

7 EPIDERMOPHYTON FLOCCOSUM (Division Deuteromycota) (500x)

All of the fungi discussed thus far have been observed to reproduce sexually. The division Deuteromycota is unique because the organism classified in it seem to lack a sexual means of reproduction. This lack has caused these organisms to be called "imperfect" fungi.

Epidermophyton (ep-ah-DEHM-ob-FYE-ten), seen in this slide, is an example of one of the imperfect fungi. Relatives of epidermophyton are classified within the Division Ascomycota, but as of yet no sexual reproduction has been observed for this particular species, so it remains within the Division Deuteromycota. If a sexual process is discovered, the fungus will be removed from this division and reclassified. The nonsexual spores (S), called **conidia** (koh-NIH-dee-uh), may

be seen in this slide. They are contained in sacs on stalked structures known as Conidiophores (C). Nearby are the familiar hyphal strands (H) which allow the fungus to absorb nutrients from its surroundings.

Epidermophyton and many other organisms in this division are responsible for most of the external human fungal diseases commonly called **tinea**s (TIN-ee-uhz). Such disorders include ringworm, athlete's foot, and many infections of the hair shaft and follicle. In this last two examples, the organism lives directly in or on the hair filament. Not all of the fungi in this division are harmful. Penicillium, the source of the antibiotic penicillin, shares the group with its more destructive relatives.

8 LICHEN (Division Mycophycophyta) (25x)

This division contains some of the most unusual "organisms" known to science. The lichens (LYE-kuns) are unusual because they are not single individuals, but an association composed of a member of the fungus kingdom and a member of the plant kingdom, usually algae. They represent an example of mutualism (MYOO-chew-uhl-iz-um), a relationship in which two organisms live together and benefit from each other.

In this cross section of a lichen, the single-celled, green algae (A) is located within the strands of fungal hyphae (F). The algae photosynthesize, or produces sugars which are, in part, used by the fungus. The fungus provides a moist place for the algae to live.

This relationship is so highly evolved that when separated from each other, the algae and fungus composing the lichen often die. As a partnership, lichens are able to live in many places such as on rocks, the bark of trees, and in the harsh climate of the arctic. Alone, fungus or algae could never survive these conditions.

Reproduction is also a joint effort. The fungal partner, which may be an ascomycote, basidiomycote, or a deuteromycote, produces spores. These spores (S) have tiny algae filaments wrapped around them. When the spores land in a suitable area, both the algae and fungus are already together to form a new lichen.

THE KINGDOM FUNGI

INTRODUCTION

In the past, biologists have classified organisms into either the animal or plant kingdom. However, when all the characteristics are considered, it becomes apparent that a total of five kingdoms would be more helpful. The three new kingdoms are: Monera, Protista, and Fungi. This set discusses **Fungi** (FUN-gee). Other Microslide sets discuss Monera and Protista.

The molds, mildews, and mushrooms which make up the Fungi kingdom have traditionally been classified with the plants, but there are several major differences which have resulted in the establishment of this new kingdom. Plants are **autotrophs** (ought-oh-TROFS), or "self-feeders," because they contain the pigment chlorophyll and make their own food through the process of photosynthesis. The members of the kingdom Fungi lack chlorophyll and must get their food from an external source. The fungi are called **heterotrophs** (heeb-oh-TROFS), or "other feeders." These organisms absorb their food and must live in close contact with their source of nutrition because they do not move. In addition to the lack of chlorophyll, the fungi seem to have evolved independently from the protists and therefore, are not truly related to the plants at all.

Fungal cells all contain at least one nucleus, like the cells of all organisms except bacteria and blue-green algae. They are considered **eukaryotes** (yoo-CARRY-otes). Often, one fungal cell is not divided from the next and the cytoplasm may move freely through the **hyphae** (HI-pee), which are strands that make up the body of the fungus. The strands below the surface absorb nutrients like the roots of plants. Above the surface, hyphae may form a large visible mass known as **mycelium** (mi-SEL-ee-um). The familiar mushroom is simply a fungal mycelium composed of countless hyphal strands. Tiny spores, which will grow into new fungi, form on these strands.

All fungi may reproduce asexually, but most also have a sexual stage. Structures associated with reproduction are used as a basis for classification within the kingdom. Some fungi have their spores contained in sacs or on club-like structures, while others form spores directly when two different strains meet and join together.

The magnification given, for example, Slide 1 (500x), means that the microscope was set at that power when the photograph was taken.

1 ACHLYA (Division Oomycota) (500x)

These fungi are known as water molds, downy mildews, and white rusts. They are parasites of plants and animals and are primarily found in water. One species caused the potato blight which destroyed the potato harvest in Ireland in the 1800s. Saprolegnia, a related member of this division, is a major parasite on aquatic animals. It is responsible for the white spots seen on the fins of many aquarium fish.

On the left side of the slide, it is possible to see that these fungi lack all cross walls in the hyphae. Look carefully at the slide to see this feature. Only the sphere containing the oval spores is divided from the rest of the fungus. Such a division may be seen

at the lower right of the slide.

Hyphae develop into male and female strands and essentially fertilize by growing together. When fertilization is complete, a sphere forms which contains reproductive structures called zoospores. When they are mature, the zoospores can move independently with tiny hair-like tails before growing into new fungi. This fact has led some researchers to classify Oomycota within the kingdom Protista. They are included in this lesson set because they have traditionally been considered fungi and do show many typical fungal characteristics.