State of Texas Assessments of Academic Readiness

Biology

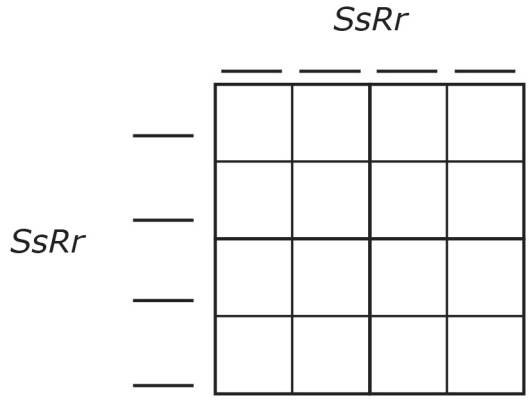
Paper Item Sampler

1 Giant sequoias can grow to be nearly 100 meters (328 feet) tall. They rely on a complex transport system to allow water to travel from the roots to the leaves at the top of the tree.

Which transport tissue allows water to travel upward from the roots to the leaves?

Record your answer in the space provided.

2 The cross between two individuals with the genotype *SsRr* is shown in the Punnett square.



How many out of 16 offspring would be expected to be homozygous recessive for both traits?

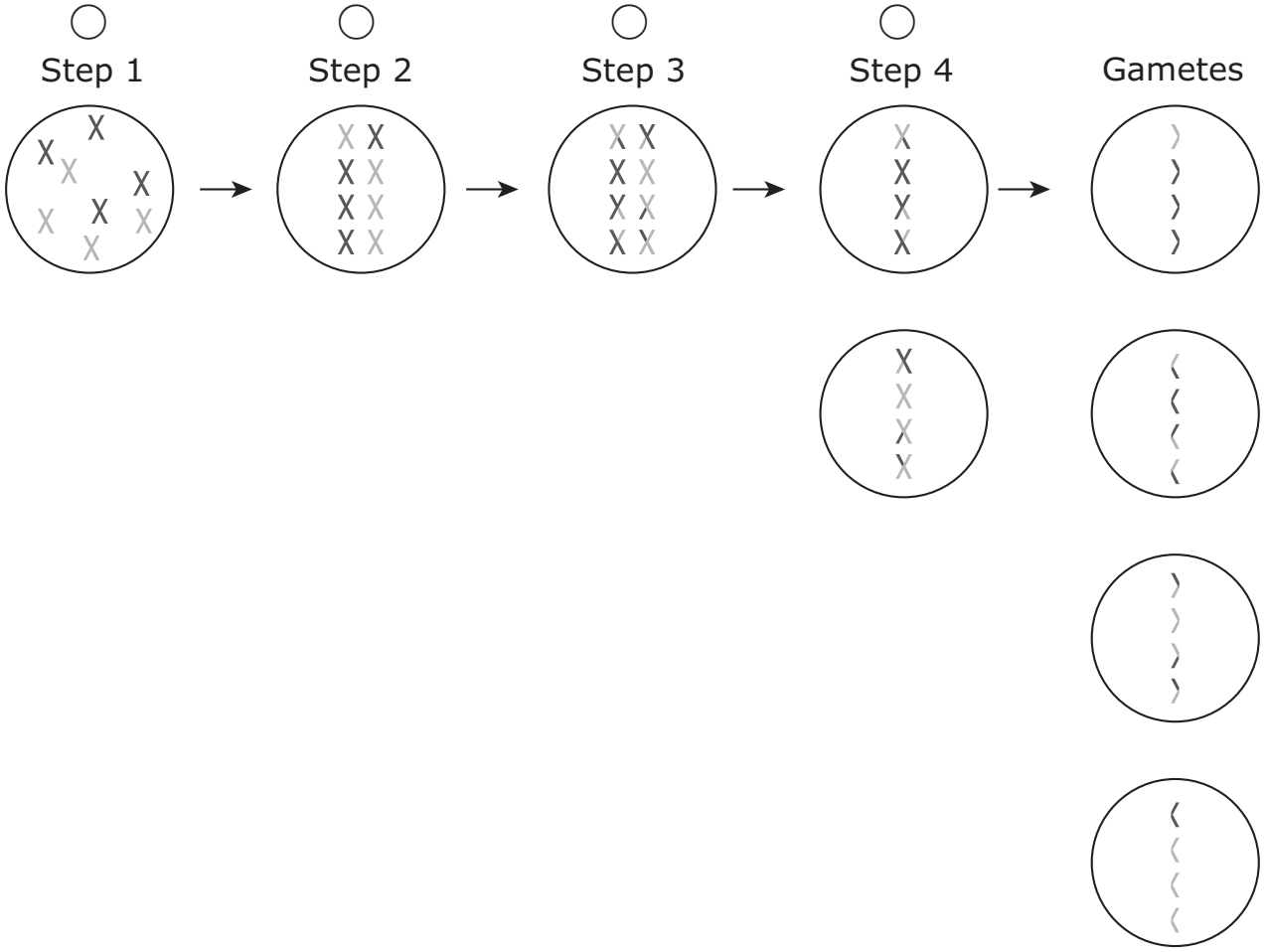
Record your answer in the space provided. Your answer must be a whole number.

/16 offspring.

3 A biological process is shown.

Which two parts of this process help increase the genetic variation in the gametes of the population?

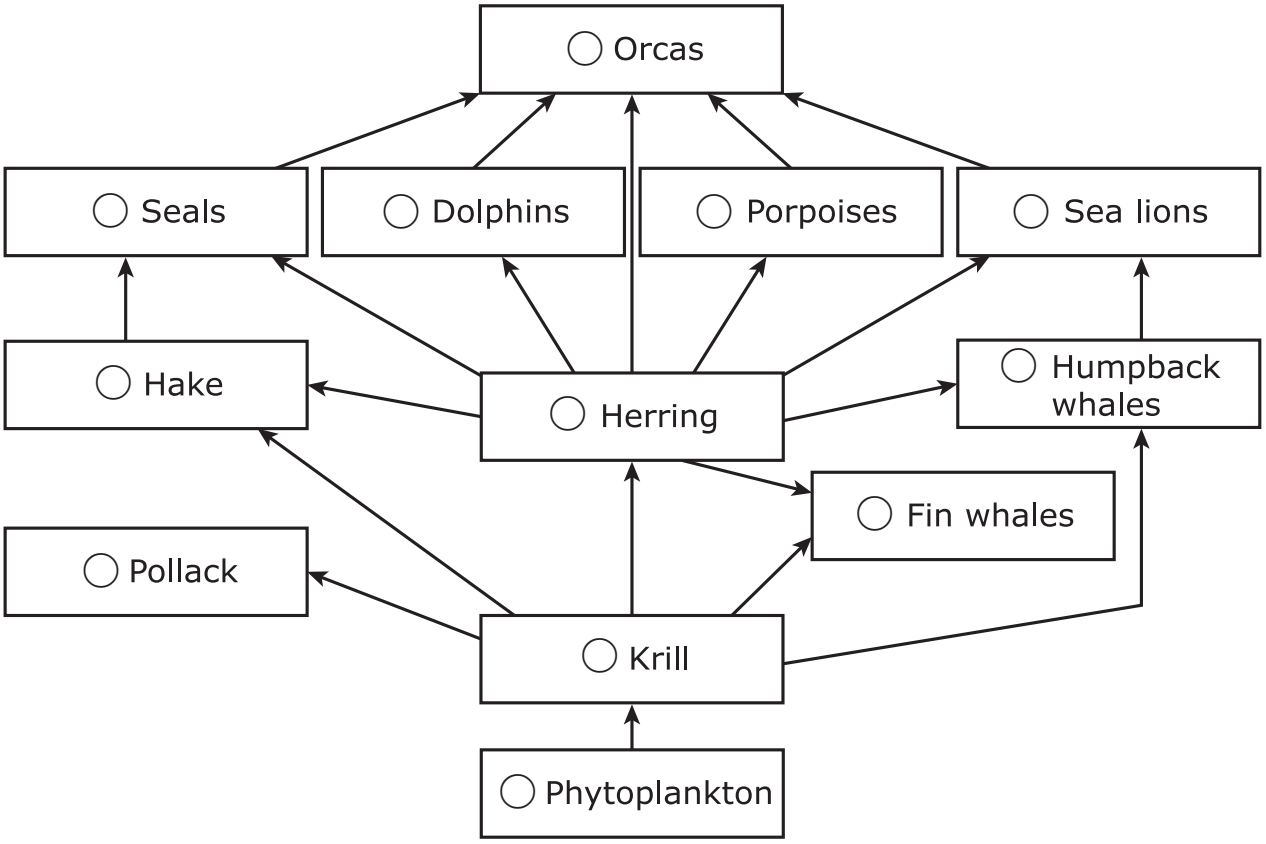
Select **TWO** correct answers.



4 An aquatic food web is shown.

Which organisms are both secondary and tertiary consumers?

Select **THREE** correct answers.



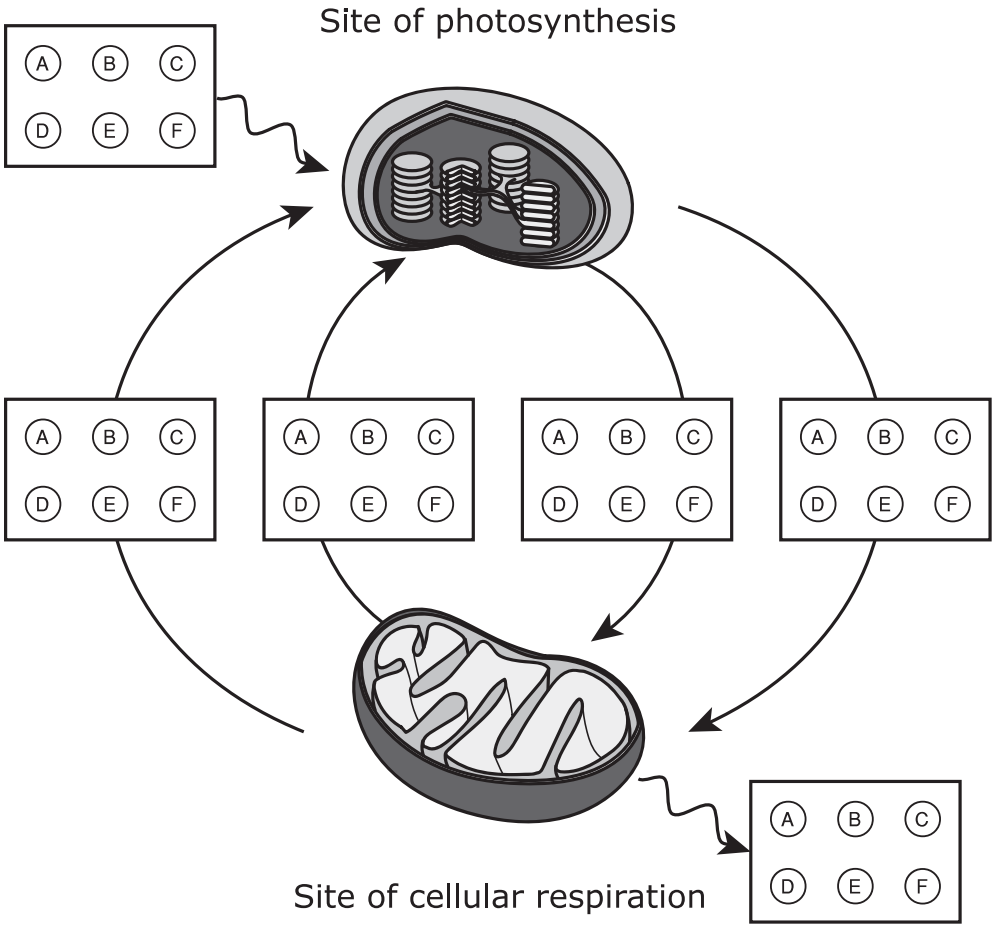
Source: Surma, S., Pitcher, T., Kumar, R., Varkey, D., Pakhomov, E., and Lam, M., *PLOS One*, 2018

5 The relationship between two cellular processes is shown in the diagram.

What is the relationship between the site of photosynthesis and the site of cellular respiration?

Select the correct answer for each box.

A Carbon dioxide	**B** Oxygen	**C** Water
D Glucose	**E** Chemical energy	**F** Light energy



6 The physical adaptations of wolves, *Canis lupus*, are related to their hunting abilities. Larger wolves are able to take down larger prey such as elk.

How could an increase in the typical body size of elk affect the typical body size of wolves after several generations?

Select the correct answer for each box. Not all answers will be used.

A not change **B** increase **C** decrease

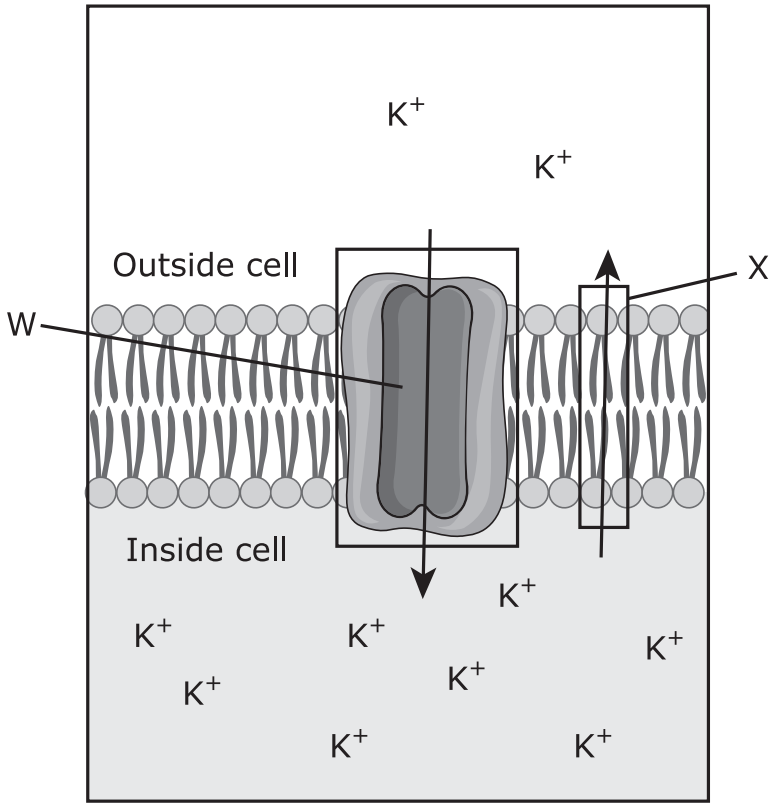
The typical body size of individuals in the wolf population could

[A B C] after several generations because this change would

[A B C] reproductive fitness for the individuals affected.

7 This question has two parts. First, answer Part A. Then, answer Part B.

A diagram of the cell membrane is shown.



Part A

Based on the diagram, which statement correctly describes how component W and component X transport molecules across the cell membrane?

Ⓐ Component W carries out active transport and component X carries out passive transport.

Ⓑ Component W carries out passive transport and component X carries out active transport.

Ⓒ Both component W and component X carry out active transport.

Ⓓ Both component W and component X carry out passive transport.

Part B

What evidence supports the answer to Part A?

Ⓐ Component W uses energy to move molecules from an area of high concentration to an area of low concentration, and component X uses energy to move molecules from an area of low concentration to an area of high concentration.

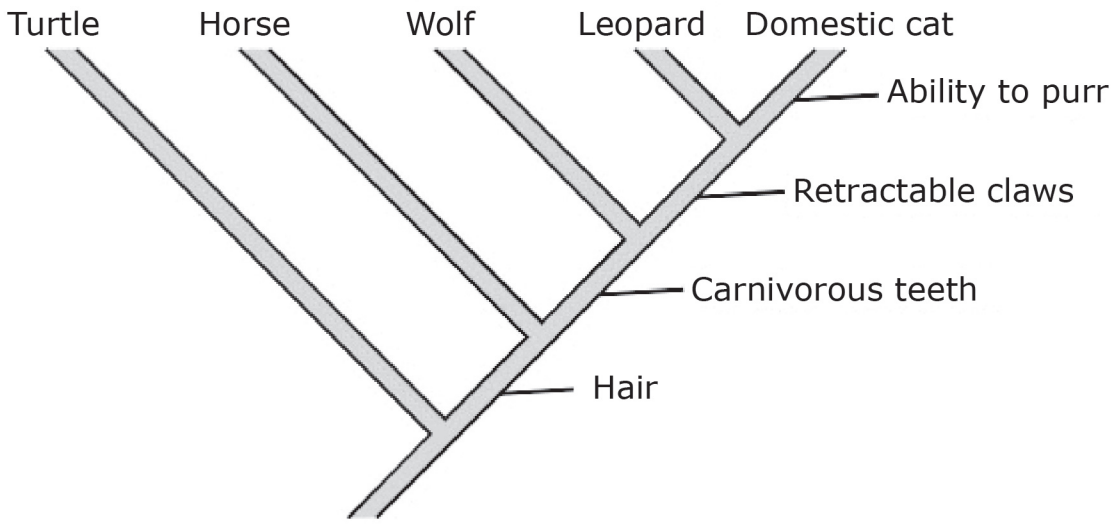
Ⓑ Component W uses energy to move molecules from an area of low concentration to an area of high concentration, while component X does not use energy to move molecules from an area of high concentration to an area of low concentration.

Ⓒ Component W does not use energy to move molecules from an area of low concentration to an area of high concentration, while component X uses energy to move molecules from an area of high concentration to an area of low concentration.

Ⓓ Component W does not use energy to move molecules from an area of high concentration to an area of low concentration, and component X does not use energy to move molecules from an area of low concentration to an area of high concentration.

8 This question has two parts. First, answer Part A. Then, answer Part B.

A cladogram is shown.



Part A

Based on the information in the cladogram, which characteristic would likely be found in the most recent common ancestor of the leopard and the domestic cat but **NOT** in the other organisms?

Ⓐ Ability to purr

Ⓑ Retractable claws

Ⓒ Carnivorous teeth

Ⓓ Hair

Part B

Which additional piece of evidence would **BEST** support the answer to Part A?

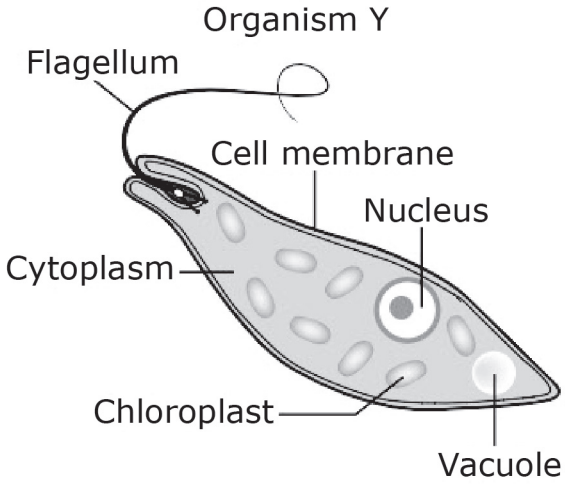
Ⓐ They have limbs with a similar function.

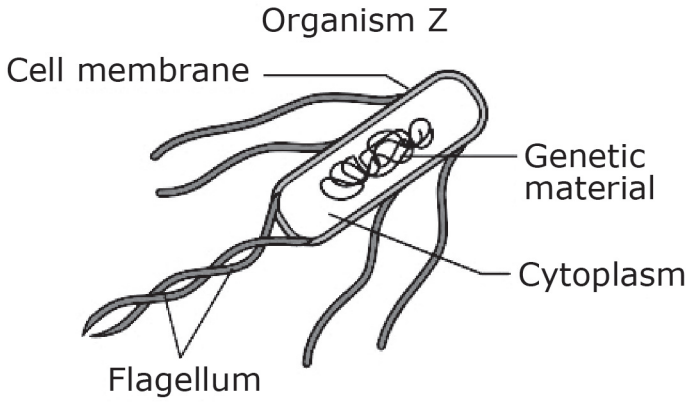
Ⓑ They have similar DNA sequences.

Ⓒ They have diets of similar prey.

Ⓓ They have similar coat colors.

9 Two single-celled organisms are shown.



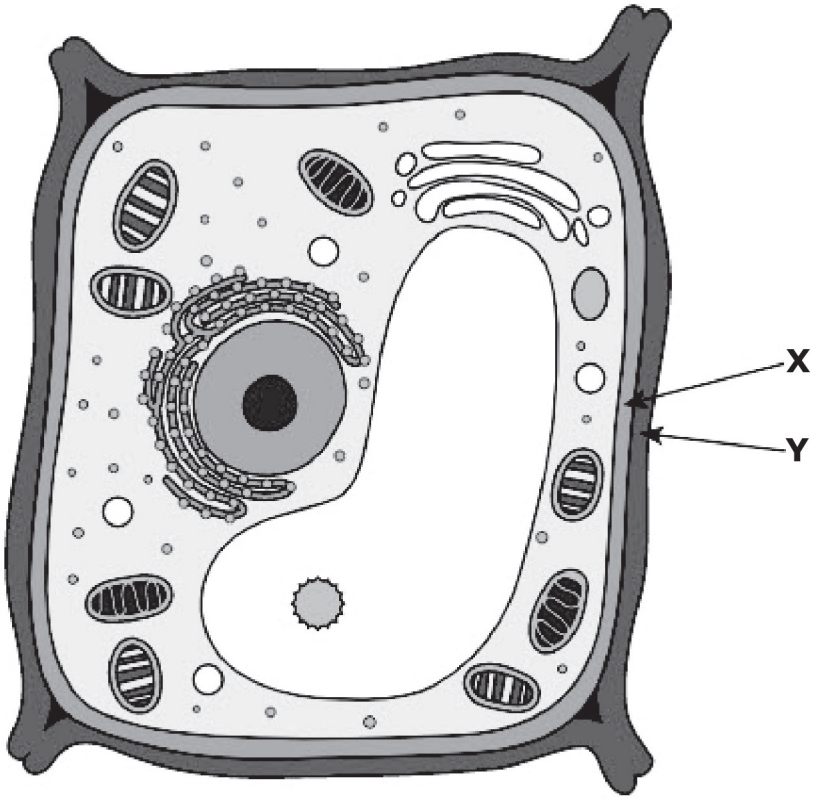


Which statements accurately compare the two organisms?

Select **TWO** correct answers.

- ◯ Organism Y is a eukaryotic cell, while Organism Z is a prokaryotic cell.
- ◯ Organism Z has a complex structure, while Organism Y has a simple structure.
- ◯ Organism Y requires a host cell to reproduce, while Organism Z does not.
- ◯ Organism Z contains genetic material, while Organism Y does not.
- ◯ Organism Y contains membrane-bound organelles, while Organism Z does not.

10 A cell is shown with structure X and structure Y labeled.



Which functions do structure X and structure Y carry out to maintain homeostasis and molecular transport within the cell?

Select **TWO** correct answers.

- ◯ Restricting molecules entering and exiting the cell
- ◯ Producing proteins for the cell
- ◯ Maintaining the size and shape of the cell
- ◯ Providing energy for the cell
- ◯ Regulating gene expression within the cell

11 *Prochlorococcus* is a bacterium that lives in marine environments and produces hydrogen peroxide as a byproduct of its biological processes. Hydrogen peroxide is toxic to *Prochlorococcus*. Another marine bacterium, called *Alteromonas*, produces an enzyme that breaks down the hydrogen peroxide as a result of normal metabolism. This prevents both organisms from being harmed.

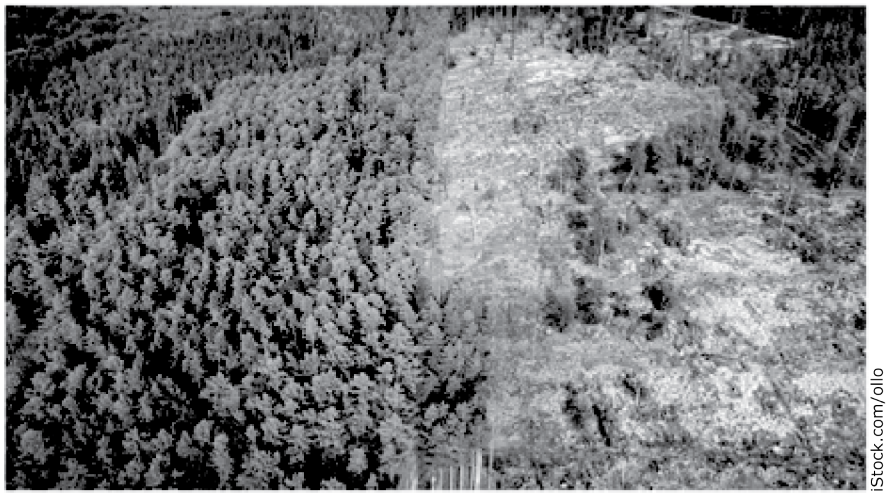
Based on the information above, address the following questions:

- What are the two relationships that could exist between *Prochlorococcus* and *Alteromonas*?
- What additional information would be required to determine which of the two relationships exists between *Prochlorococcus* and *Alteromonas*?

Think about the question carefully. Then record your answer in the box provided.

12 The picture shows a region before and after deforestation.

Before Deforestation After Deforestation



iStock.com/ollo

How does the environmental change depicted in the image affect the ecosystem's stability **AND** its ability to recover from change?

Look at the picture and think about the question carefully. Then record your answer and explanation in the box provided.

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