best** describes an effect of population density on mouse populations?



- A. High population density decreases the birthrate.
- B. High population density decreases the death rate.
- C. High population density increases the male to female ratio.
- D. High population density increases the number of successful matings.