tpo_17_passage_1

A symbiotic relationship is an interaction between two or more species in which one species lives in or on another species. There are three main types of symbiotic relationships: parasitism, commensalism, and mutualism. The first and the third can be key factors in the structure of a biological community; that is, all the populations of organisms living together and potentially interacting in a particular area. Parasitism is a kind of predator-prey relationship in which one organism, the parasite, derives its food at the expense of its symbiotic associate, the host. Parasites are usually smaller than their hosts. An example of a parasite is a tapeworm that lives inside the intestines of a larger animal and absorbs nutrients from its host. Natural selection the process that results in the survival of individuals or groups best adjusted to the conditions under which they live favors the parasites that are best able to find and feed on hosts. At the same time, defensive abilities of hosts are also selected for. As an example, plants make chemicals toxic to fungal and bacterial parasites, along with ones toxic to predatory animals (sometimes they are the same chemicals). In vertebrates, the immune system provides a multiple defense against internal parasites. At times, it is actually possible to watch the effects of natural selection in host-parasite relationships. For example, Australia during the 1940's was overrun by hundreds of millions of European rabbits. The rabbits destroyed huge expanses of Australia and threatened the sheep and cattle industries. In 1950, myxoma virus, a parasite that affects rabbits, was deliberately introduced into Australia to control the rabbit population. Spread rapidly by mosquitoes, the virus devastated the rabbit population. The virus was less deadly to the offspring of surviving rabbits, however, and it caused less and less harm over the years. Apparently, genotypes (the genetic make-up of an organism) in the rabbit population were selected that were better able to resist the parasite. Meanwhile, the deadliest strains of the virus perished with their hosts as natural selection favored strains that could infect hosts but not kill them. Thus, natural selection stabilized this host-parasite relationship. In contrast to parasitism, in commensalism, one partner benefits without significantly affecting the other. Few cases of absolute commensalism probably exist, because it is unlikely that one of the partners will be completely unaffected. Commensal associations sometimes involve one species' obtaining food that is inadvertently exposed by another. For instance, several kinds of birds feed on insects flushed out of the grass by grazing cattle. It is difficult to imagine how this could affect the cattle, but the relationship may help or hinder them in some way not yet recognized. The third type of symbiosis, mutualism, benefits both partners in the relationship. Legume plants and their nitrogen-fixing bacteria, and the interactions between flowering plants and their pollinators, are examples of mutualistic association. In the first case, the plants provide the bacteria with carbohydrates and other organic compounds, and the bacteria have enzymes that act as catalysts that eventually add nitrogen to the soil, enriching it. In the second case, pollinators (insects, birds) obtain food from the flowering plant, and the plant has its pollen distributed and seeds dispersed much more efficiently than they would be if they were carried by the wind only. Another example of mutualism would be the bull's horn acacia tree, which grows in Central and South America. The tree provides a place to live for ants of the genus Pseudomyrmex. The ants live in large, hollow thorns and eat sugar secreted by the tree. The ants also eat yellow structures at the tip of leaflets; these are protein rich and seem to have no function for the tree except to attract ants. The ants benefit the host tree by attacking virtually anything that touches it.

They sting other insects and large herbivores (animals that eat only plants) and even clip surrounding vegetation that grows near the tree. When the ants are removed, the trees usually die, probably because herbivores damage them so much that they are unable to compete with surrounding vegetation for light and growing space. The complex interplay of species in symbiotic relationships highlights an important point about communities: Their structure depends on a web of diverse connections among organisms.

question 1

Which of the following statements about commensalism can be inferred from paragraph 1?

A It excludes interactions between more than two species.

B It makes it less likely for species within a community to survive.

C Its significance to the organization of biological communities is small.

D Its role in the structure of biological populations is a disruptive one.

question 2

According to paragraph 2, which of the following is true of the action of natural selection on hosts and parasites?

A Hosts benefit more from natural selection than parasites do.

B Both aggression in predators and defensive capacities in hosts are favored for species survival.

C The ability to make toxic chemicals enables a parasite to find and isolate its host.

D Larger size equips a parasite to prey on smaller host organisms.

question 3

Which of the following can be concluded from the discussion in paragraph 3 about the Australian rabbit population?

A Human intervention may alter the host, the parasite, and the relationship between them.

B The risks of introducing outside organisms into a biological community are not

worth the benefits.

C Humans should not interfere in host-parasite relationships.

D Organisms that survive a parasitic attack do so in spite of the natural selection process.

question 4

According to paragraph 3, all of the following characterize the way natural selection stabilized the Australian rabbit population EXCEPT:

A The most toxic viruses died with their hosts.

B The surviving rabbits were increasingly immune to the virus.

C The decline of the mosquito population caused the spread of the virus to decline.

D Rabbits with specific genetic make-ups were favored.

question 5

According to paragraph 5, the relationship between legumes and bacteria benefits the soil by

A adding enriching carbohydrates

B speeding the decay of organic matter

C destroying enzymes that pollute it

D contributing nitrogen to it

question 6

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

A The relationship between flowering plants and pollinators provides pollinators

with food and flowers with efficient reproduction.

B In some cases birds obtain food from the seeds that are dispersed in the wind.

C The wind not only helps the flowers distribute their seeds but enables birds to find more food.

D Animals and insects are more effective in distributing pollen and seeds than the wind.

question 7

According to paragraph 5, which of the following is NOT true of the relationship between the bull’ s horn acacia tree and the Pseudomyrmex ants?

A Ants defend the host trees against the predatory actions of insects and animals.

B The acacia trees are a valuable source of nutrition for the ants.

C The ants enable the acacia tree to produce its own chemical defenses.

D The ants protect the acacia from having to compete with surrounding vegetation.

question 8

What is the main purpose of this passage?

A To explain the concept of symbiosis by expanded descriptions of its principal types

B To make a comparison between human relationships and symbiotic interactions in the natural world

C To demonstrate the unforeseen benefits of natural processes that at first seem wholly destructive

D To argue that parasitism is a problem that can be solved by scientific intervention

question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage.

A symbiotic relationship is an interaction between two or more species in which one species lives in or on another species. There are three main types of symbiotic relationships: parasitism, commensalism, and mutualism. The first and the third can be key factors in the structure of a biological community; that is, all the populations of organisms living together and potentially interacting in a particular area. Parasitism is a kind of predator-prey relationship in which one organism, the parasite, derives its food at the expense of its symbiotic associate, the host. Parasites are usually smaller than their hosts. An example of a parasite is a tapeworm that lives inside the intestines of a larger animal and absorbs nutrients from its host. Natural selection the process that results in the survival of individuals or groups best adjusted to the conditions under which they live favors the parasites that are best able to find and feed on hosts. At the same time, defensive abilities of hosts are also selected for. As an example, plants make chemicals toxic to fungal and bacterial parasites, along with ones toxic to predatory animals (sometimes they are the same chemicals). In vertebrates, the immune system provides a multiple defense against internal parasites. At times, it is actually possible to watch the effects of natural selection in host-parasite relationships. For example, Australia during the 1940's was overrun by hundreds of millions of European rabbits. [] The rabbits destroyed huge expanses of Australia and threatened the sheep and cattle industries. [] In 1950, myxoma virus, a parasite that affects rabbits, was deliberately introduced into Australia to control the rabbit population. [] Spread rapidly by mosquitoes, the virus devastated the rabbit population. [] The virus was less deadly to the offspring of surviving rabbits, however, and it caused less and less harm over the years. Apparently, genotypes (the genetic make-up of an organism) in the rabbit population were selected that were better able to resist the parasite. Meanwhile, the deadliest strains of the virus perished with their hosts as natural selection favored strains that could infect hosts but not kill them. Thus, natural selection stabilized this host-parasite relationship. In contrast to parasitism, in commensalism, one partner benefits without significantly affecting the other. Few cases of absolute commensalism probably exist, because it is unlikely that one of the partners will be completely unaffected. Commensal associations sometimes involve one species' obtaining food that is inadvertently exposed by another. For instance, several kinds of birds feed on insects flushed out of the grass by grazing cattle. It is difficult to imagine how this could affect the cattle, but the relationship may help or hinder them in some way not yet recognized. The third type of symbiosis, mutualism, benefits both partners in the relationship. Legume plants and their nitrogen-fixing bacteria, and the interactions between flowering plants and their pollinators, are examples of mutualistic association. In the first case, the plants provide the bacteria with carbohydrates and other organic compounds, and the bacteria have enzymes that act as catalysts that eventually add nitrogen to the soil, enriching it. In the second case, pollinators (insects, birds) obtain food from the flowering plant, and the plant has its pollen distributed and seeds dispersed much more efficiently than they would be if they were carried by the wind only. Another example of mutualism would be the bull's horn acacia tree, which grows in Central and South America. The tree provides a place to live for ants of the genus Pseudomyrmex. The ants live in large, hollow thorns and eat sugar secreted by the tree. The ants also eat yellow structures at the tip of leaflets; these are protein rich and seem to have no function for the tree except to attract ants. The ants benefit the host tree by attacking virtually

anything that touches it. They sting other insects and large herbivores (animals that eat only plants) and even clip surrounding vegetation that grows near the tree. When the ants are removed, the trees usually die, probably because herbivores damage them so much that they are unable to compete with surrounding vegetation for light and growing space. The complex interplay of species in symbiotic relationships highlights an important point about communities: Their structure depends on a web of diverse connections among organisms.

question 10

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

A. Parasitic relationships involve the interplay of aggression by the parasite and resistance and adaptation by the host.

B. Parasitic damage to Australian rabbits was never reversed because the rabbits were unable to adapt to the parasites' attacks.

C. Mutualism ordinarily involves an interaction between two members of the same species.

D. The rarity of commensal relationships stems from the difficulty of finding relationships that benefit one species without affecting the other.

E. Mutualism is unique among symbiotic relationships in that it benefits both partners involved in the relationship.

F. The structure of biological communities depends on the types of relationships that exist among the species within.