D) The flagellar stain : As flagella are too tiny and fine (12-30 ηm) , so that such structures:

"can be treated with colloidal suspension of tannic acid solution " causing heavy precipitation on flagella, which can be visualized by staining with basic fuchsin .

E) The capsular stain:

1.Using Negative stain

2.Welch's method :

- Prepare smear by air drying without heat fixation.
- Crystal violet (2 min.).
- Washing with CuSO4 solution (20%) (do not rinse with water).

F) DNA (nucleoid) stain:

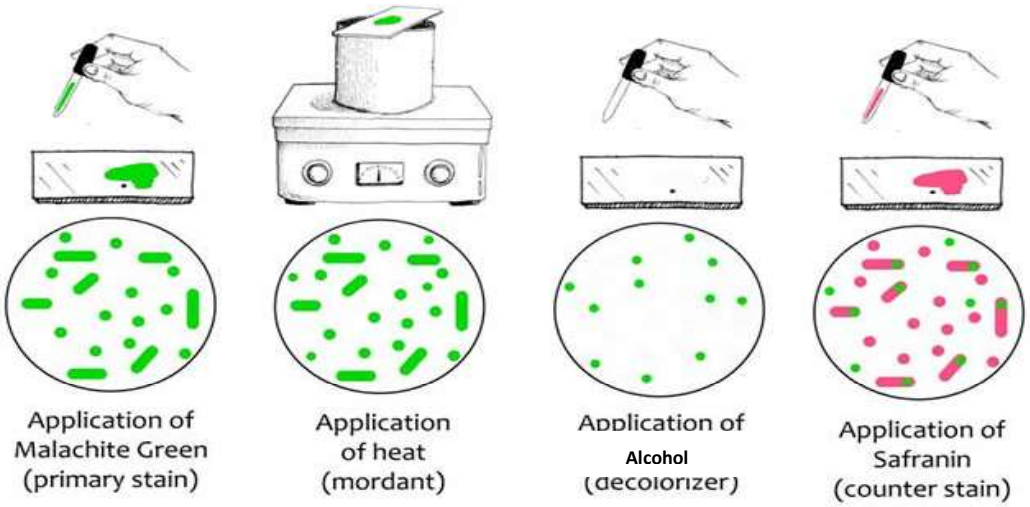
Can be stained with the specific Feulgen stain.

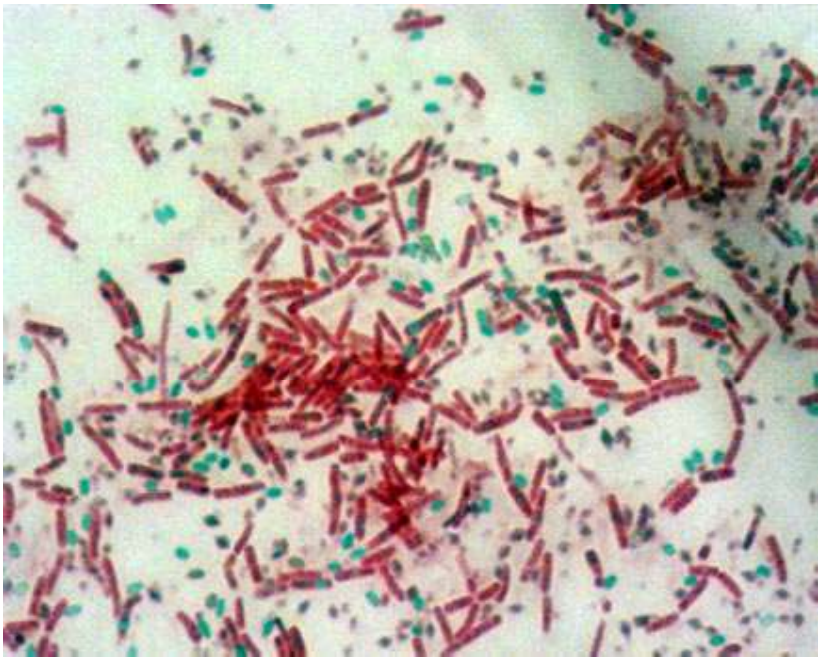
G) The spore stain:

1.Malachite green (steaming) (4-5 min).

2. Decolorization with water for few seconds.

3.Safranin (counter stain) (1-2) min.


Application of
Malachite Green
(primary stain)
Application
of heat
(mordant)
Application of
Alcohol
(decolorizer)
Application of
Safranin
(counter stain)



Bacterial physiology

Growth : Is the orderly increase in the sum of all components of an organism .

Such that ; cell multiplication and increase in cell number making up a population or culture, is a growth of unicellular organisms.

A.The measurement of microbial growth :

Depends on :

1-Measurment of viable cell number per unit volume of culture .

Or

2-Measurment of biomass concentration (dry weight of cells per unit volume of culture).

I-Cell concentration:

a.Viable cell count (plate count).

b.Measuring turbidity of a culture (photoelectric means) with standard curve.

II-Biomass concentration:

a.Dry weight of a microbial culture.

b.Estimation of cellular protein content.

c.PCV (packed cell volume).

B)The growth curve :

1.Lag phase

Cells adapt to the new environment , enzymes and other metabolites formed and accumulate to

permit cellular growth and multiplication.

2.Exponential phase (log phase) :

Cell number (biomass) increase in an exponential manner , until the exhaustion of one or more

nutrients in the medium or the accumulation of toxic products and inhibit growth .

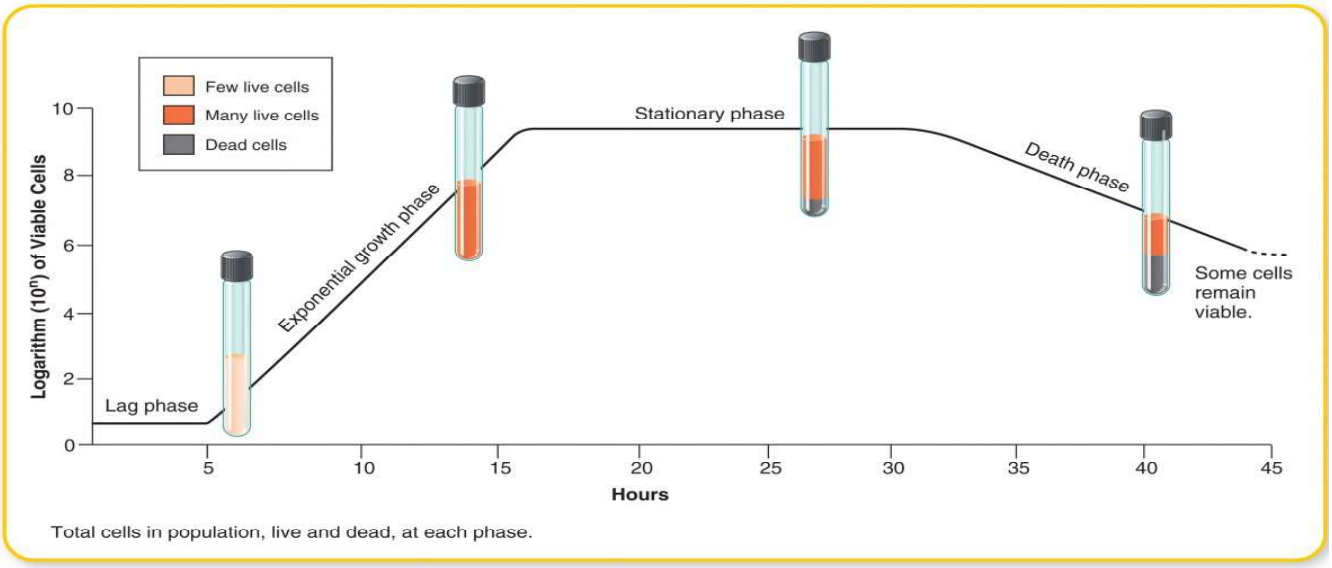
3.Stationary phase :

Exhaustion of nutrients and accumulation of toxic byproducts ceasing growth completely , such that number of new cells = number of dead cells.

4.Decline phase : (death phase)

The death rate increases , such that :

Number of dead cells > number of viable cells (survived cells).



Total cells in population, live and dead, at each phase.