



EDO UNIVERSITY, IYAMHO
Department of Microbiology

MCB 311: General Mycology

Instructor: *Mr. Arthur C. Okafor.* **Email:** arthur.okafor@edouniversity.edu.ng

Lecture Period and venue: Monday, 8am – 10 am, NLT3.

Office hours: Tuesday, 8am - 1pm, Wednesday, 9am - 2pm, Friday, 8am – 1pm.

Office: New Faculty of Science Block, Rm B6.

Description: This course is intended to give the students a thorough knowledge of fungi, their morphology, classifications, ecology, importance to industry and public health significance.

Prerequisites: Students should have thorough knowledge of **Introductory Microbiology** and **General Microbiology** courses offered in 200 Level.

Assignments: There shall be a minimum of 4 assignments throughout the course in addition to a Mid-Term quiz and a Final Exam. Completed assignments must be submitted at the beginning of the lecture periods on the due dates. Assignments are organized and structured to serve as supplementary materials for the midterm quiz and final exam. There will also be 3 practical classes.

Grading: I will assign 10% of this class grade to assignments, 5% for attendance, 15% for the mid-term quiz and 70% for the final exam. The Final exam is comprehensive.

***Textbooks:**

(1.) NESTER'S MICROBIOLOGY by Nester *et al.* 5th Edition. Jaypee Publishers.

(2.) INTRODUCTION TO FUNGI by Webster J. and Weber R. 3rd Edition. Cambridge Univer. Press.

(3.) PRESCOTT'S MICROBIOLOGY by Joanne *et al.* 9th Edition. Mc Graw Hill Education.

*The recommended textbooks above also serve as references from which this lecture note was compiled.

Lectures: Below is a description of the contents.

MORPHOLOGY OF FUNGI

All fungi have typical eukaryotic morphology. They have rigid cell wall composed of chitin which may be layered with mannans, glucans and other polysaccharides in association with polypeptides. Some lower fungi possess cellulose in their cell wall. The plasma membrane is a typical bilayered membrane in addition to the presence of sterols. Fungal membranes possess ergosterol in contrast to cholesterol found in mammalian cells. The cytoplasm consists of various organelles such as mitochondria, golgi apparatus, ribosomes, endoplasmic reticulum, lysosomes, microtubules and a membrane enclosed nucleus. A unique feature of nuclear membrane is that it persists throughout the metaphase of mitosis unlike in plant and animal cells where it dissolves and reforms. Fungi exist in two forms namely: the filamentous (hyphal) form and Unicellular (budding) form.

(a) Filamentous form (Moulds)

The thallus of mould is made of hyphae, which are cylindrical tube like structures that elongates by growth at tips. A mass of hyphae is known as mycelium. It is the hypha that is responsible for the filamentous nature of mould. The hyphae may be branched or unbranched. They may be septate or aseptate. Hyphae usually have cross walls that divide them into numerous cells. These cross walls, called septa have small pores through which cytoplasm is continuous throughout the hyphae. Therefore all hyphal fungi tend to be coenocytic (multinucleate). With exception of zygomycetes (*Rhizopus*, *Mucor*), all moulds are septate. Non-septate hyphae are considered to be more primitive because if a hyphal strand is damaged the entire strand dies. When a septate hyphal strand is damaged, the pores between adjacent compartments can be plugged, thus preventing death of the whole hyphal strand. Mycelium are of three kinds:

1. **Vegetative mycelium** are those that penetrates the surface of the medium and absorbs nutrients.
2. **Aerial mycelium** are those that grow above the agar surface
3. **Fertile mycelium** are aerial hyphae that bear reproductive structures such as conidia or sporangia.

Since hypha is the structural unit of mould, the mycelium imparts colour, texture and topography to the colony. Those fungi that possess melanin pigments in their cell wall are called phaeoid or

dematiaceous and their colonies are coloured grey, black or olive. Examples are species of *Bipolaris*, *Cladosporium*, *Exophiala*, *Fonsecaea*, *Phialophora* and *Wangiella*. Those hyphae that don't possess any pigment in their cell wall are called hyaline. Hyphae may have some specialized structure or appearance that aid in identification.

Unicellular form (yeasts)

Yeasts are unicellular spherical to ellipsoid cells. They reproduce by budding, which result in blastospore

(blastoconidia) formation. In some cases, as the cells buds the buds fail to detach and elongate thus forming a chain of elongated hyphae like filament called pseudohyphae. This property is seen in *Candida albicans*. The same species also have the ability to produce true hypha, which is seen as germ tube. The difference between the two is that there is a constriction in pseudohyphae at the point of budding, while the germ tube has no constriction. Some yeast such as *Cryptococcus* and the yeast form of *Blastomyces dermatitidis* produce polysaccharide capsule. Capsules can be demonstrated by negative staining methods using India ink or Nigrosin. The capsule itself can be stained by Meyer Mucicarmine stain (Sridhar Rao, P.N.).