Bioaccumulation Relay

Objective

The students will describe the process of bioaccumulation.

Materials

- ❑ 80 or more round plastic game chips
- ❑ playing field (30’ x 60’)

Background

Although it might seem that any toxins that enter the ocean would be diluted in the water, they actually become very concentrated as they pass from prey to predator in a food chain. For example, phytoplankton (small plants that float or drift in an ocean’s currents) get their “food” or energy from the sun. Phytoplankton may also absorb toxic chemicals or heavy metals dissolved in the water.

When fish eat plankton, they also ingest these toxins. These toxins become part of a fish’s body. The more the fish eat, the more toxins they absorb. Fish are prey for seals, and a seal may eat many fish. In turn, a polar bear may eat many seals. With each step along the food chain, consumers obtain bigger chunks of concentrated toxins. Scientists call this effect bioaccumulation—the buildup over time of harmful substances in animal and plant tissues. These substances are then passed on to animals higher in the food chain.

Action

1. Before beginning the relay race game, review with students the concepts of predator, prey, food chain, food web, and how energy is passed from one level to the next in a sample food chain of phytoplankton, krill, fish, seal, and polar bear.
2. To prepare for the relay game, have students count off in fives. Mark a starting line on the playing field and have each number form a single-file line behind the starting line. Name the first student in each line phytoplankton; the second krill; the third fish; the fourth seal; the fifth polar bear.

   Place plastic chips on the opposite side of the playing field.
3.
4. Instruct students to run down the playing field and pick up twice as many plastic chips as they already have. Phytoplankton students begin by grabbing one chip and passing it to the next student in line, krill. Krill students grab another one to double the chips to two. Fish students grab two to double the number to four. Seals grab four, and polar bears grab eight for a final total of 16 plastic chips.
5. When the game is over explain that each plastic chip represents a toxin. Ask students what happens to top predators (like polar bears) that consume prey with toxins in their tissues. Explain bioaccumulation and how concentrated toxins can pose a serious threat to the survival of predators.