CLASSIFICATION OF MICROBES
MICRO-ORGANISMS

- Organisms of minute size.
- Can belongs to both plant and animal kingdom
- Have different structures - complex / simpler.
- Classifications may depend on their origin or structure or other characteristics.
STRUCTURES OF CELL

Two different kind of cell structures in the living world.

- PROKARYOTIC CELLS: Complex unit of structures, can be in both plants and animals.

- EUKARYOTIC CELLS: Simpler unit of structures, usually of bacteria and cyanobacteria.
BASIC FIVE CATEGORIES

- Bacteria
- Fungi
- Algae
- Protozoa
- Virus
CLASSIFICATION

According to E.Haeckel

- Animalae: Those belongs to animal kingdom, perform active movements.
- Plantae: Those belongs to plant kingdom, capable to photosynthesize.
- Protist: Those belongs to both kingdom.
CLASSIFICATION

According to Aristotle

- Animalalai: Ability of active movements.
- Plantae: Ability to photosynthesize.
CLASSIFICATION

According to R.H. Whittaker

- Monera: Prokaryotic bacteria.
- Protist: Eukaryotes
- Fungi: Eukaryotes/Prokaryotes:
  - a) Yeast
  - b) Mold
- Plantae: Eukaryotes
- Animalia: Eukaryotes
MICROBES OF INDUSTRIAL IMPORTANCE

yeast
bacteria
mold
MOLDS

➢ Basic filament or the tissue: Hyphae.

➢ Interwined hyphae: Thallus.

➢ Whole mass of thallus: Mycelium.
CHARACTERISTICS OF MOLDS

- MULTICELLULAR AND FILAMENTOUS
- Physiological: Related to their physical requirements.
- Cultural: Related to their appearance, texture, and look.
PHYSIOLOGICAL CHARACTERISTICS

- Moisture requirement – Less than yeast, bacteria. Below 14 – 15 % moisture is not favorable.
- Temperature Requirement – Three types
  - Mesophile : 25 - 30°C
  - Psychrotrophic : -5 to -10°C
  - Thermophile : Above 40°C.
- Oxygen Requirement : Aerobic in nature.
- Food Requirement : Both simpler and complex food.
- Inhibition : have the inhibiting capability.
CULTURAL CHARACTERISTICS

- Gross appearance which indicates its class or the orders.
- Some are loose and fluffy, while others are compact.
- Some look velvety, some dry and powdery, wet or gelatinous.
- Some are restricted in size while others are not.
## MOLD OF INDUSTRIAL IMPORTANCE

<table>
<thead>
<tr>
<th>Mucor</th>
<th>Geotrichum</th>
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<tbody>
<tr>
<td>Zygorrhynchus</td>
<td>Neorospora</td>
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<tr>
<td>Rhizopus</td>
<td>Sporotrichum</td>
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<td>Absidia</td>
<td>Botrytis</td>
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<td>Thamnidiium</td>
<td>Cephalosporium</td>
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<td>Aspergillus</td>
<td>Trichoderma</td>
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<td>Penicillium</td>
<td>Cladosporium</td>
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<td>Trichothecium</td>
<td>Monascus</td>
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<td>Endomyces</td>
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MOLD FORMATION

- Spores
- Stolon
- Rhizoid
- Sporangium
- Sporangiophore
YEAST

- NON FILAMENTOUS AND UNICELLULAR
- Most popular organism used for food bakery
CULTURAL CHARACTERISTICS

- Young yeast are moist and slimy.
- Some are whitish, some creamy and some pinkish.
- Some changes with age, become dry and wrinkled.
- Can be oxidative, fermentative or both.
- Can be called the wild yeast also.
YEAST CLASSIFICATIONS

- According to their growth pattern.
  1) Oxidative: Grows as film on the surface of the liquid.
  2) Fermentative: Grows throughout the liquid.
- Wild Yeast – Used one for reuse.
PHYSIOLOGICAL CHARACTERISTICS

- Require plenty of water/moisture to grow
- Water activity (a) : According to concentration of solutes, higher conc. , lesser the the growth
- Optimum temperature required is 25-30°C, maximum required is 35-47°C and minimum is 0°C or lesser.
- Sugars are the best source of energy for them.
YEAST OF INDUSTRIAL IMPORTANCE

- Genus Schizosaccharomyces
- Genus saccharomyces
- Genus kluyveromyces
- Genus pichia
- Genus zygosaccharomyces
- Genus hansenula
- Genus debaryomyces
- Genus hanseniaspora
BACTERIA

- Surrounded by a capsule that increases its resistance against adverse conditions.
- Can be various shape and structures.
CULTURAL CHARACTERISTICS

- Pigmented bacteria causes discolourization on surfaces of food.
- Their growth leads to formation of films over the surfaces of liquids.
- Growth of bacteria makes the food unattractive.
PHYSIOLOGICAL CHARACTERISTICS

- Growth & activity of bacteria brings about chemical changes in food.
- Require more moisture than yeast and mold.
- Hydrolyses protein to amino acid and fats to fatty acid.
- Temperature requirement varies from very high to very low resistance.
BACTERIA OF INDUSTRIAL IMPORTANCE

- Lactic acid forming bacteria – lactics.
- Acetic acid forming bacteria – acetics.
- Butyric acid forming bacteria – butyrics.
- Propionic acid forming bacteria – propionics.
- Proteolytic bacteria.
- Lipolytic bacteria.
- Saccharolytic bacteria.
- Pectinolytic bacteria
- Thermophilic bacteria
- Thermoduric bacteria
- Psychrotrophic or psychrotrophs.
- Halophilic
- Osmophilic
- Pigmented bacteria
- Slime forming bacteria
- Gas forming bacteria