

## Fungi

Fungi are eukaryotic organisms that include microorganisms such as yeasts, moulds and mushrooms. These organisms are classified under fungi kingdom.



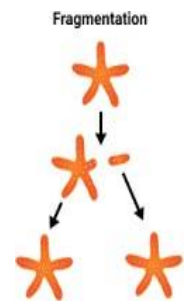
A characteristic that places fungi in a different kingdom from plants, bacteria, and some protists is chitin in their cell walls. Fungi, like animals, are heterotrophs; they acquire their food by absorbing dissolved molecules, typically by secreting digestive enzymes into their environment. Fungi do not photosynthesize. Growth is their means of mobility, except for spores, which may travel through the air or water. Fungi are the principal decomposers in ecological systems. The biology devoted to the study of fungi is known as mycology. In the past, mycology was regarded as a branch of botany, but now known fungi are genetically more closely related to animals than to plants.

# Reproduction

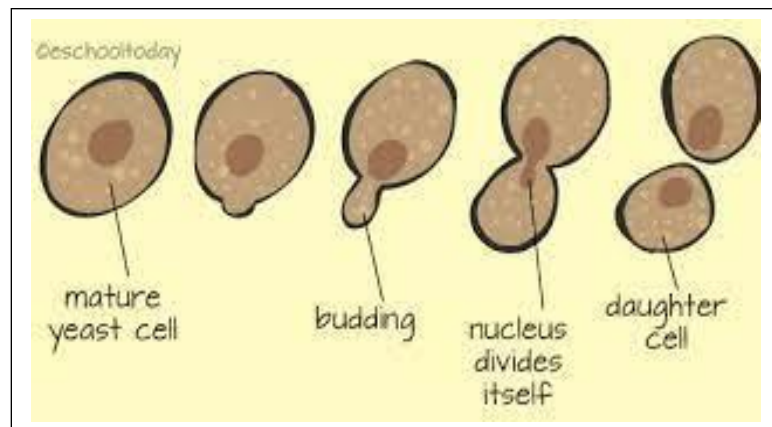
## *Asexual reproduction*

Fungi reproduction asexually

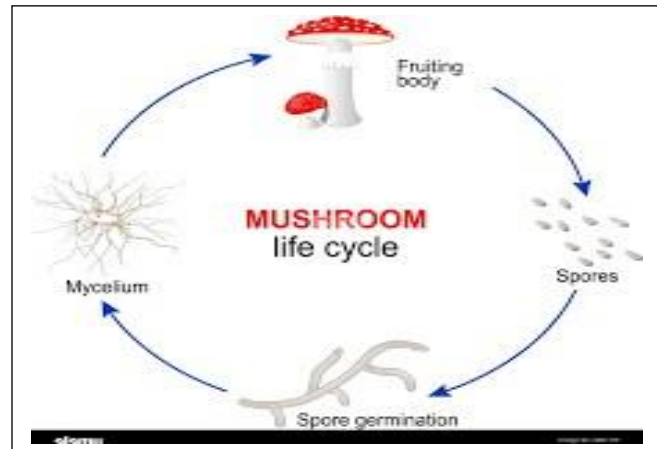
1- **Fragmentation**.. Mycelial fragmentation occurs when a fungal mycelium separates into pieces, and each component grows into a separate mycelium. Here reproduction is fast.



2- **Budding**.. In this process, a bud develops on the surface of either the yeast cell or the hypha, with the cytoplasm of the bud being continuous with that of the parent cell and Nuclear division (of the parent cell) also occurs so that the parent's genetic material is passed on to the new bud.

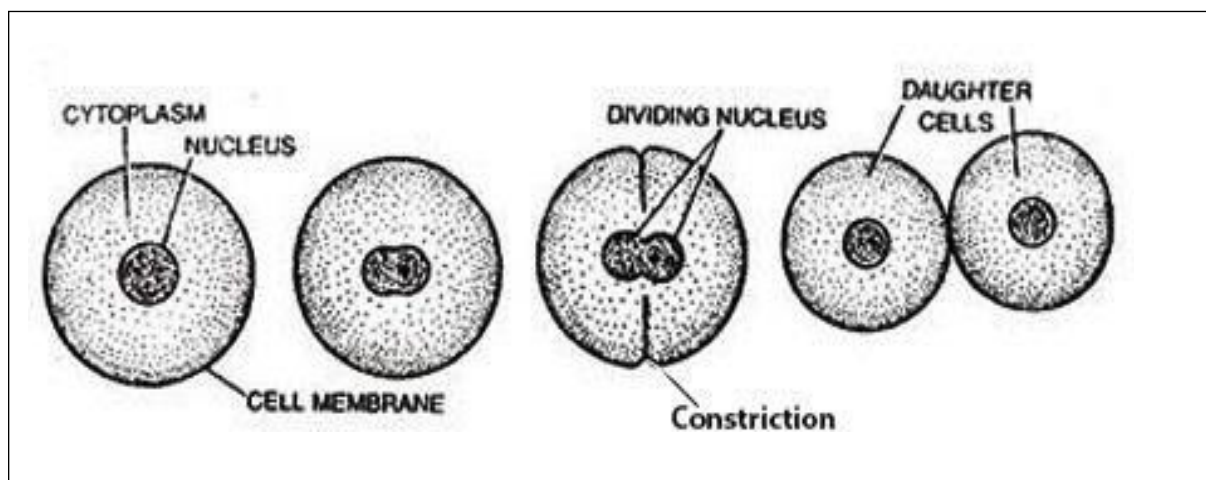


3-Spore production.. The most common method of asexual reproduction is through the formation of asexual spores, which are produced by only one parent (through mitosis) and are genetically identical to that parent.



#### 4-Indirect division

involves complicated changes within the cell, e.g. formation of chromosomes, before the parent cell divides and produce daughter cells.



## Sexual reproduction

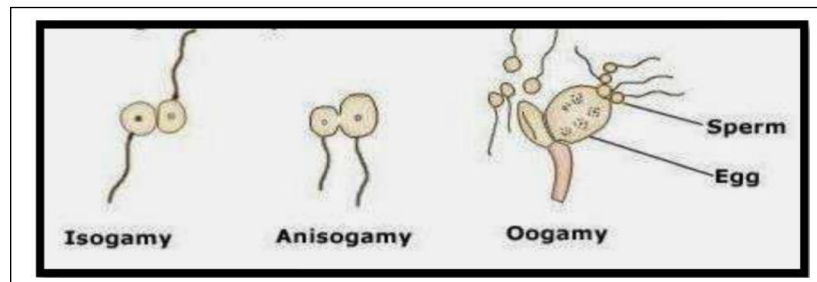
The process of sexual reproduction includes three stages:

- 1- Plasmogamy: fusion of protoplasm
- 2- Karyogamy: fusion of two nuclei
- 3- Meiosis: Reductive nuclear division

This is done in different ways:

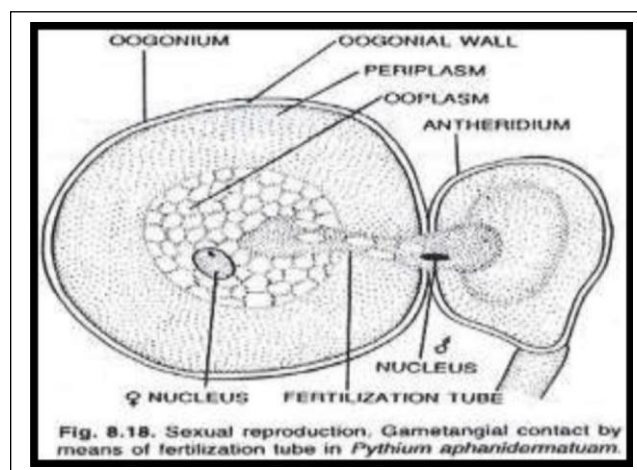
### 1- Intercourse

Fusion of two naked gametes, one or both of which are motile



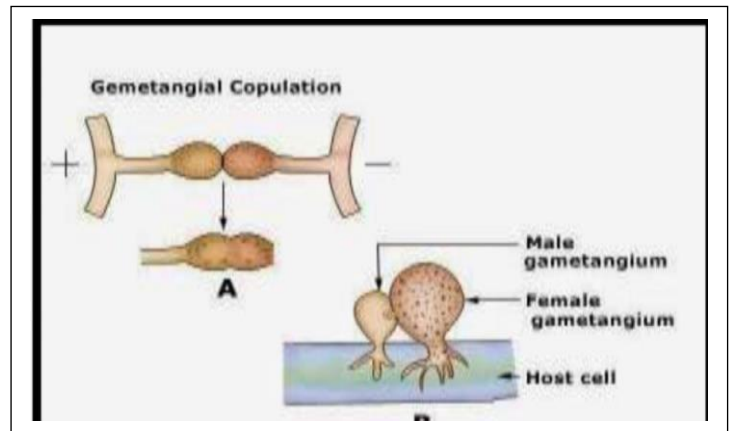
### 2- Gamete-gametangial copulation

- \* Male and female gametangia comes into contact but do not fuse.
- \* A fertilization tube formed from where male gametangium enters the female gametangium and male gamete passes through this tube.



### 3- Gametangial copulation

- \* Two gametangia or their protoplast fuse and give rise to zygospore

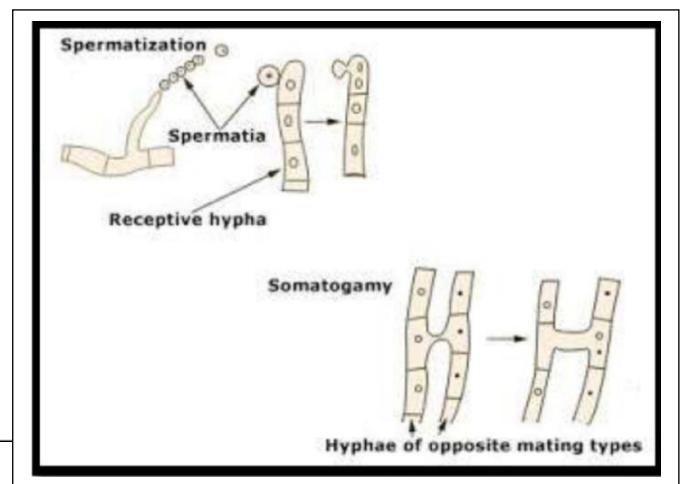
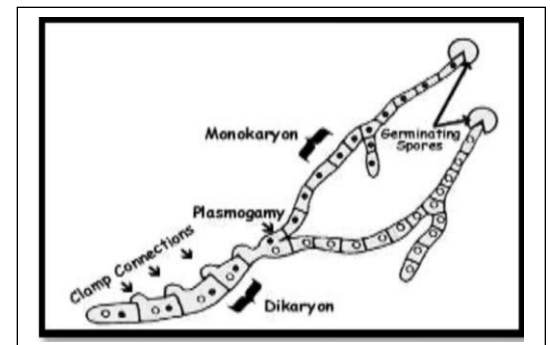


### 4- Somatic copulation

- \* Also known as somatogamy.
- \* In this process fusion of somatic cell occurs
- \* This sexual fusion of undifferentiated vegetative cells (monokaryons) results in dikaryotic hyphae, so the process is also called dikaryotization.

### 5-Spermatization

Some fungi produce many minute, spore-like, single-celled structures called spermatia (nonmotile gametes)

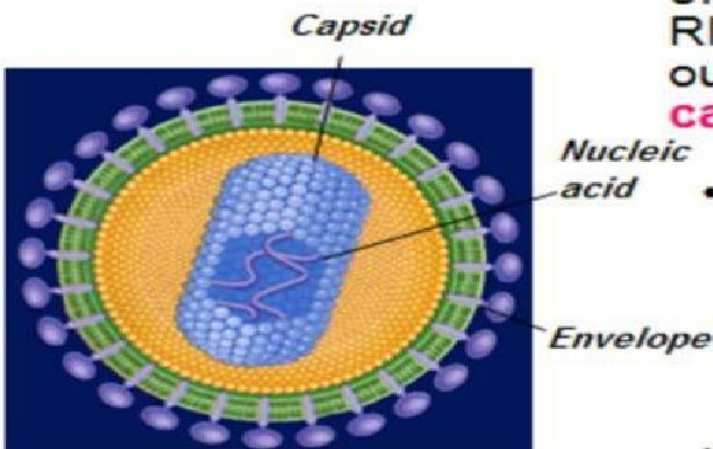


# Virus

## What is a virus?

- **Viruses** are nonliving infectious agents and are smaller than the smallest bacterium.
- Most biologists consider viruses to be nonliving because they don't exhibit all the criteria for life.
- They don't carry out respiration, grow, or develop. All viruses can do is replicate and they can't even do that without the help of living cells.
- A cell in which a virus replicates is called the **host cell**.
- A virus that infects a bacterium is called a **bacteriophage**, or phage for short.

## Viral Structure



- A virus has an inner core of **nucleic acid**, either RNA or DNA, and an outer protein coat called a **capsid**.
- Some may have an additional layer, called an **envelope**, surrounding their capsids.

**Lytic infection** is the method that viruses use to reproduce.

**Overview of the Lytic Cycle:**

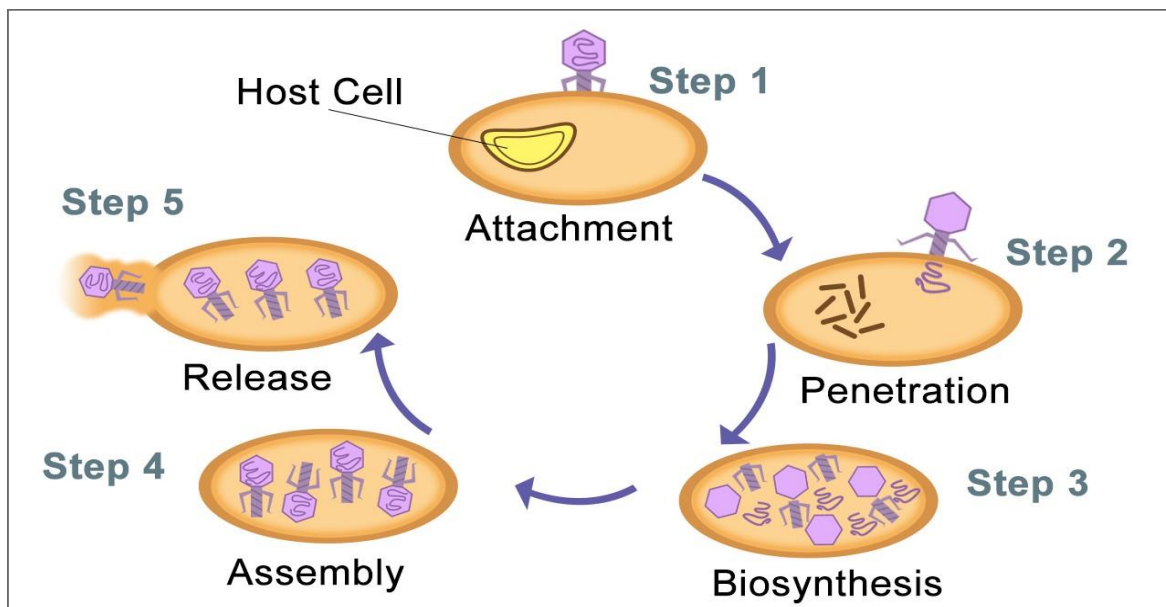
**1-Attachment:** The virus attaches to the host cell

**2-penetration:** Injecting genetic material into a host cell.

**3-Replication:** The virus controls the metabolism of the host cell, causing the organelles to produce new proteins and nucleic acids.

**4-Assembly:** Nucleic acids and proteins are put together to form new viruses during assembly.

**5-Release:** Viral enzymes cause the host cell to explode, releasing viruses into the surrounding environment. These new viruses are able to infect other cells



### **Five notable facts about viruses:**

- 1-Viruses can infect bacterial, plant, and animal cells.
- 2-Retroviruses are used in gene therapy and cloning.
- 3-No other organism evolves as quickly as viruses.
- 4-Many viruses can lead to cancer.
- 5-For years a virus may lie dormant in a host.

### **virus classification**

#### **Based on their host.**

viruses can be classified into three types:-

- \* animal viruses.
- \* plant viruses .
- \* bacteriophages.

**These viruses are inactive when they are present outside of host cells, but become active within host cells.**

## Based on the structure

- 1-complex virus. For example, the **smallpox virus**
- 2-Radial symmetry virus. For example **bacteria**
- 3-Virus in the form of cubic or icosahedral symmetry. For example **Reovirus**,
- 4-Rod or virus of spiral shape or helical symmetry. For example, **paramyxovirus**,

## Based on the replication properties and site of replication

- 1-Replication within the cytoplasm of the host cell. For example **all RNA viruses except the influenza virus**.
- 2-Replication within the nucleus and cytoplasm of the host cell. For example **influenza virus**.
- 3-Replication within the nucleus of the host cell. for example **All DNA viruses except the box virus**
- 4-Virus multiplication through a double-stranded DNA medium. For example **all DNA viruses, retroviruses**.
- 5-Virus replication is mediated by single-stranded RNA. For example **all RNA viruses except Reovirus**.

## based on the mode of transmission

1-Airborne viruses - transmission of the virus through the air into the respiratory tract. For example **swine flu**.

2-Oral route- transmission of the virus through contaminated water or food.For example, **hepatitis A virus**.

3-STD - transmission of the virus through sexual contact with an infected person. For example, **retroviruses**.

4-Transfusion-borne infection - Transmission of the virus through blood transfusion.For example, **hepatitis B virus**.

5-Zoonotic disease - transmission of the virus by animal bites to humans. For example **alpha virus**.

## based on the presence of nucleic acid

### DNA virus

Single-stranded DNA virus (ss):e.g. **Parvovirus**

Double-stranded DNA virus (ds):e.g. **Herpes virus**

### RNA virus

Double-stranded (ds) RNA virus: e.g. **reovirus**.

Single-stranded (ss) RNA virus (+RNA) and (-RNA) e.g. **influenza**.