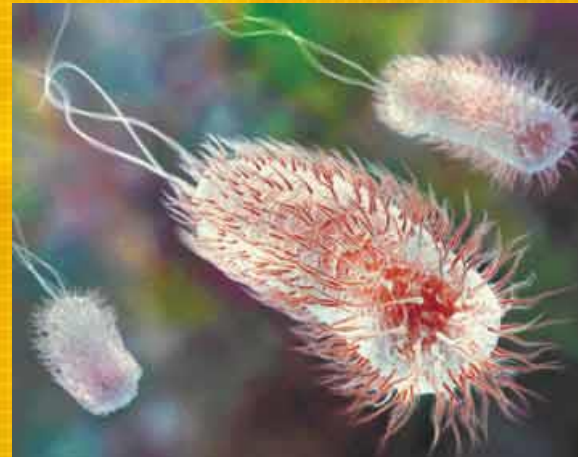


# Bacterial motility



## *Objectives:*

- To gain expertise in determining the motility of living bacteria.
- To learn about the different methods of motility determination.

**There are a variety of ways to determine •  
motility of a bacterium—biochemical tests  
as well as microscopic analysis.**

**Motility could be detected by •**

**1-Flagellar stain •**

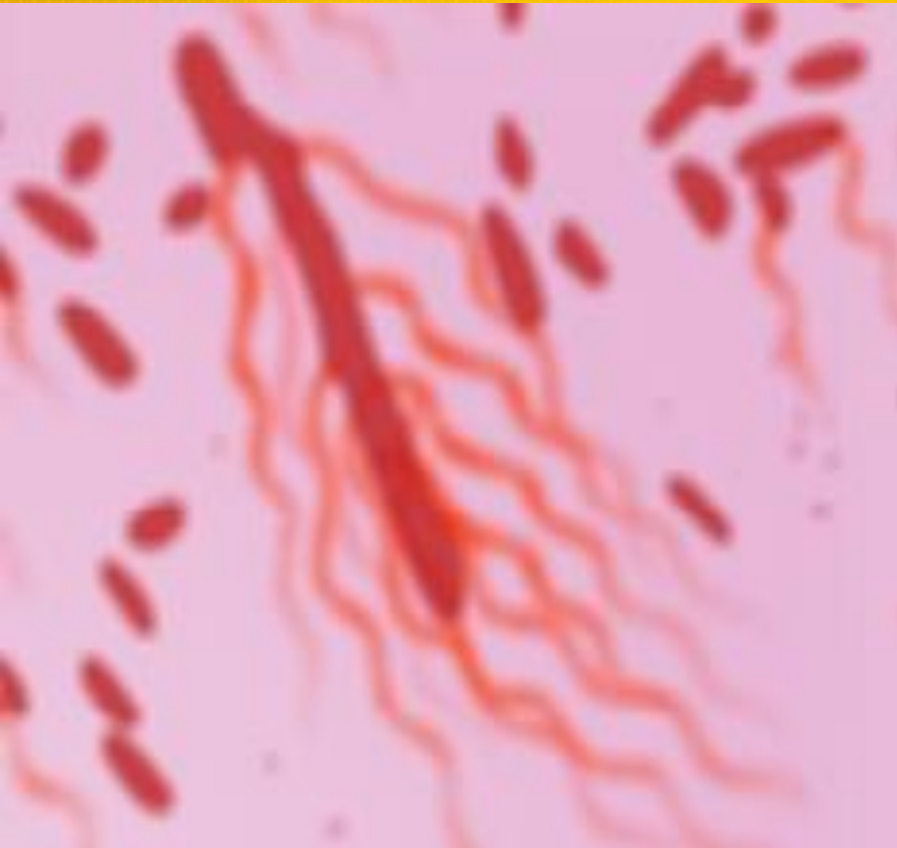
**2-Hanging Drop technique •**

**3-Semi-Solid media Inoculation •**



**The pattern of flagellation is an important feature in identification of motile bacteria.**

Peritrichous (E.coli)



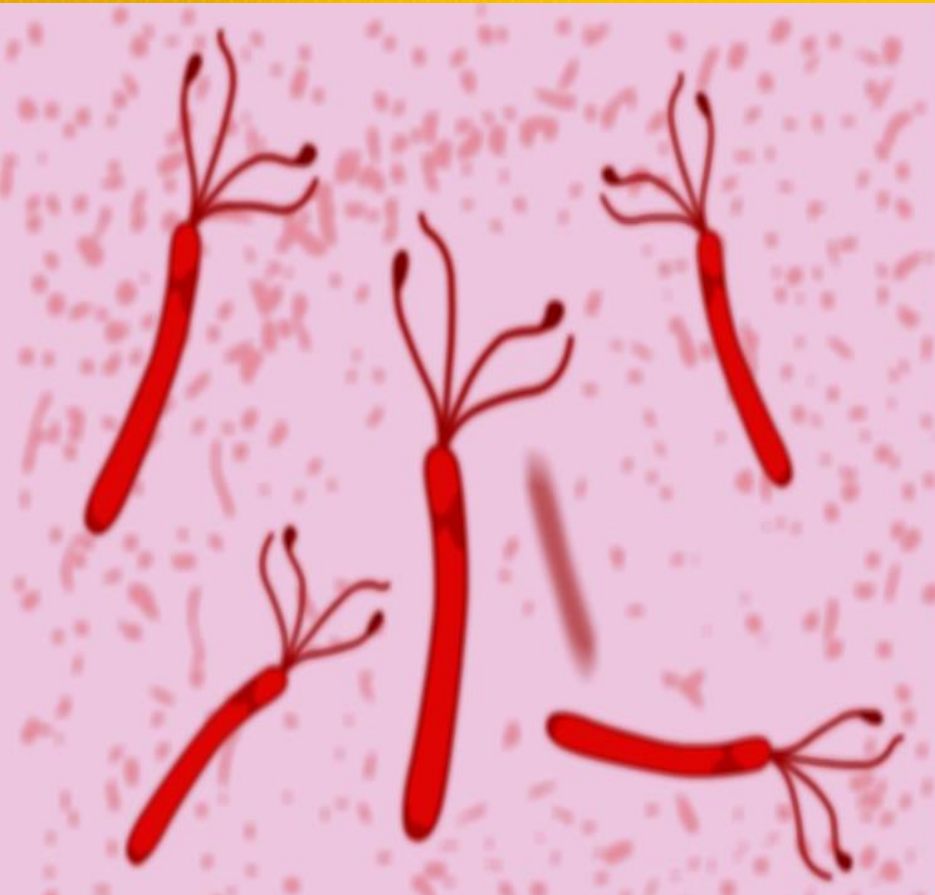
Monotrichous (Vibrio cholerae)





# *Site of flagella*

Lophotrichous (*Pseudomonas*)



amphitrichous (*Spirillum volutans*)



- Most motile bacteria move in a straight line for a brief time, then turn and randomly change directions before swimming again.



# ***Motility testing***

- Motility could be detected by:
  1. Hanging Drop technique.
  2. Flagella stain.
  3. Semi-Solid media Inoculation.

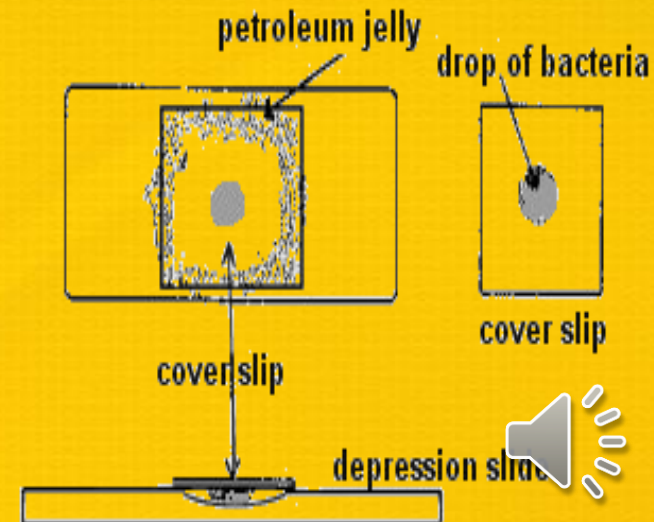


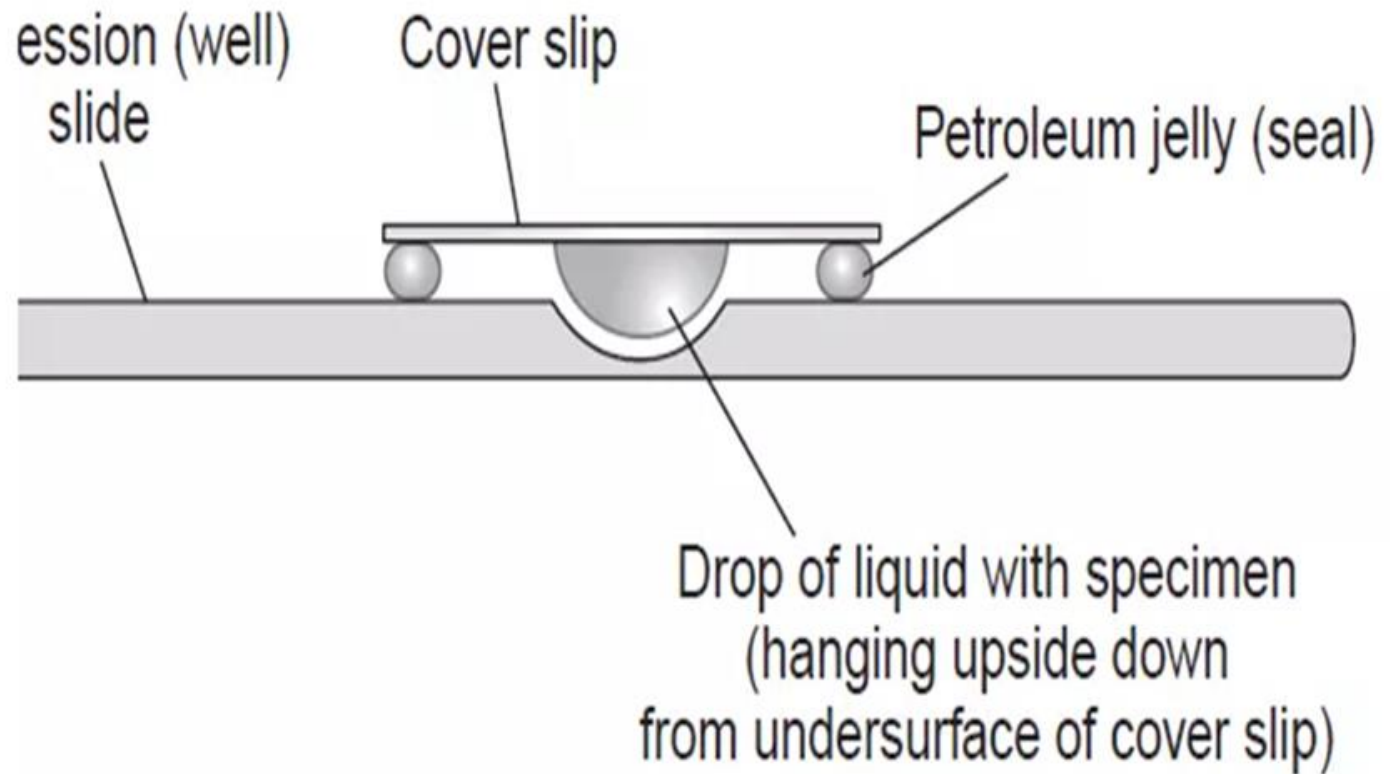


# ***1. Hanging Drop slide***

The slide for a hanging drop is ground with a concave well in the centre; the cover glass holds a drop of the suspension.

- When the cover glass is inverted over the well of the slide, the drop hangs from the glass in the hollow concavity of the slide.
- Since the drop lies within an enclosed glass chamber, drying out occurs very slowly. A ring of Vaseline around the edge of the cover slip keeps the slide from drying out.







## ***2. Semi-Solid media Inoculation***

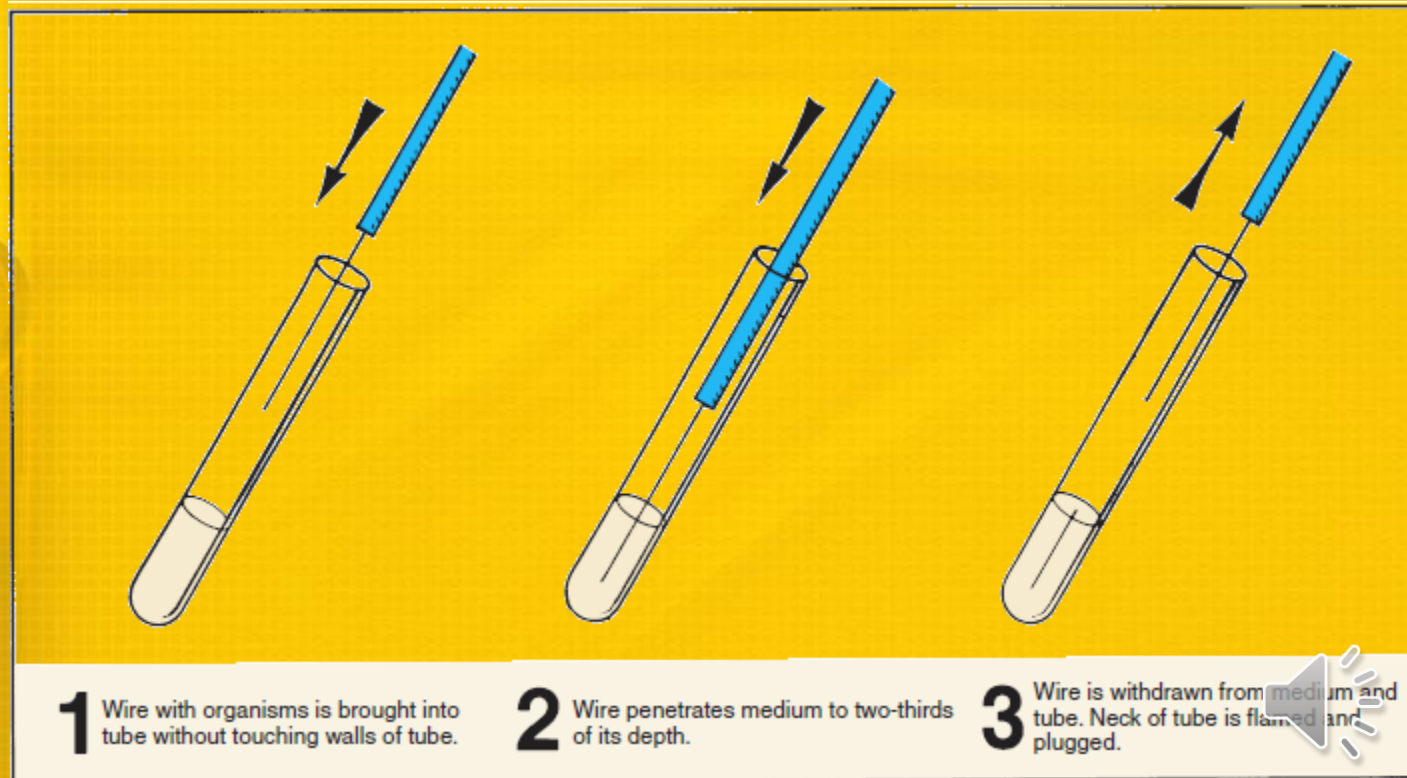
- The most commonly used test for motility in microbiology lab.
- It depends on the ability of motile bacteria to move through semi-solid media.
- Ordinary solid media contain 1.5-2.0% Agar
- Semi solid media contain about 0.4% Agar



# *Procedure of Motility Test*

## *How to Perform Test:*

- Using a sterile bacteriological loop, pick a colony of the test organism
- Stab quickly a tube of semi solid media.
- Incubate the semi solid media for 24 hours



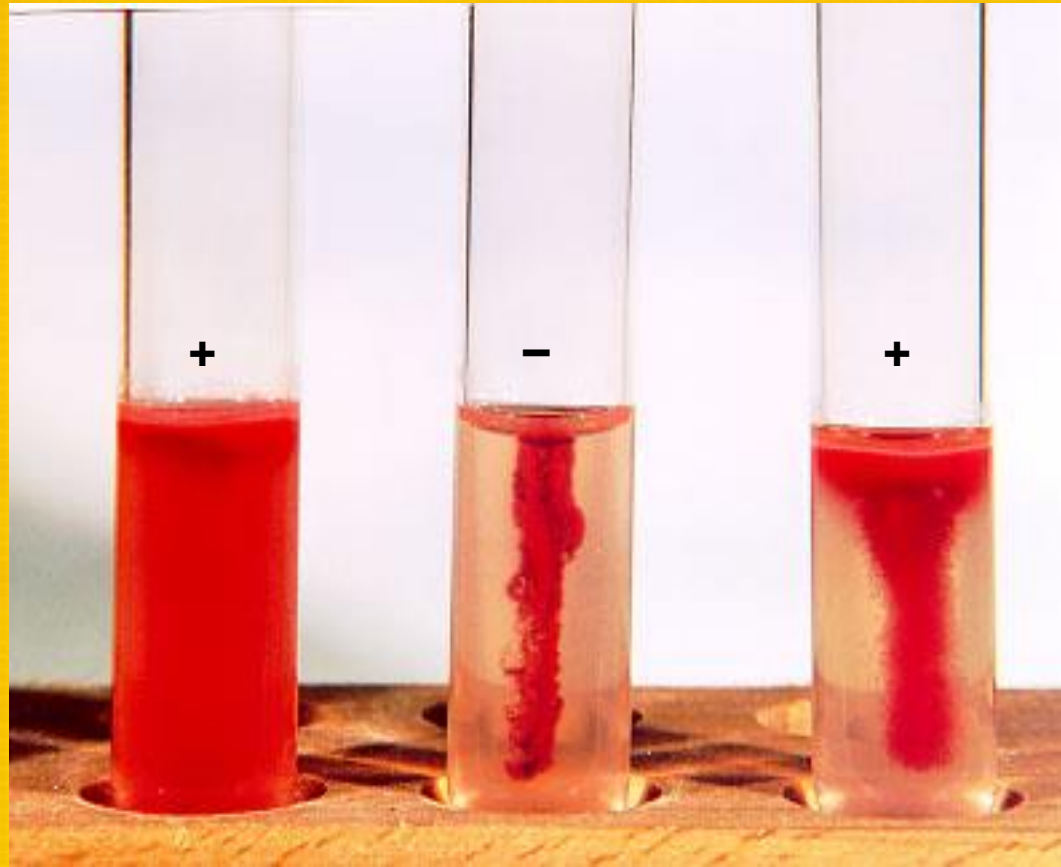
- ***Reading Results:***

- Hold the tube up to the light and look at the stab line to determine motility
- Non-motile bacteria generally give growths that are confined to the stab-line, have sharply defined margins and leave the surrounding medium clearly transparent.
- Motile Bacteria typically give diffuse, hazy growths that spread throughout the medium rendering it slightly opaque.





***Semi solid media with tetrazolium chloride (color indicator)***



# Laboratory Use

- In laboratory Motility testing using semi-solid medium is commonly used for the identification of Gm-ve bacteria of Enterobacteriaceae family.
- Motility test is also used for the species differentiation of gram positive cocci, Enterococci.
- Enterococcus faecium and E. faecalis are non-motile, whereas *E. gallinarum* generally are motile.
- *P.aeruginosa* and Proteus spp. are motile whereas *K.pneumoniae* are not



# Flagella stain.

- **Principle of Flagella Staining**
- The Leifson flagella stain method uses tannic acid and a dye. When bacterial flagella absorb this tannic acid and a dye, it forms a colloidal precipitate as a result the flagella is colorized and as well as increase in diameter, thus amenable to viewing by light microscopy.





Three test tubes are visible on the left side of the slide. The first tube on the left contains a dark red liquid. The middle tube contains a clear, colorless liquid. The third tube, partially obscured, contains a dark red liquid. The background is a solid yellow color.

- Thank you

