

## Should Genetically Engineered Bacteria Be Released into the Environment?

When people hear the word *bacteria*, they usually think of germs and illness—and with good reason. Many infectious diseases are caused by bacteria. But bacteria serve many beneficial functions as well. They are an important part of the ecosystem, recycling nutrients from dead tissue back into the food web. We use bacteria for many purposes, including making yogurt and cheese.

Genetic engineering has greatly expanded the ability of scientists to use bacteria. Genes from other organisms can be placed in bacteria to create new traits. For example, the gene for human insulin production has been successfully inserted into bacteria, causing the bacteria to produce the hormone.

Other potential uses for genetically engineered bacteria involve the release of bacteria into the environment. Such microbes could be used to improve agricultural production or help in environmental cleanup. However, many people strongly object to the deliberate release of new life forms into the environment.

**Supporting Points** In April 1987, near Brentwood, California, scientists field-tested an altered form of *Pseudomonas syringae*, a bacteria that normally grows on the surface of many crops, including strawberries. Normal *P. syringae* contain a gene that promotes the formation of ice crystals on crops. In the genetically altered bacteria, commonly called *ice-minus*, the ice-forming gene had been removed. Spraying the crops with ice-minus bacteria protected them from frost damage. Scientists believed that this protection would reduce the amount of frost damage, lengthen the growing season, and save billions of dollars in crop loss.

Genetically engineered bacteria have many potential environmental uses. Bacteria that consume wastes, such as plastic or old automobile tires, could reduce some of the problems of waste storage. Other bacteria could

be engineered to act as pesticides or to remove toxic wastes from the soil.

As the human population continues to increase, the need for more productive agriculture and more effective waste disposal systems also increases. Genetically engineered bacteria may help to solve these environmental problems.

**Opposing Points** Many, including scientists, objected to the release of the ice-minus bacteria in 1987 because they did not believe *any* engineered bacteria should be released into the environment.

It is impossible to accurately predict what will happen to microbes after they have served their function, or how they might affect other organisms. Although the developer of the bacteria intends to keep them under controlled, contained conditions, there is always the possibility of accidental release. Consider what might happen if tire-eating bacteria escaped and reproduced freely. Because bacteria cannot tell the difference between good tires and waste, all rubber tires could eventually become useless!

The release of new organisms into an ecosystem affects the entire system. This process has been observed when new species of plants or animals are introduced into new habitats. Introduced organisms may aggressively compete with and displace native species. This would affect the populations of predator and prey organisms that normally coexist with the displaced species. Eventually, the whole ecosystem could be disrupted.

The balance of nature is very delicate. All living things play a role in their environment, whether people understand or appreciate the role or not. It may be unwise to endanger the intricate web of life by releasing new microbes whose activities cannot be predicted with absolute certainty.

**REVIEW** *On the lines provided, answer the following questions.*

1. In what ways could genetically engineered bacteria be useful in the environment?

---

---

---

---

---

2. What risks are associated with the release of engineered bacteria?

---

---

---

---

---

---

---

**CONSIDER THIS** *On the lines provided, answer the following questions.*

1. If you were a strawberry farmer, would you use ice-minus bacteria on your crops if it meant a 10 percent increase in your productivity? Explain your decision.

---

---

---

---

---

---

---

2. Suppose there were bacteria that could destroy mosquito larvae, reducing the number of mosquitoes in your area all summer long. Would you encourage the release of such bacteria? Explain your answer.

---

---

---

---

---

---

---

---

---

---