

**Part B**

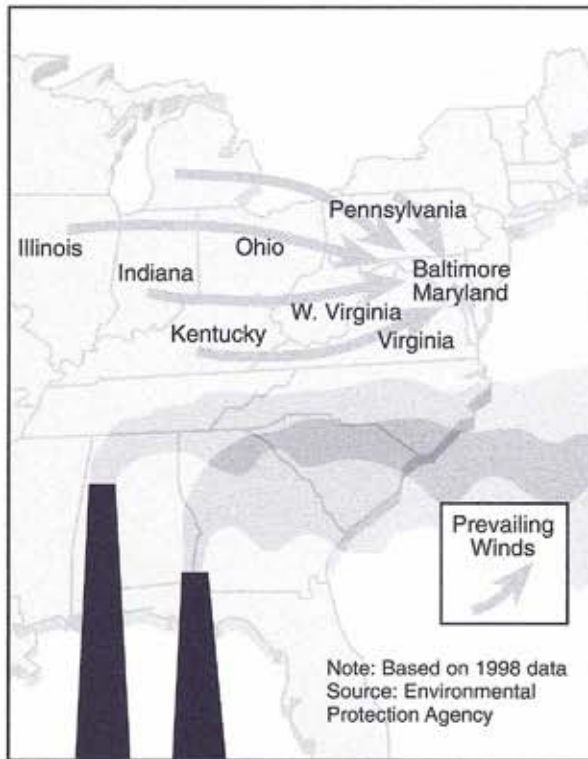
**Answer all questions in this part.** [30]

Directions : For those questions that are followed by four choices, circle the number of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question and record your answers in the spaces provided.

1. The map below shows the movement of some air pollution across part of the United States.

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**Movement of Air Pollution**



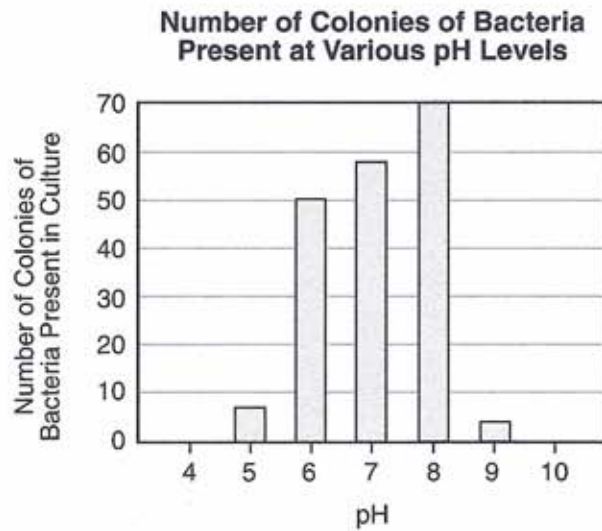
Which statement is a correct inference that can be drawn from this information?

- (1) Illinois produces more air pollution than the other states shown.
- (2) The air pollution problem in Baltimore is increased by the addition of pollution from other areas.
- (3) There are no air pollution problems in southern states.
- (4) The air pollution problems in Virginia clear up quickly as the air moves toward the sea.



Base your answers to questions 2 and 3 on the graph below and on your knowledge of biology. The graph illustrates a single species of bacteria grown at various pH levels.

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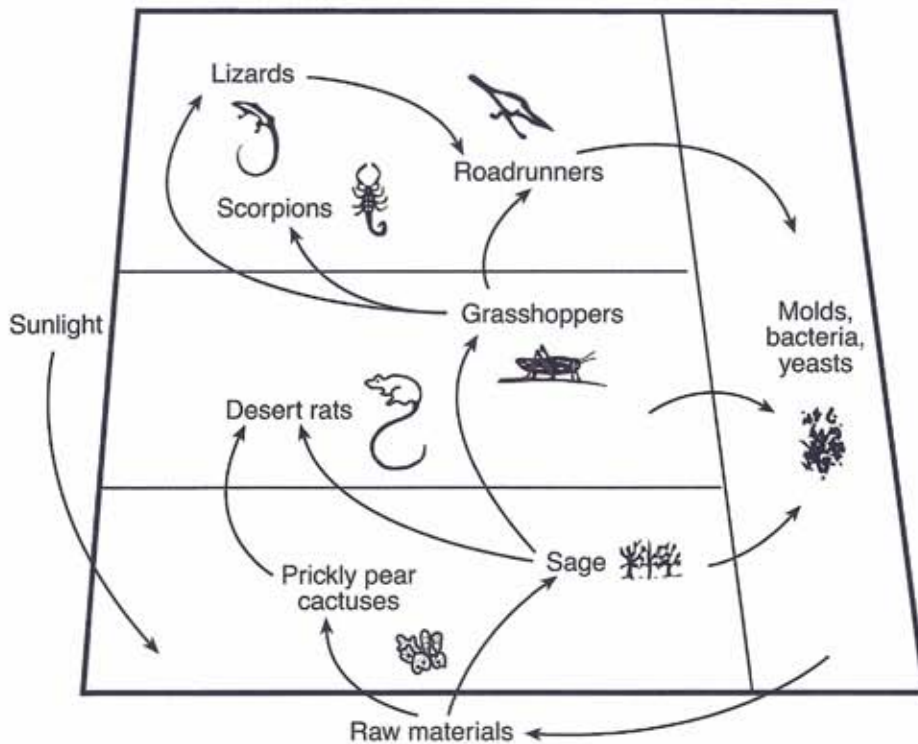
2. The most likely reason there are no colonies in cultures of this species at pH 4 and at pH 10 is that

- (1) these bacteria could successfully compete with other species of bacteria at these pH values
- (2) there are more predators feeding on these bacteria at pH 4 and pH 10 than at other pH levels
- (3) at pH 4 and pH 10 the environment is too acidic or too basic for the bacteria to grow
- (4) fertilization cannot occur in these bacteria at pH 4 or pH 10

3. Which statement is supported by data from this graph?

- (1) All species of bacteria can grow well at pH 7.
- (2) This type of bacterium would grow well at pH 7.5.
- (3) This type of bacterium would grow well at pH 2.
- (4) Other types of bacteria can grow well at pH 4.

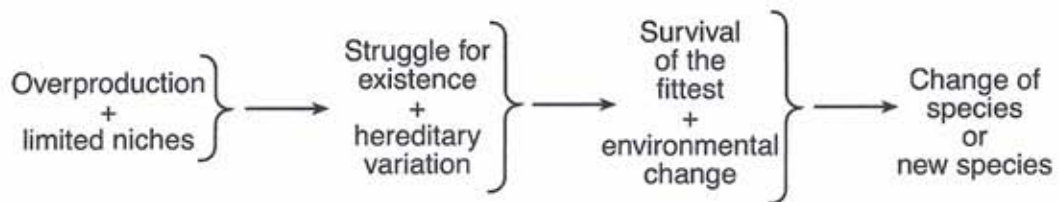
4. Some interactions in a desert community are shown in the diagram below.



Which statement is a valid inference based on the diagram?

- (1) Certain organisms may compete for vital resources.
- (2) All these organisms rely on energy from decomposers.
- (3) Organisms synthesize energy.
- (4) All organisms occupy the same niche.

5. Which concept is best illustrated in the flowchart below?

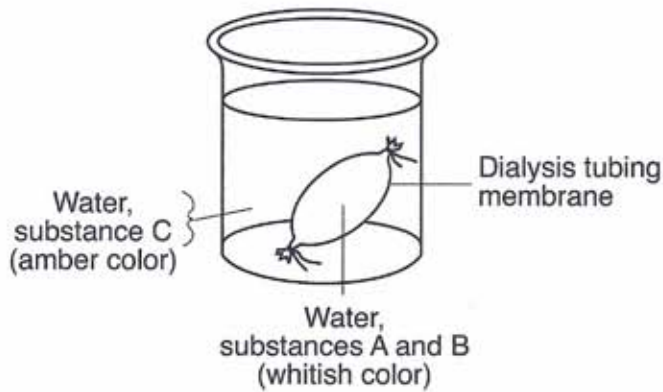


- (1) natural selection
- (2) genetic manipulation
- (3) dynamic equilibrium
- (4) material cycles

Base your answers to questions 6 and 7 on the information and table below and on your knowledge of biology.

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A model of a cell is prepared and placed in a beaker of fluid as shown in the diagram below. The letters A, B, and C represent substances in the initial experimental setup.



The table below summarizes the content and appearance of the cell model and beaker after 20 minutes.

**Results After 20 Minutes**

	Outside of Cell Model	Inside of Cell Model
Substances	water, A, C	water, A, B, C
Color	amber	blue black

6. Complete the table below to summarize a change in location of substance C in the experimental setup. [3]

Name of Substance C	Direction of Movement of Substance C	Reason for the Movement of Substance C

7. Identify substance *B* and explain why it did *not* move out of the model cell. [2]

Substance: \_\_\_\_\_

\_\_\_\_\_

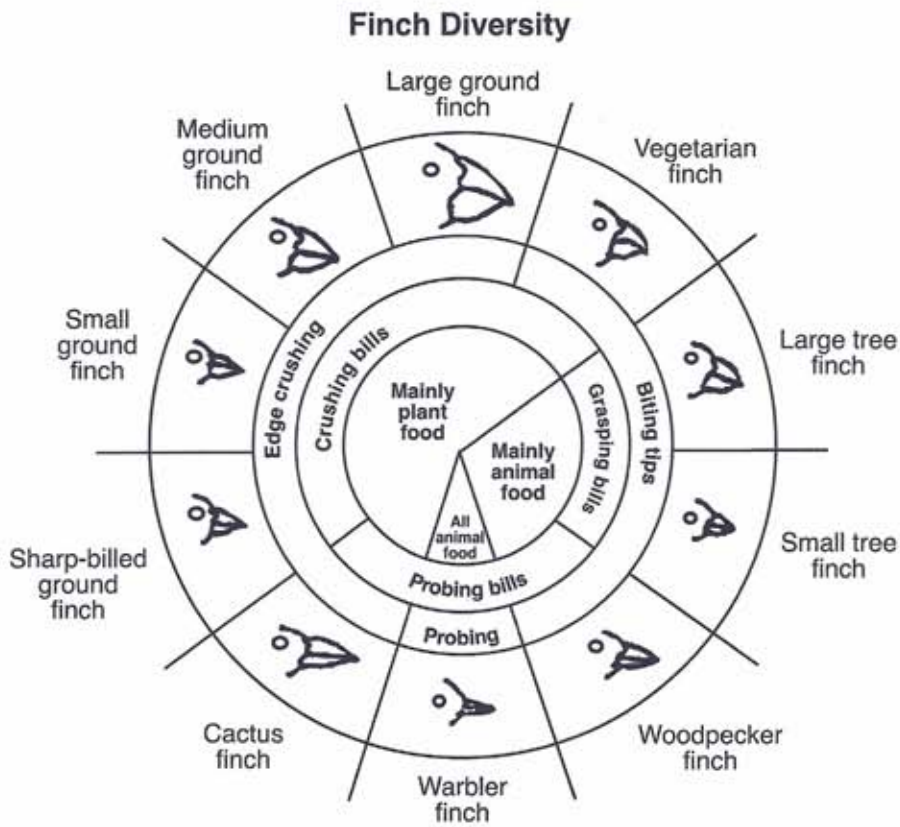
\_\_\_\_\_

\_\_\_\_\_

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8. Species of finches are represented in the diagram below.



State the name of *one* species of finch from the diagram that is most likely to compete with the small tree finch if they lived on the same island. Support your answer with an explanation. [1]

Species: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

9. Electrophoresis is a method of

- (1) separating DNA fragments
  - (2) changing the genetic code of an organism
  - (3) indicating the presence of starch
  - (4) separating colored compounds on a strip of paper
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Base your answers to questions 10 through 13 on the information below and on your knowledge of biology.

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Insecticides are used by farmers to destroy crop-eating insects. Recently, scientists tested several insecticides to see if they caused damage to chromosomes. Six groups of about 200 cells each were examined to determine the extent of chromosome damage after each group was exposed to a different concentration of one of two insecticides. The results are shown in the data table below.

**Cell Damage After Exposure to Insecticide**

Insecticide	Insecticide Concentration (ppm)	Number of Cells with Damaged Chromosomes
Methyl parathion	0.01	7
	0.10	15
	0.20	30
Malathion	0.01	3
	0.10	4
	0.20	11


*Directions (44–46):* Using the information in the data table, construct a line graph on the grid on the next page, following the directions below.

10. Mark an appropriate scale on the axis labeled, "Number of Cells with Damaged Chromosomes." [1]

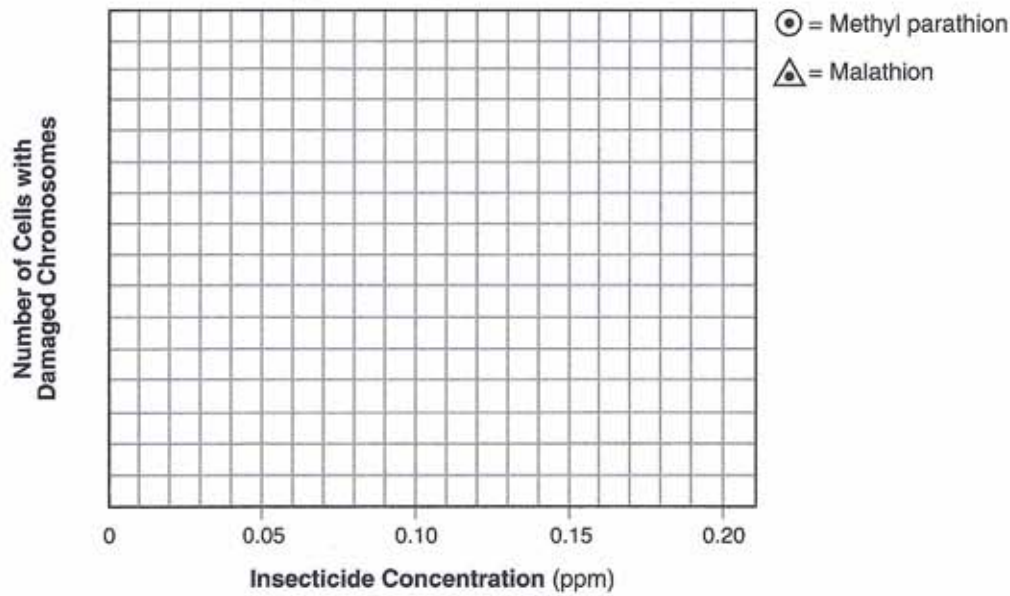
11. Plot the data for methyl parathion on the grid. Surround each point with a small circle and connect the points. [1]

Example: 

12. Plot the data for malathion on the grid. Surround each point with a small triangle and connect the points. [1]

Example: 

Cell Damage After Exposure to Insecticide



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13. Which insecticide has a more damaging effect on chromosomes? Support your answer. [1]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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14. State *one* specific way white blood cells help to protect the human body from pathogens. [1]

\_\_\_\_\_

\_\_\_\_\_

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15. Identify *two* body systems that help maintain glucose levels in the blood and describe how each system is involved. [2]

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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Base your answers to questions 16 through 18 on the table below, which represents the DNA codes for several amino acids.

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Amino Acid	DNA Code Sequence
Cysteine	ACA or ACG
Tryptophan	ACC
Valine	CAA or CAC or CAG or CAT
Proline	GGA or GGC or GGG or GGT
Asparagine	TTA or TTG
Methionine	TAC

16. A certain DNA strand has the base sequence: TACACACAAACGGGG. In the space provided below, write the sequence of amino acids synthesized from this code if it is read from left to right. [1]

\_\_\_\_\_

17. The DNA sequence undergoes the following change:

TACACACAAACGGGG → TACACCCAAACGGGG

How would the sequence of amino acids be changed as a result of this mutation? [1]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. The original DNA sequence undergoes the following change:

TACACACAAACGGGG → TACACACAAACGGGT

State *one* reason this mutation produces *no change* in the action of the final molecule that will be synthesized from this code. [1]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Base your answers to questions 19 through 23 on the information below and on your knowledge of biology.

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An investigation was carried out to measure the rate of activity of catalase, an enzyme that breaks down hydrogen peroxide. Five 40-mL solutions of the enzyme at concentrations of 20%, 40%, 60%, 80%, and 100% were prepared. A filter paper disk was placed in each enzyme solution. Each soaked disk from the different enzyme concentrations was then added to different cups containing 30 mL of 1% hydrogen peroxide. The rate of catalase activity was inferred from measurements of how fast the disks rose from the bottom to the top of each cup. The following data were obtained: 40%–12.1 seconds, 80%–5.8 seconds, 100%–4.1 seconds, 20%–15.8 seconds, and 60%–9.9 seconds.

*Directions (19-20):* Organize the data by completing the data table, according to the directions below.

19. Label the second column of the data table with an appropriate heading and record that label on the *y*-axis of the graph. [Be sure to include units.] [1]

20. Complete the data table so that the percent enzyme *increases* from the top to the bottom of the table. [1]

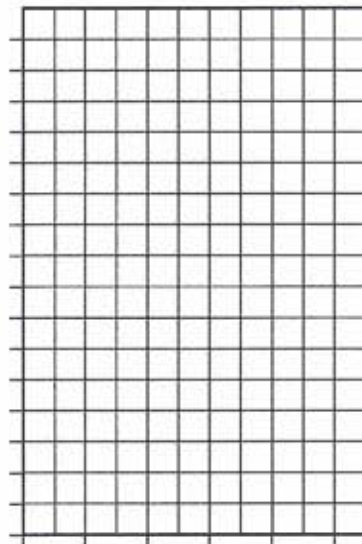
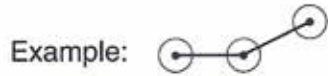
Enzyme Concentration (percent)	

Directions (21--23): Using the information in the data table, construct a line graph on the grid provided, following the directions below.

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21. Mark an appropriate scale on each axis. [1]

22. Plot the data from your data table. Surround each point with a small circle and connect the points. [1]



Percentage of Catalase

23. State *one* valid conclusion that relates enzyme concentration to reaction rate. [1]

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