

Mutualism in Fungi

Fungi have several mutualistic relationships with other organisms. In mutualism, both organisms benefit from the relationship. Two common mutualistic relationships involving fungi are mycorrhiza and lichen.

- A **mycorrhiza** is a mutualistic relationship between a fungus and a plant. The fungus grows in or on the plant roots. The fungus benefits from the easy access to food made by the plant. The plant benefits because the fungus puts out mycelia that help absorb water and nutrients. Scientists think that a symbiotic relationship such as this may have allowed plants to first colonize the land.
- A **lichen** is an organism that results from a mutualistic relationship between a fungus and a photosynthetic organism. The other organism is usually a cyanobacterium or green alga. The fungus grows around the bacterial or algal cells. The fungus benefits from the constant supply of food produced by the photosynthesizer. The photosynthesizer benefits from the water and nutrients absorbed by the fungus. Figure below shows lichen growing on a rock.



Lichen Growing on Rock.

- Unlike plants, lichen can grow on bare rocks because they don't have roots. That's why lichens are often pioneer species in primary ecological succession. How do lichen get water and nutrients without roots?
- Many fungal mutualisms are driven by the ability of the fungus to decompose organic substrates that are inaccessible to its host. Again, it is often not clear to what extent the two partners benefit (experience enhanced fitness), which calls into question the classification of these interactions as mutualisms.
- Lichens are symbioses involving fungi and unicellular algae

- The fungi are mostly ascomycetes, but there are also a few basidiolichens. The algae are mostly eukaryotic green algae, but there are also some cyanobacterial symbionts. The fungi obtain carbohydrates from the algae, which are photosynthetic and contribute the green color to the lichen thallus. Many lichens are sensitive to air pollution and are indicators of air quality.

Summary

- Many fungi are involved in symbiotic relationships.
- Some fungi are parasites. They are specialized to penetrate a host and break down the host's tissues. Parasitic fungi often cause illness and may eventually kill their host.
- Two common mutualistic relationships involving fungi are mycorrhiza (fungi and plant roots) and lichen (fungi and either cyanobacteria or green algae).
- Some fungi also have mutualistic relationships with insects.

Review

1. How significant are fungi as plant parasites?
2. Describe an example of a mutualistic relationship between fungi and insects.
3. Assume that you notice a fungus growing on a plant. What possible relationships might exist between the fungus and the plant? What

type of evidence might help you identify which is the correct relationship?

4. Compare and contrast mycorrhiza and lichen.