GALWAD

FUTURE FUNGI

FIND OUT HOW IMPORTANT FUNGI COULD BE FOR OUR FUTURE, WITH AN ACTIVITY ON HOW IT COMMUNICATES ACROSS LARGE DISTANCES

Background information

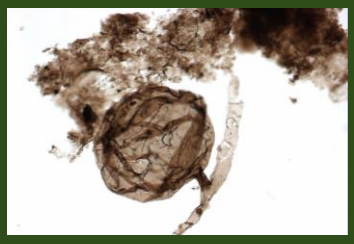
When we think of fungi, most of us think of mushrooms. But mushrooms are only fruiting bodies, similar to apples on a tree. Most fungi live out of sight, yet they make up a massively diverse kingdom of organisms that support and sustain nearly all life on Earth.

Fungi are important as decomposers in the soil - they convert organic matter that is hard to digest into forms other organisms can use. Lots of people are familiar with the above ground appearance of a mushroom – but may not be aware of the mycelium. Mycelium is a root-like structure of a fungus consisting of a mass of branching, thread-like hyphae or strands

Mycelium physically bind soil particles and are crucial in creating a healthy soil environment. Also, incredibly, up to 90% of all plant life depends on a symbiotic relationship with fungi to stay alive. Fungi get sugars from plants, and in return fungi supply plants with soil minerals. In short **no fungi, no plants, no life on earth!**

Through the mycelium, a fungus absorbs nutrients from its environment. The mycelium network spreads throughout the soil – in fact if you teased apart the mycelium found in a teaspoon of healthy soil and laid it end to end, it could stretch anywhere from 100 metres to 10km.

The largest living organism in the world is a 2400 years old honey fungus which covers more than 3.4 square miles in an American Forest.



Fossil records suggest the first known appearance of fungi to about one billion years ago – long before plants evolved.

Many common medicines are produced using fungi, including the first known antibiotic, penicillin.

Scientific research has shown that fungi communicate along their mycelium by sending small electrical impulses, and use information collected from their surroundings to determine the best way to grow. It may sound like something from a sci-fi programme, but there is potential for incorporating tissue from a fungus into future computing devices.

Scientists are also exploring how fungi can be used to help map transport infrastructure, clean up pollution, create sustainable clothing and construction options and even help regenerate habitats. In fact, Adidas are one of several big companies who now sell mushroom clothing in the form of trainers. Mushroom mycelium can be used to produce a sustainable alternative to leather called Mylo (mylo-unleather.com)

We are alive because there are fungi, and it looks like they will help shape a sustainable future for us as well!

Activity

Below are two fungus linked outdoor activities designed to raise awareness of these incredible organisms. They incorporate elements of mindfulness, team work, and problem solving. We also recommend a mushroom hunt to see if you can spot any growing in school. You could use this simple ID chart (wildlifewatch.org.uk).

Please never pick a wild mushroom as some can be toxic.

Mycelium Mindfulness
Participants work in pairs or small groups. One participant becomes the fungus, and their fingers are their mycelium. Ask this participant to close their eyes (or put on a blindfold) as fungus cannot see – they have to rely on their mycelium to interpret the world around them. The other members of the group go and find different pieces of natural material and lay them in front of the fungus, who has to work out what the items are by focussing in on the texture and feel of the items alone.

An alternative version is to use trays of loose soil to hide the items in, so the fungus has to spread its mycelium throughout the soil to investigate each item buried within.

Fungus code breaker
Fungus can send electrical impulses underground through long, thread-like structures called hyphae, which expand to form a network of mycelium – it is similar to how our nervous system works. Research has even shown that the firing rate of these impulses increases when the mycelium of fungi come into contact with

something they want to digest, raising the possibility that fungi use this electrical "language" to share information about food or injury with distant parts of themselves.

The Challenge
Ask one participant to become a fungus at the centre of the space. Ask other pupils to create a line from the fungus and then ask them all to hold hands to make a chain. Chains should have at least five participants, but can be as long as you like. This chain represents the mycelium of the fungus, reaching out trying to locate food.
In your hand hold a sample of natural materials (e.g. pebbles, pieces of wood, leaves).

You will discretely show one of these materials to the end participant in the chain (furthest from the fungus) and they have to send a message back through the chain to the fungus as to what the item is. As fungi rely on electrical impulses to send messages, so will the participants. If the item is wood, the end member of the chain will squeeze the hand of the next participant once. This code of 'one squeeze' needs to be passed along the chain to the fungus so it can decide whether it is food or not. Two squeezes can be code for a pebble, and three squeezes for a leaf, or any code you come up with.

After a few attempts, try placing a code 'sentence' of items by the end of the mycelium chain (e.g. pebble, pebble, wood, leaf), and see if the participants can successfully transmit the code back to the fungus.

Extension – The latest research suggests some fungus species have a language of up to 50 'words'. Challenge your fungus to interpret a wider range of items, coming up with codes for each one. How many can they get right?

Extension - Have more than one group acting as a fungus (ensure each group has the same number of participants in the mycelium chain). Show the same code 'word' (e.g. pebble, wood, leaf, pebble) to each group and see which team can get the message back quickest and most accurately. Or have a few participants as the central fungus with multiple mycelium chains coming off (like a real fungus) and see if they can send multiple coded messages at once.

Reflection

You've learnt a little about how vital fungi are to our daily lives and a little about how they could potentially help make our planet a more sustainable place. We are still learning so much about the amazing things that mushrooms can do or things that they can be made into.

The network of mycelium is like a fantastically connected community, communicating messages that support other parts of the community. Is there anything that we could learn about how they communicate and support other parts of the ecosystem community?

Curriculum links

WALES

Purposes

- Ethical, Informed Citizens
- Enterprising, creative contributors

AOLES and What Matters statements

Humanities

- Our natural world is diverse and dynamic, influenced by processes and human action.

Science and Technology

- The world around us is full of living things which depend on each other for survival.

SCOTLAND

Social Studies: People, place and environment.
Sciences: Planet Earth – Biodiversity and interdependence.

NORTHERN IRELAND

The World Around Us: Place, Change Over Time.
Personal Development and Mutual Understanding: Mutual understanding in the local and wider community.

ENGLAND

PSHE: Living in the Wider World – carrying out shared responsibilities for protecting the environment.
Science: Living things and their habitats

Global Goals

Goal 15: Life on Land

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