AP® Biology (Operational)
2004 Sample Student Responses

4. Organisms rarely exist alone in the natural environment. The following are five examples of symbiotic relationships.

4 R1

- Plant root nodules
- Digestion of cellulose
- Epiphytic plants
- AIDS (acquired immune deficiency syndrome)
- Anthrax

Choose FOUR of the above and for each example chosen,

(a) **identify** the participants involved in the symbiosis and describe the symbiotic relationship, and

(b) **discuss** the specific benefit or detriment, if any, that each participant receives from the relationship.

1. a) nodules in the roots of legumes, such as snow peas, are inhabited by a bacteria. The legume has a symbiotic relationsh in which both parties benefit b) as the bacteria gets moisture, nutrients, and shelter within the root nodules, the bacteria gives off a for of nitrogen necarry for the legume to grow and develop. W/out the bacteria to help with nitrogen fixation, the Legume would not survive, same as the bacteria requires the shelter and access to nutrients availible in the legume's roots.

2. a) a cow eating grass also requires the help of bacteria, this time to digest cellulose. b) the bacteria break-down the cellulose through fermentation to release nutrients, some of which the bacteria consume as food also. The bacteria also help prevent sickness to the cow by occuping minute spaces w/in its digestive tract, preventing another, more harmful bacteria from residing there.

3. a) Aids is an infection in which a virus takes over the immune system of a human host. b) the HIV virus origaly occupies a limited number of immune system

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cells and causes ~~@~~ no effects good or bad to the host. When the HIV virus begins to proliferate out of control, the infection becomes overwhelming to the host's system, resulting in Aids. The host receive no benefit and in fact suffers from a weakend or non existent immune system and is very suseptable to even comanonly "puney" sicknesses as chronic and fatal. The virus, however, recieves a means to replicate and manufacure itself within the host, and even uses the host to contaminate and take over others and spread

4. a) Anthrax is a fungus which preys on living animal hosts.
b) anthrax enters a host as spore and feeds off of its host ~~F~~ by tapping into its circulatory system. The toxins released from its metabolism are fatal and eventualy the host dies from the infection. the animal host receives no benefit from a symbiodic relationship with anthrax.

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4 S1

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Most organisms cannot digest cellulose by themselves. This is why some organisms who feed on wood or other substances primarily made of cellulose often have a symbiotic relationship with bacteria that live in the organisms intestine. This is an example of a mutualism relationship because the bacteria help the organism break down cellulose into nutrients while the organism provides the bacteria with shelter and food.

Plant root nodules provide a place for ants to build nests while the ants protect the plant. This is an example of a mutualism symbiotic relationship because the plant is recieving protcation while the ants recieve a place to live.

AIDS is an example of a parasitic symbiotic relationsh The AIDS virus lives inside a person and uses the host for food and shelter. The AIDS virus will eventually kill its host. The AIDS virus benefits while the host is being harmed.

Anthrax rarely exists in nature and usually

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lives in swamp lands. Anthrax is a bacteria and can grow inside a living organism. Sometimes anthrax affects cattle. When cattle are infected with Anthrax, it is an example of a parasitic symbiotic relationship. The anthra gets nutrients and a warm, wet environment. The host is usually killed by the anthrax. The arthrax is the parasite in the symbiotic relationship and the cow is the host.

4 T1

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There are three types of symbiotic relationship There is ~~Not~~ Mutualism in which both organisms ~~bef~~ benefit. Commentalism in which one organism benefits and the other organism does not gain anything, but it is not harmed either. The third type is Parasitic in which one organism ~~Benefits~~ at the expense of the other organism.

Plant root nodules work in ~~cor~~ relationship with a type of fungos (creates) mycelium, which expands the surface area of the roots, and enables it to ~~Ab~~ absorb more nutrients more the soil. The plant nodules in turn provide it with some ~~sorg~~ support & nutrients. This is a mutualistic relation as both of them ~~benf~~ benefit from each other.

Digestion of cellulose in most organisms occurs in the digestive tract, where ~~here~~ bacteria is present,

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Bacteria break down cellulose, and aid the animal in digestion. This is again a mutualistic relationship because the organism's ~~stomach~~ intestine digestive system contains the right pH, where the ~~organism~~ (bacteria) can thrive.

AIDS is ~~a~~ a parastic relationship because the virus take over the functions of the cell, and ~~eventually~~ eventually kills the cell. The virus is able to reproduce and spread, but at the expense of the cell and indirectly the organism.

Anthrax is also similar to AIDS, it is parasitic because the organisms will die, where as the Anthrax spreads and thrives inside the body. They do it at the expense of the cell.

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