

# NATURE NOTES

## Essential Workers:

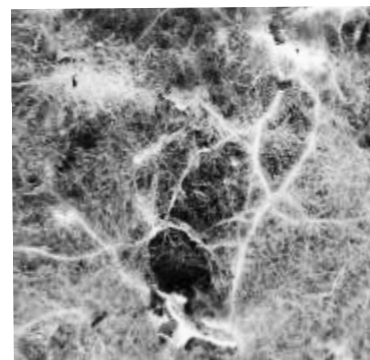
## FUNGI — unseen, unsung, unpaid

We seldom think of these little workers unless they cause problems, but many are indispensable for life to exist. They are members of the **Kingdom Fungi** and the free "ecosystem services" they provide are truly essential.

### What are fungi?

Fungi are microscopic living organisms that evolved 900 million years ago. They come in many forms; the ones we know best are yeasts, molds and mushrooms. They can be a single cell or multicellular. Some grow out into tiny fungal threads called **hyphae**, that form thick mats called **mycelia**. To reproduce, fungi create **spores**, rather than seeds. A single organism grown from a single spore can have kilometres of threads. Most of the fungus is in the mat of underground mycelium. We see only the "fruiting bodies," such as mushrooms, that appear above ground when the organism is ready to reproduce.

Fungi do not contain chlorophyll and are unable to make their own food from sunlight, carbon dioxide and water, as plants do. To get nutrients, fungi excrete enzymes into their environment to decompose dead and dying plants and animals. The fungus absorbs some of the soluble digested material as food for growth.



Fungus mycelium

### What kinds of ecosystem work do they do?

#### Decompose complex organic material

Essential work because, without decomposition of dead and dying plant and animal material, soils would be severely lacking in nutrients for new growth. Organic particles resulting from fungal decomposition significantly benefit soil structure and function. As breakdown continues, nutrients such as carbon (C), nitrogen (N), phosphorus (P) and potassium (K) are released into the soil and are available to be recycled into plants.

#### Form mutually beneficial associations

Fungus hyphae and plant roots grow together and form large assemblies called **mycorrhizae**. Fungus gets carbohydrates produced by plants; fungus gives plants vital nutrients and water absorbed from the soil.

Lichens have a physical structure built of a fungus that contains algae to synthesize food.

Sources say that up to 90% of plants require fungal associations.

#### Facilitate communication between plants

In the 1980s, Canadian researcher Suzanne Simard showed that mature trees can send food to young trees via the fungal mat. Simard later found that "fir trees were using the fungal web to trade nutrients with paper-bark birch trees over the course of the season."

It has been shown that plants, attacked by parasites, for example, can send chemical signals via the fungus network to warn other plants to institute defense mechanisms.

Some call it the "wood-wide net" or "nature's internet."

#### Enable tiny seeds and plants with no chlorophyll to grow

Some plants produce minute seeds without enough food to start embryo growth. The tiny seed of moccasin flowers has a slit at one end, just right for a fungal thread to enter and provide what is needed. Without the critical associated fungus, we would not have these beautiful little native orchids.

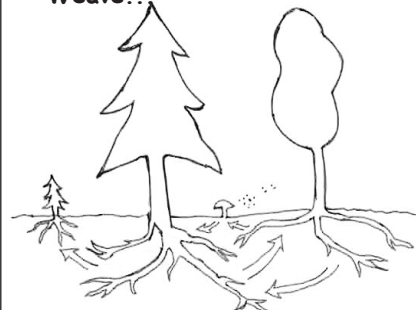
Some plants, such as ghost pipes (a.k.a. Indian pipes) and beech drops, have no chlorophyll and cannot produce their own food. They depend on fungus to share carbohydrates obtained from plants that do have chlorophyll.

#### More...

~"Entangled Life: How Fungi Make Our Worlds, Change Our Minds and Shape Our Futures" Martin Sheldrake 2020

~"Finding the Mother Tree: Discovering the Wisdom of the Forest" Suzanne Simard 2021

"Oh! What a Tangled Web We Weave..."



~ Trees use chlorophyll and sunlight to produce sugars (C) from CO<sub>2</sub> in the air, and send them to seedlings, other trees and to fungi via fungal threads

~ Fungal threads absorb N, P, K and H<sub>2</sub>O from soil and send to plant roots

~ Mature trees share these nutrients and sugars with seedlings, and exchange with other trees, even if a different species

~ Aileen Merriam