

An investigation is done into the characteristics and features of different M.O & helps in the Initial diagnosis of their genera in lab. By two main tests, these are:

- 1) **Direct microscopic examination .**
- 2) **Cultural examination for M.O, which is grown on agar or in broth .**

***Direct microscopic exam. (D.M.E):**

Microorganisms are tiny organisms which can not be seen by naked eye so microscope should be used for seeing them & recognizing their shapes & other characteristics .

Some of the features that can be recognized by direct microscope exam.

Direct microscopy is used for the identification of:

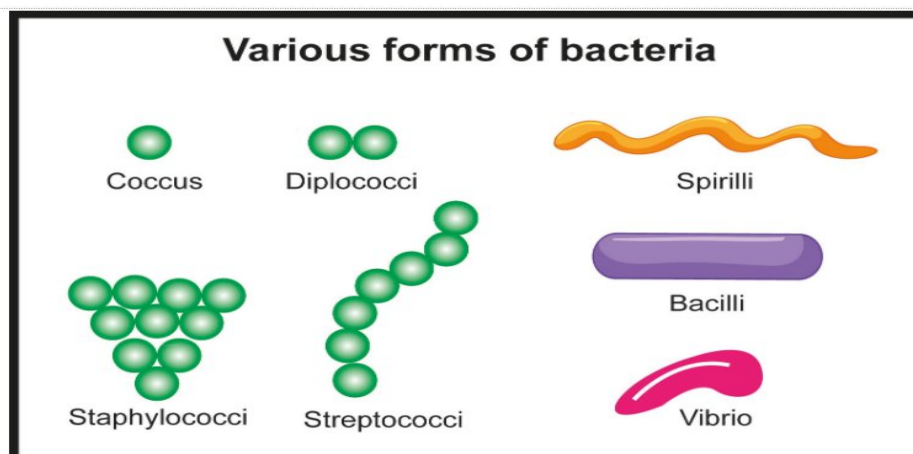
- 1) Morphology of M.O cells.
- 2) Cells arrangement .
- 3) Type of staining especially when we use gram stain.
- 4) Formation of spores or capsules .

The specimen which is examined microscopically is either taken from nature (water ,soil ,milk) or it is taken from infected human or animal (urine, stool, pus , sputum).

Bacterial cells morphology:-

Bacterial cells appear in different shapes when exam. By microscope & these shapes include the following:-

1. **Cocci (singular : coccus)** : these are round cells or spherical in shape like: *Staphylococcus*.
2. **Bacilli (singular : bacillus)** : these are cells similar to rod & they are either short bacilli such as : *Haemophilus influenzae* or long bacilli *Bacillus sp.*
3. **Coccobacilli (singular: coccobacillus)** :these are small bacilli tend to the oval or spherical shape so they are not round like cocci & not elongated like bacilli such as : *Brucella*
4. **Vibro** : these are rods that are bended slightly like comma (bend -shape) or (comma- shape) like: *Vibrio cholera*.
5. **Spirilla (singular : spirillum)** :these are twisted cells or wavy shaped with different length like : *Borrelia*.



Bacterial cells arrangement

Bacterial cells appear in different arrangement when examined under microscope which may help in diagnosing it , these arrangements are :-

A- cocci

1- Single cocci :- single bacteria **e.g:- *Micrococcus sp.***

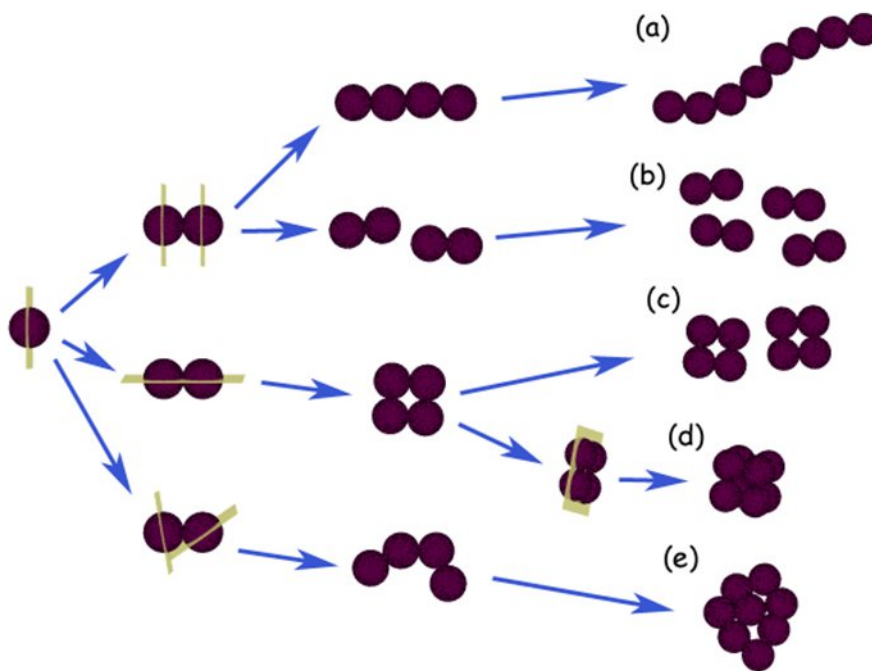
2- Diplococci : these are round or spherical cells arrange or aggregate in pairs as the single cell divides in a perpendicular level only & the 2 cells that result from this division remain attached together in a form of pairs . **e.g: *Neisseria* or *Streptococcus pneumoniae*.**

3- Streptococci :- these are round cells arranged in chains as the single cell divides in one level only which is the vertical & the cells that result from this division remain attached in a form of chain or rosary like:-

Streptococcus faecalis

4- Staphylococci : these are round cells arrange in clusters (grape-like) as the cells divide in different irregular levels forming these clusters like : ***staphylococcus aureus*.**

5-Tetrads: This arrangement results when the cell divides into two planes first **perpendicular** & the other is **horizontal**, resulting in four close cells that remain attached and grow **like : *Pediococcus***



B- Bacilli

1- Single bacilli -----à *Bacillus*

2- Diplobacilli -----à *Lactobacillus*

3-Streptobacilli-----à *Lactobacillus*

4- Irregular arrangements of bacilli in the form of the letter V or L like *Mycobacterium tuberculosis* (parallel rods).

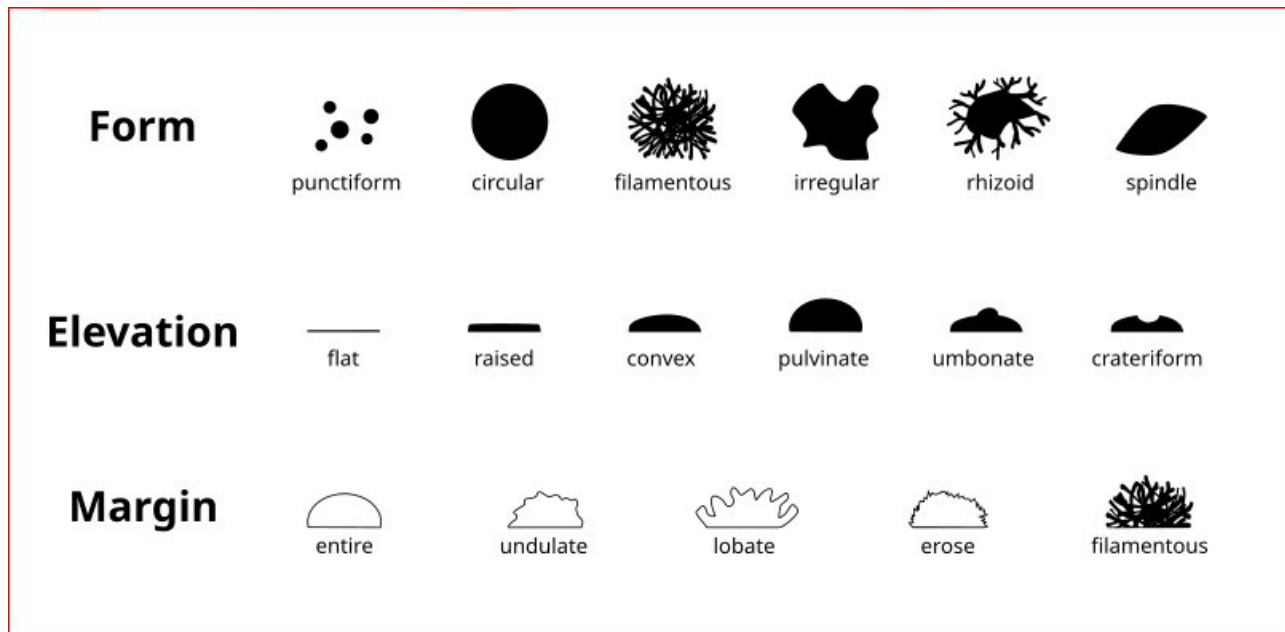
5- Irregular arrangements of bacilli in the form of Chinese letters like *Corynebacterium diphtheria* (polymorphic rods).

Colony Morphology Of Culture

Macroscopic Appearance in petri dish :

A colony is a large number of bacterial cells on solid medium, which is visible to the naked eye as a separate unit. Pure Culture Containing Only One Type Of Organism That Suitable For The Study .Different Genus or species of bacteria can produce very different colonies. colony have many feature as following:

- **SIZE OF COLONY:** Vary from large colonies to tiny colonies less than 1 mm = punctiform (pin-point), Small, Moderate, Large.
- **FORM OF COLONY :** Circular, Irregular, Filamentous, Rhizoid (root-like).
- **ELEVATION OF COLONY :** This describes the “side view” of a colony : flat, raised, low convex, dome-shaped.
- **MARGIN OF COLONY :** Entire, wavy, lobate, filiform
- **SURFACE OF COLONY:** Smooth, shiny, rough, dull, wrinkled.
- **TEXTURE OF COLONY :** Dry, moist, mucoid, hard, granular, buttery.
- **COLOR OF COLONY:** It is important to describe the color or pigment of the colony such as: colorless, yellow, red, pink, black & *Pseudomonas* give green blue color in the nutrient agar.
- **TRANSPARENCY :** Opaque, dull, translucent.
- **ODOR :** example the *pseudomonas* give bad fruity smell ,the fishy smell caused by the *Proteus* bacterium, Rainy smell produced by soil microbes.
- **EFFECT ON MEDIA :** Hemolysis (Alpha, Beta, Gamma).



Common signs of broth growth: include turbidity (cloudiness), the formation of a surface film called a pellicle, or a visible sediment at the bottom of the tube and Bubble formation as sign of gas production. These growth patterns are observed after inoculation and incubation, with different types of microorganisms exhibiting distinct behaviors in the broth.

Liquid Media – Broth Culture Patterns

