

Symbiosis

A close relationship between individuals of two or more species is called symbiosis. The partners in symbiosis typically have effects on each other's lives such as their ability to survive and reproduce. Symbioses are classified according to which species benefits from the relationship. There are three kinds of symbiosis: mutualism, commensalism, and parasitism.

Mutualism

A relationship in which both species benefit is called mutualism. There are many examples involving species from every kingdom of life. Most plants form a type of mutualistic relationship with fungi that is called a mycorrhizal. Fungi have hairlike structures that take up water and nutrients. The fungi live on sugars and other food they collect from plant roots. In turn, the fungi absorb water and minerals that are shared with the plant.

Mutualism results in many dramatic adaptations. Pollinators, such as birds and insects, and the flowers they pollinate are an example. Plants produce flowers with the shape, color, and smell preferred by their pollinators. Some flowers even look much like females of the insect pollinator's species.

Parasitism

Parasitism is a symbiotic relationship in which one organism, the parasite, feeds on the living body of the other organism. The parasite benefits, while the host, or the organism on which the parasite lives, is harmed. Some parasites, including fleas, mosquitoes, and ticks, live on the outside of the host. Other parasites, such as tapeworms, can live only inside the host's body. Parasites have evolved to where they may hurt, but not kill, the host. If the host dies, the parasite can also die. Host species adapt by poisoning parasites or attacking them with their immune systems.

Commensalism

A symbiotic relationship in which one organism benefits and the other is not affected is called commensalism. One common type of commensalism occurs between jellyfish and young fish. A young fish benefits from the relationship because it is protected from predators by the jellyfish's stinging tentacles. The jellyfish is neither helped nor hurt by the presence of the fish. Commensal species adapt by seeking partners that will provide the full benefit of the relationship. If small fish are more likely to survive when being protected by a jellyfish's tentacles, the fish species will likely adapt to recognize and attach themselves to jellyfish.

Predator-Prey Relationships

Predation is another type of mutualism in which one organism kills and eats another organism. Predation involves two organisms or species—a predator and its prey. The predator benefits by gaining food, while the prey that is eaten can no longer survive and reproduce. Unlike parasitism, which lasts a long time without killing the host, predation is a one-time relationship. Predator and prey species can affect each other's carrying capacity in a community.

Predation and Carrying Capacity

On Isle Royale in Lake Superior, moose colonized the island, and their population grew rapidly in the absence of predators. Food was one of the limiting factors that influenced the carrying capacity of the moose. When wolves colonized the island, predation became another factor that reduced the carrying capacity of the moose but increased the carrying capacity of the wolf.

How Changes Affect Food Webs

If the top predator in a food web is removed, all the other species in the web will be affected, for better or worse. For example, humans have killed off wolves throughout most of the United States to prevent wolves from eating livestock and to reduce competition between human hunters and wolves. One unexpected result was the significant increase in the number and range of coyotes. Coyotes were competing with wolves for small-animal prey. Also, wolves killed and ate many young coyotes. So, as the population of wolves decreased, the population of coyotes increased. Elk, rabbit, mouse, and deer populations also grew rapidly after the removal of wolves. These increases led to overgrazing and destruction of crops and plant communities.

Adaptation to Predation

Predators and prey both adapt to their relationships. Prey species adapt by becoming harder to find and less tasty to predators. They may also adopt a reproductive strategy of having many offspring at once. For example, all the maple trees in a population produce a heavy crop of seeds at the same time every few years. There are too many seeds for predators to eat them all. By the time the predator populations have grown larger, the young trees are too big to be eaten. Predators also adapt to increase their fitness. They can become better at catching and killing their prey. Behaviors such as speed, teamwork, and quiet movement help lions kill large animals. In addition, many predators can survive for a long time without catching any prey. Spiders can wait months between meals, and wolverines store meat under the snow.