Welcome to the World of Fungi

In the beginning

‘Can you believe that fungi have been around on earth longer than humans?’

► Earth is approximately 4.6 billion years old.
► Humans have been on earth for about 200,000 years.
► Fungi have been on earth for about 500 million years.

Fungi are so tough and well adapted to their environment that they outlived the dinosaurs. The scientists that study fungi (mycologists) have so far identified more than 100,000 species, but estimate that there could be 1.5 million species all over the world.

► Question: Why do you think not all species have been found?

There are so many living organisms on earth that scientists have classified them into 5 kingdoms:

1. Animals
2. Plants
3. Bacteria
4. Protists
5. Fungi

[Note: all those names are plural. If you have one mushroom, it is a fungus; if you have two they are fungi.]
**Let’s focus on fungi**

What do you think of when you read the word........fungi?
...............................mushrooms and toadstools?

These answers are correct, but they aren’t the only answers.

Bacteria are called prokaryotes (they have no nucleus) whilst fungi (as well as animals, plants and protists) are eukaryotes (they have a nucleus) and may be single celled (yeast) or filamentous and multicellular (with 100s or 1000s of cells.)

Filamentous multicellular fungi include:
    - mushrooms and toadstools
    - moulds
    - cup fungi
    - bracket fungi
    …and lots of others

They all have different:
    - sizes
    - shapes
    - colours
    - smells
    - textures

From *Fungus Fred Goes Foraying* by Margaret Hadley
What are Fungi Made of?

If you pull a shop-bought mushroom apart with your fingers you’ll see that the body of the mushroom is made up of a network of threads or fibres – these are called hyphae. A hypha is characteristic of fungi. It is a long, growing tube.

The large network of hyphae is called the mycelium. It is responsible for finding food sources for the fungus.

Growth of a mushroom occurs in different stages. The mycelium grows under the soil, searching for food.

This searching and branching outwards develops the mycelial network. Only when conditions are correct, does the mycelia grow upwards out of the soil to produce a mycelial knot that eventually grows into the visible mushroom.
Why aren’t Fungi Plants?

<table>
<thead>
<tr>
<th>Plant Cell</th>
<th>Fungal hypha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulose cell wall</td>
<td>Cell wall made of chitin</td>
</tr>
<tr>
<td>Chloroplasts</td>
<td>No chloroplasts</td>
</tr>
</tbody>
</table>

**KEY DIFFERENCE:** **Feeding.**

1. Plants make their own food, converting light energy gained from the sun into chemical energy, using their chloroplasts. This is called photosynthesis.
2. Animals engulf their food (even individual animal cells do this).
3. Fungi secrete enzymes into their food to digest it externally; they then absorb the small molecules produced by the digestion as their nutrients.

Fungi differ in the way they feed. They can be:

1. **Saprotrophic** (obtaining their nutrients by decomposing [and therefore recycling] dead organic materials)
2. **Symbiotic** (in a close, mutually-beneficial relationship with another organism)
3. **Parasitic** (living on or in another organism (the ‘host’) and taking their nutrients from the host; this may injure and may kill the host).
Hyphal growth is characteristic of fungi. Hyphae grow at their tips; they search for areas in the soil which contain plenty of food. They don’t engulf their food like animals, so **how does the food enter the hyphae?**

The answer is **enzymes digest the food outside the hyphae.** Special enzymes are released (secreted) from the hyphal tips and can break down large complex food into smaller soluble food that the hyphae can then absorb.

## Where are Fungi Found?

<table>
<thead>
<tr>
<th>Fields</th>
<th>Forest floor</th>
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<tbody>
<tr>
<td></td>
<td>On trees</td>
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<td></td>
<td>Back garden</td>
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<table>
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<tr>
<th>Obvious?</th>
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<table>
<thead>
<tr>
<th>On ships</th>
<th>Window frames</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheese and bread (food)</td>
<td>Between your toes</td>
</tr>
<tr>
<td>In your mouth</td>
<td>On your skin</td>
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<table>
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<tr>
<th>Not so obvious?</th>
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► **Question:** How many uses for fungi can you think of?

### SAFETY

Some fungi are edible, but some are **POISONOUS**

If you find a fungus growing wild

**DON’T EAT IT**

**DON’T Touch IT**
Find the correct explanation to complete the statement.

Draw a line linking the start of the sentence in the left-hand column with the end of the sentence in the right-hand column.

1. Fungi are… …special enzymes that break down complex food into smaller soluble food.

2. Fungal parasites… …500 million years ago.

3. Fungal decomposers… …feed off living trees and plants and can sometimes kill them.

4. Fungal symbionts… …break down dead wood, plant and animal material.

5. Fungi can be found… …eukaryotes.

6. Fungi feed via… …make physical links with another organism. Both benefit from the relationship.

7. Fungi first appeared on earth… …(a) in woodland areas, (b) between our toes, (c) on ships.