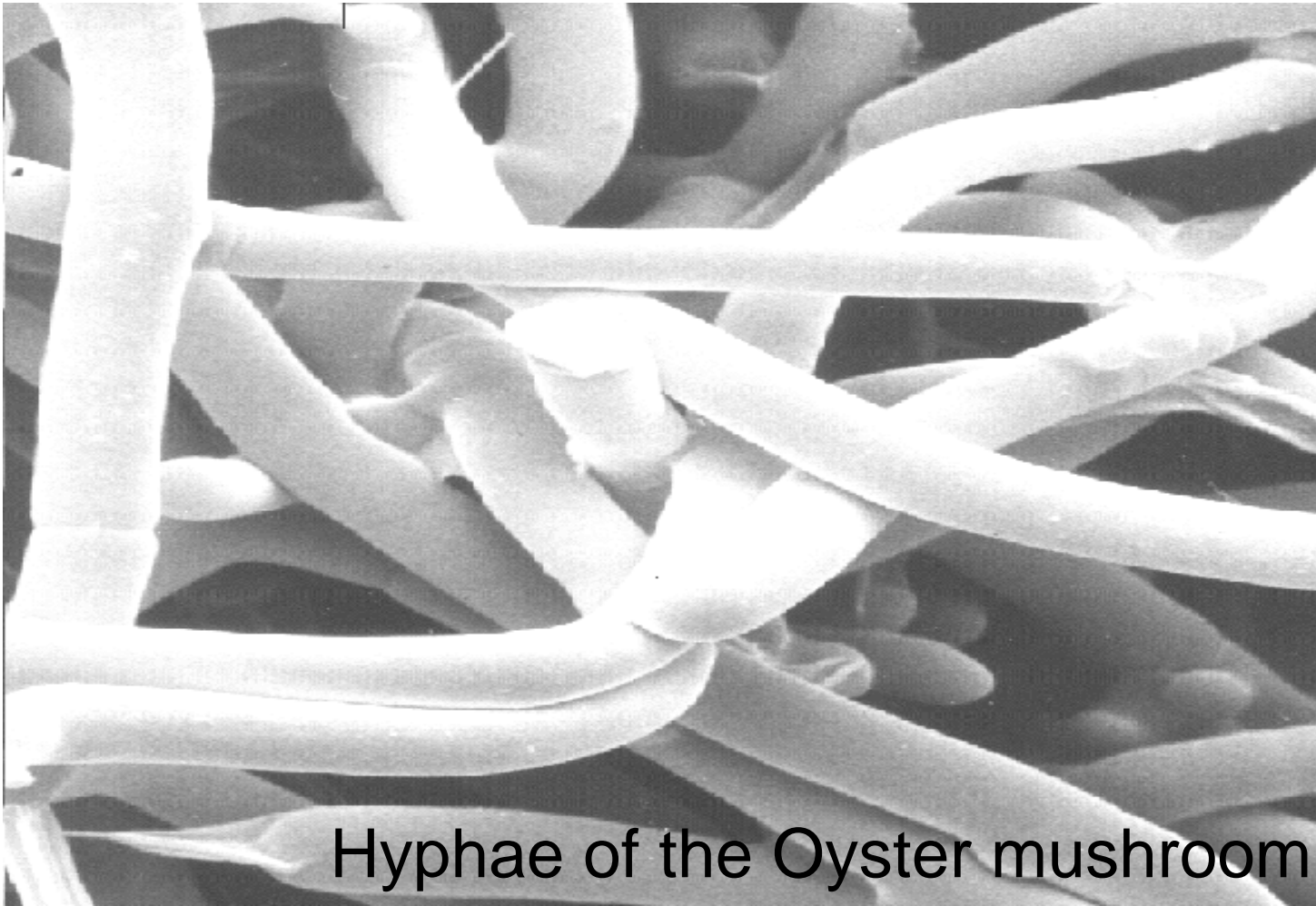


WHAT ARE FUNGI?

- Fungi are not classed as animals or plants, they have a Kingdom of their own to which they belong.
- They range from being just a single cell, like the yeasts, to others that cover hundreds of acres of land.
- Most fungi are said to be filamentous. This is because the main body of the fungus is made up of thin, thread-like filaments that are called hyphae, which form the mycelium.
- Fungi are divided into four groups depending on their characteristics
 - Chytridiomycota
 - Zygomycota
 - Ascomycota
 - Basidiomycota



WHAT ARE FUNGI?



Hyphae of the Oyster mushroom

KINGDOM FUNGI

To date, **100,000** species of fungi have been discovered.

It is thought that there are over one million species still to be found.

The fungi that most people are familiar with are those that form **fruit bodies** or mushrooms.

Fungi can live in many habitats including the arctic, tropical rainforest, fresh and salt water. However, most fungi live in soil.

- People that study fungi are called **Mycologists**.
- Fungi are not able to produce their own food as plants do.
- Fungi are said to be **SAPROTROPHS**, because they live on dead organic matter such as leaves and wood.
- To obtain nutrients fungi secrete special **digestive enzymes** which degrade organic material outside the mycelium. The degraded compounds can then be ingested.



Reproduction

Fungi are able to reproduce both sexually and non-sexually.

Individuals can be produced that are genetically identical to one another by the fungal cells breaking up.

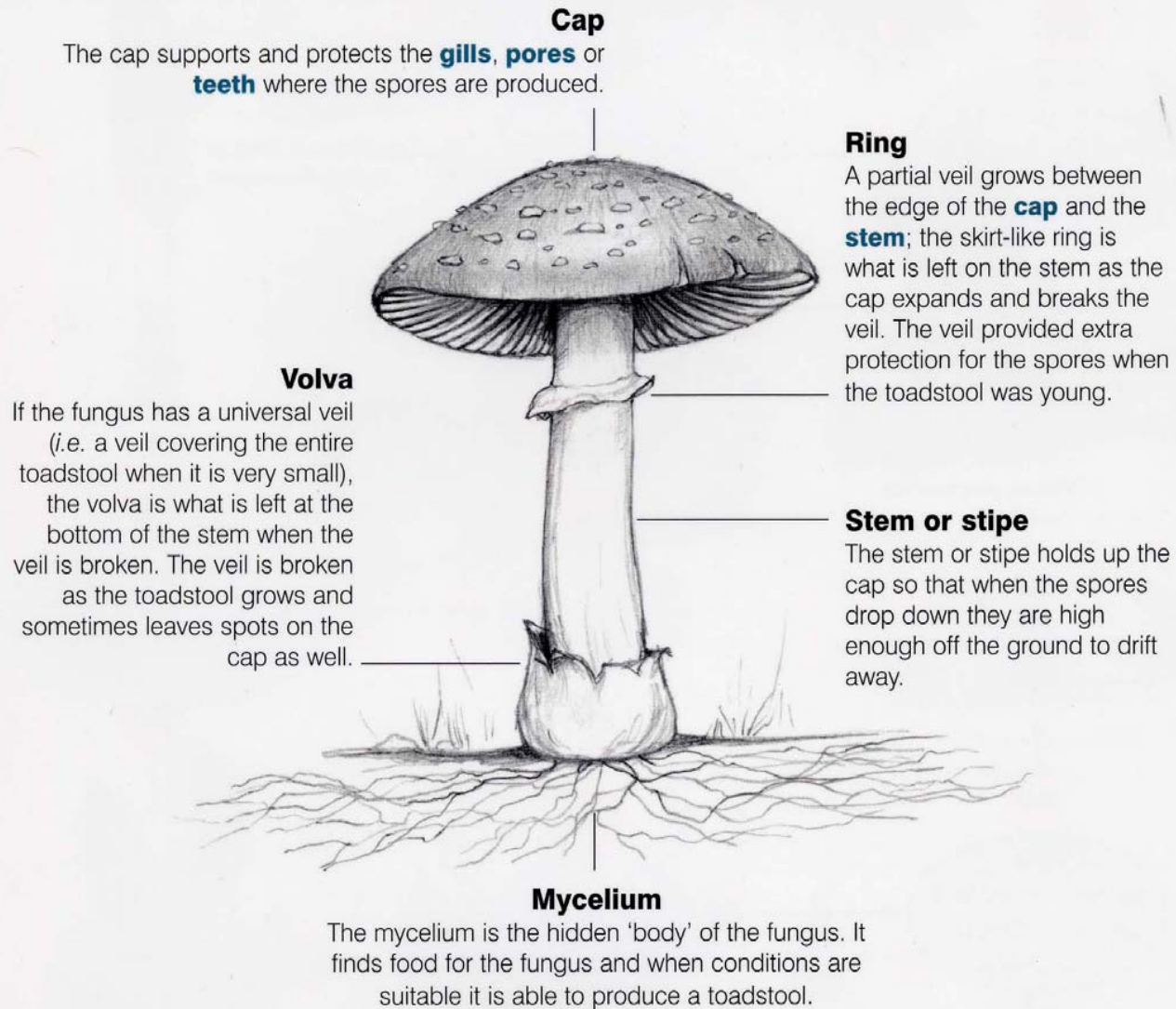
Fungi are not classed as males or females. Fungi have thousands of different sexes, which are determined by genes which make up their mate type.

The products of reproduction are spores. These are small compartments which house the genetic information of the fungus.

Spores are usually dispersed from fruit bodies such as mushrooms, truffles and puffballs. Once dispersed the spore can germinate producing a new fungal colony.



Parts of a Fungus



From *The Fungi Name Trail* by Liz Holden & Kath Hamper



FFI6

Fungi and Us

- Many useful products have been isolated from fungi which have been of great benefit to humans.
- Certain activities of fungi are also used to produce food and drink.
- Some examples are shown opposite.

- **Derived from fungi**

- Antibiotics
- Agents to lower cholesterol
- Immune system suppressants

- **Used in the manufacture of**

- Beer
- Chocolate
- Cheese
- Bread
- Fizzy drinks
- Enzymes for washing powders



Fungi and Termites

- Fungi can be useful to some sorts of insects.
- A type of termite in Africa lives on plant material. However, because plants have tough cell walls they are quite difficult to break down. So even after digestion, lots of the nutrients are still present in the faeces.
- These types of termites have developed a clever strategy to obtain more nutrients.
- They cultivate a type of fungus by using their faeces as compost. The fungus is able to use the left over nutrients in the faeces to grow.
- The fungus then provides the termites and their larvae with a rich food source.



Fungi and Ambrosia Beetles

Another relationship where fungi are used by insects is the use of ambrosia fungi by the ambrosia beetle.

This type of beetle lives inside tree trunks, and the females bore passages in which to lay their eggs.

The mother uses the ambrosia fungus to feed the newly hatched baby beetles.

This is achieved by the mother infecting the wood with the fungus by carrying some from a previous nest.

By the time the eggs hatch the fungus has grown on the walls of the tree trunk, providing an easily accessible food source for the larvae.

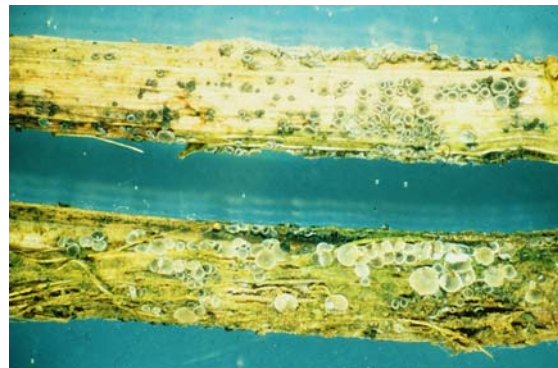


Fungal Infections

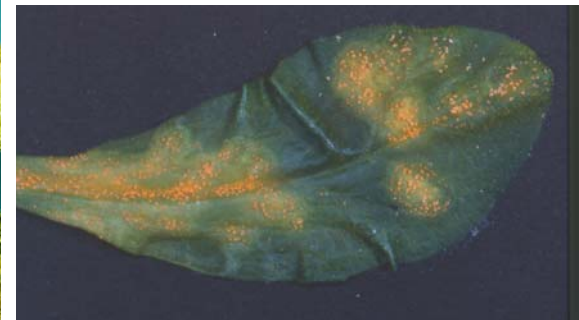
- Fungi can infect plants and animals; including humans.
- Masses of spores cause discolouration of the leaves so infections of plants are called smuts, rusts, spots and other names describing the symptoms.



Tarspot of sycamore



Eyespot of wheat



Leaf rust of daisy

Fungal Infections

- Plants that are infected are weakened because the fungus absorbs nutrients from the plant on which it is living. Because of this weakened state plants are more likely to be affected by other forms of parasite and other stresses (like shortage of water), and the yield of crop plants is greatly reduced.



Humans as hosts

- Human fungal infections are divided into three groups.
- The first of which are **superficial infections**.
- These are infections of the outer layers of the skin, the hair and nails. Infections of the skin are specifically known as dermatomycoses.
- Examples are athlete's foot and ringworm (yes, it's a fungus, not a worm!).

Subcutaneous fungal infections

- The second group are the **subcutaneous** fungal infections. This is when the deeper layers of the skin are infected, and sometimes even bone.
- The organisms usually cross the protective barrier of the skin at the site of a cut. Most of these organisms live in soil.
- Deep skin infections include **Mycetoma** and **Chromoblastomycosis**.



Systemic Mycoses

- Fungal infections that enter into the body and invade internal organs are called **systemic mycoses**. Infection can arise from inhalation of fungal spores, although such cases are not usually life threatening.
- Most people that suffer from a systemic fungal infection are usually sick already. The fungus is said to be 'opportunistic' because if the person was healthy the fungus would not usually cause any serious harm.
- If someone is sick the body is less able to defend itself against pathogenic organisms, they therefore have an increased risk of susceptibility to infectious fungi.



References

- Hadley, M. (2002) *Fungus Fred goes Foraying*. British Mycological Society, UK.
- Moore, D. (2001) *Slayers, Saviors, Servants and Sex: An Expose of Kingdom Fungi*. Springer-Verlag, New York.
- Assinder, S. & Rutter, G. (2001) *How the Mushroom Got its Spots*. Published jointly by the British Mycological Society and BBSRC.
- <http://microbiologyonline.org.uk/>
- <http://www.doctorfungus.org/educatio/index.htm>
- <http://www.mushworld.com>

