

Four men and four women were identified as the first team. But before they closed the door, they had to populate Biosphere 2 with other organisms in order to turn the newly finished building into an ecosystem. The ecologists working on the project spent a long time selecting organisms. They knew that they needed plants, animals, and microorganisms. They needed to have food for eight people and life support for the organisms that would provide the food. They needed organisms to refresh the air and dispose of waste materials. The planning was complex and detailed—lives depended on getting it right.

## The First Mission

In September 1991 the door was closed and sealed with the eight Biospherians and 1800 other populations on the inside. The challenge faced by the humans was the same one astronauts will probably face during our first visits to other planets. The trip to the Moon takes a few days. A trip to Mars might take a year. The most efficient way to make such a journey would be in a miniecosystem, where everything needed for life recycles.

Biosphere 2 had surprises for the scientists inside. Before long they noted that the oxygen concentration began to drop. The oxygen started at 21%, the concentration of oxygen in Earth's atmosphere, but got down to 14%. This was a dangerous level for the people. Where was the oxygen going?

Analysis revealed that the soil in Biosphere 2 was too rich in organic matter. The populations of microbes were growing out of control, using too much of the oxygen. The scientists reasoned that if the oxygen concentration was going down, the carbon dioxide (CO<sub>2</sub>) concentration should be going up. But the concentration of CO<sub>2</sub> was not going up as fast as the scientists calculated. It was later discovered that the CO<sub>2</sub> was being taken up by the massive

amount of concrete that was still curing.

On the biotic side, a problem came up with ants. An uninvited species, known as crazy ants, got into Biosphere 2 somehow and caused disruptions in the community. Not only did the ants put pressure on other organisms in the ecosystem, they clogged vents and chewed on wiring, creating quite a nuisance.

How could tiny organisms like ants cause a major problem in the Biosphere 2? Crazy ants form "super colonies." Super colonies have many queens and many nests. All of the ants work together to search for food, share food, and distribute resources. Most other species of ants form colonies with a single queen in a single nest and are highly territorial toward other colonies of the same species of ant. Crazy ant colonies, on the other hand, cooperate with one another. This gave them an advantage over other species of ants in Biosphere 2. While crazy ants are not aggressive to others of their species, they are very aggressive in searching out and attacking prey. They can effectively communicate the exact location of the prey to other ants in the super colony. Then they can launch an attack that will overwhelm even a large insect such as a cockroach.

Crazy ants, like other ants and many other animals, communicate with each other by using pheromones. Pheromones are scent chemicals that send signals to other animals of the same kind. For example, ants leave pheromones on the ground to mark a trail for other ants in the colony to follow. While most other ants are thought to have only one trail pheromone, crazy ants have at least three different ones. Some of these pheromones evaporate faster than others, so they stay on the trail for only 2–3 minutes, while other pheromones may last for 24 hours. Crazy ants, with more than one pheromone, can provide more information to other ants so the colonies can adjust