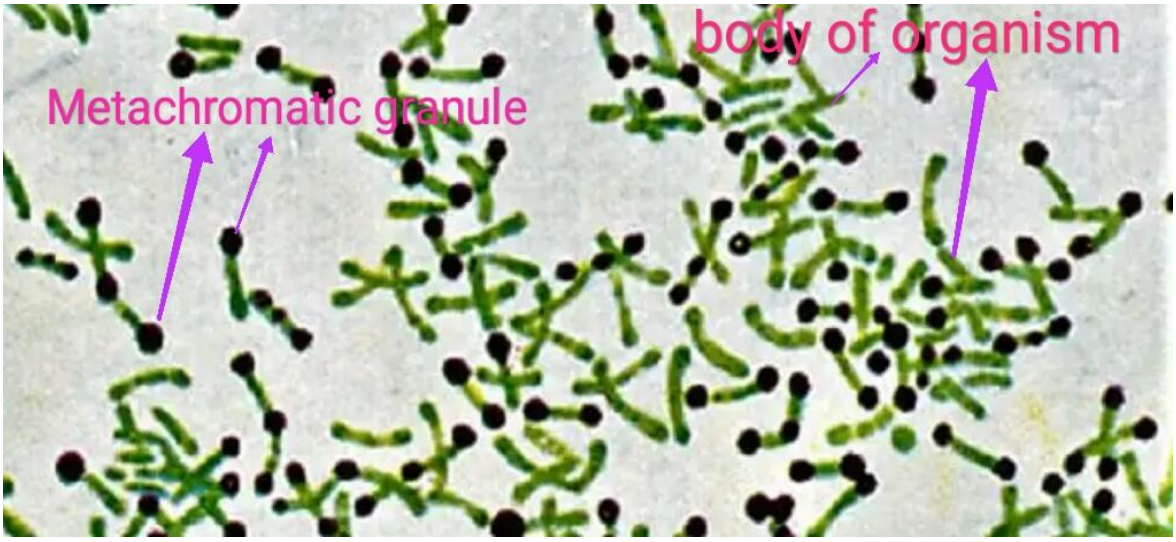
Gram-positive Bacilli

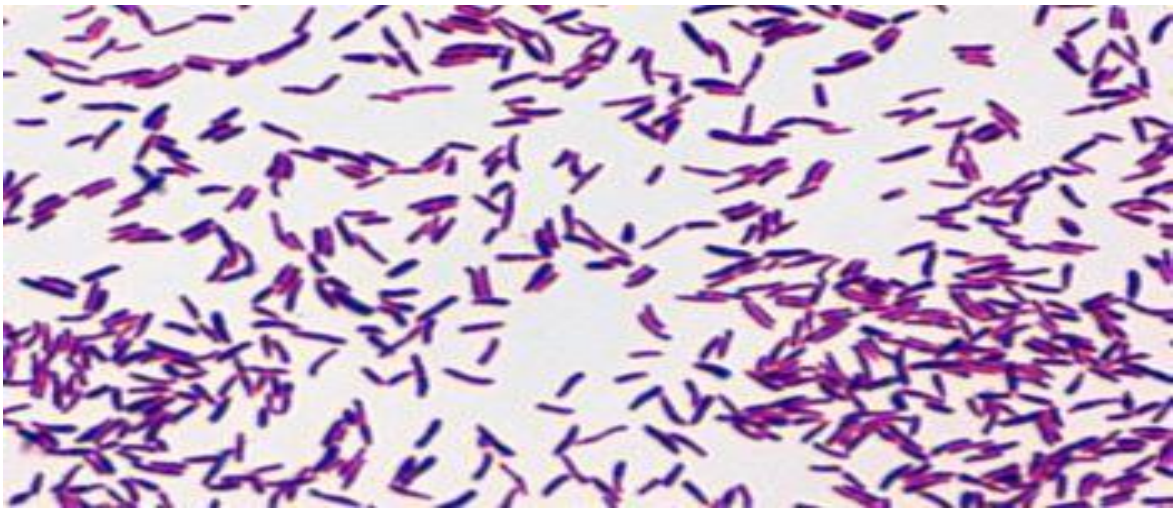
Non Spore forming Gram positive rods

Corynebacterium diphtheriae

- ✓ **Corynebacteria** are small, slender, pleomorphic, gram-positive rods & Chinese letters, or (V) shaped.
- ✓ They are nonmotile, unencapsulated, and do not form spores.
- ✓ Aerobic or facultatively anaerobic.
- ✓ Catalase positive, oxidase negative.
- ✓ Containing **metachromatic granules** called **volutin granules** present in cytoplasm and aggregated in the poles of the cells.
- ✓ To identify *C. diphtheriae*, a **Gram stain** is performed to show **Gram-positive**, highly pleomorphic organisms often looking like **Chinese letters or (V) shaped**.
- ✓ **Albert's stain** is used to demonstrate the **metachromatic granules** formed in the polar regions.



Albert's stain like metachromatic granules.



Gram stain like Chinese letters.

- ✓ ***C. diphtheriae*** is found in the **throat** and **nasopharynx** of carriers and in patients with diphtheria.
- ✓ **Mode of transmission** is person-to-person contact via respiratory droplets (i.e., coughing or sneezing), and less commonly, by touching open sores or contaminated surfaces.

✓ Pathogenesis :-

- ➢ **Early stage:-** sore throat, fever, and swollen neck gland.
- ➢ **Late stage:-** airway obstruction or breathing difficulty.

✓ Clinical significance:-

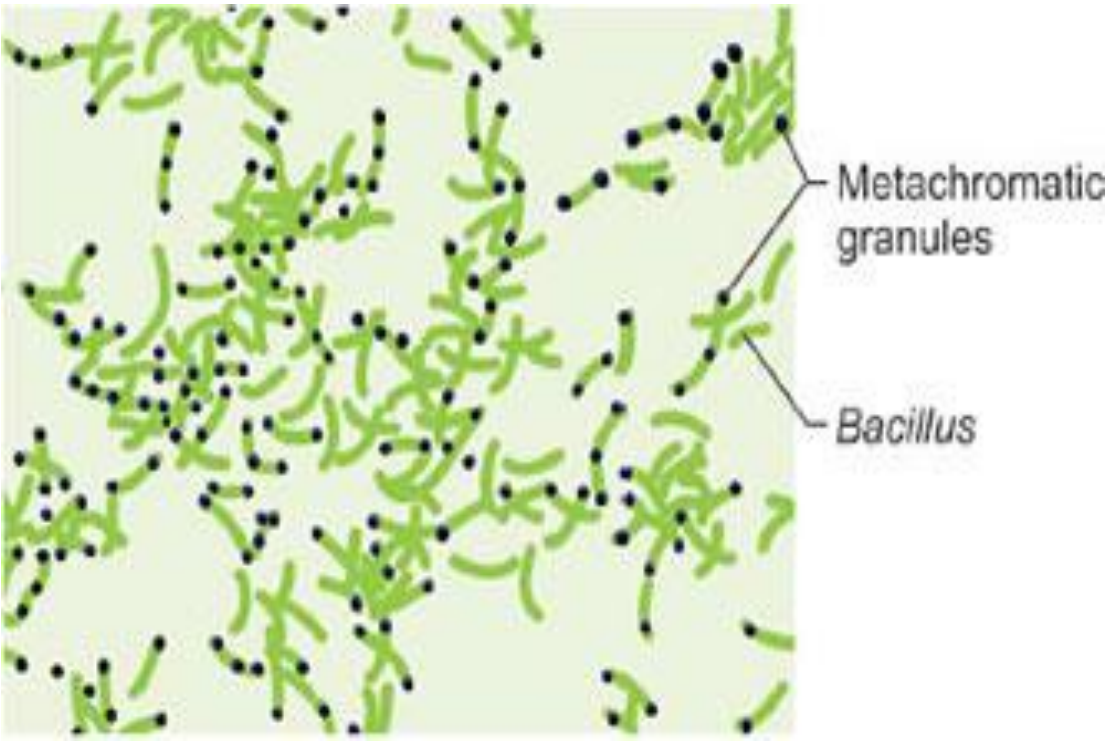
- ➢ Diphtheria consist of **local infection** of the throat, produces a thick, grayish, adherent exudate (**pseudomembrane**) that is composed of cell debris from the mucosa and inflammatory products, coats the throat and may extend into the nasal passages or down ward in the respiratory tract, leading to **suffocation**.

- generalized symptoms occur as the disease progresses (marked swelling of the **lymph nodes** in the neck.
- A puncture wound or cut in the skin can result in introduction of *C. diphtheriae* into the subcutaneous tissue, leading to a chronic, non-healing **ulcer** with a gray membrane.

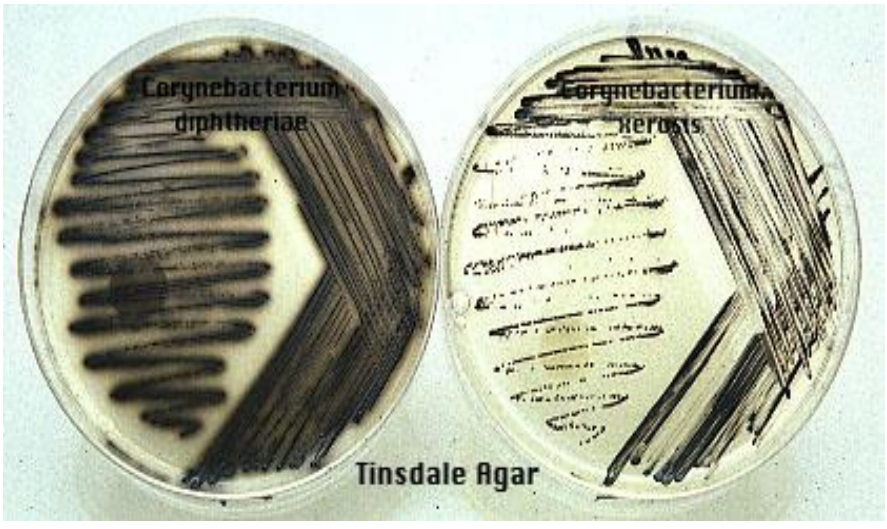
✓ Diagnostic laboratory tests:-

- **Clinical observation** :- Diphtheria should be considered in patients with **pharyngitis**, fever, swelling of the neck, erythema and adherent gray **pseudomembranes**.
- **Microscopic examination:** G+ rods, small, slender, pleomorphic, on **Gram stain** like **Chinese characters**, nonmotile, noncapsulated and do not form spores. **Albert's stain** is important to diagnostic C. because it contain **volutin granules** (C. contains accumulation of phosphate granules)

- ✓ **Result:-** Green coloured, rod shaped bacteria with **bluish black metachromatic granules** at the poles seen.



- ➢ **Macroscopic examination:** Culture = *C. diphtheriae* can be isolated easily from a **selective** medium such as **Tinsdale's agar**, which contains **potassium tellurite** produces **black colonies**.



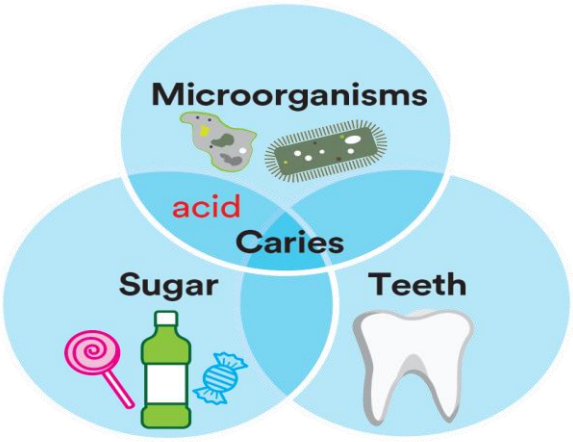
Lactobacillus

- ✓ It is Gram's positive, rod shape facultative anaerobic, non-spore forming bacilli.
- ✓ Lactobacillus species (spp.) are part of the normal flora found in the **oral cavity (pathogen)**, **gastrointestinal tract**, and **female genital tract (protection)**.
- ✓ The association between Lactobacilli and humans is a mutualistic relationship, the host aid in digestion of certain dietary substrates, found in food such as **yogurt** , as well as protection from pathogens. As it can help treat diarrhea, vaginal infections, and skin disorders such as **eczema**.
- ✓ Vaginal lactobacilli provide broad-spectrum protection against a range of pathogens through their production of copious amounts of **lactic acid**.

Lactobacillus in the oral cavity :-

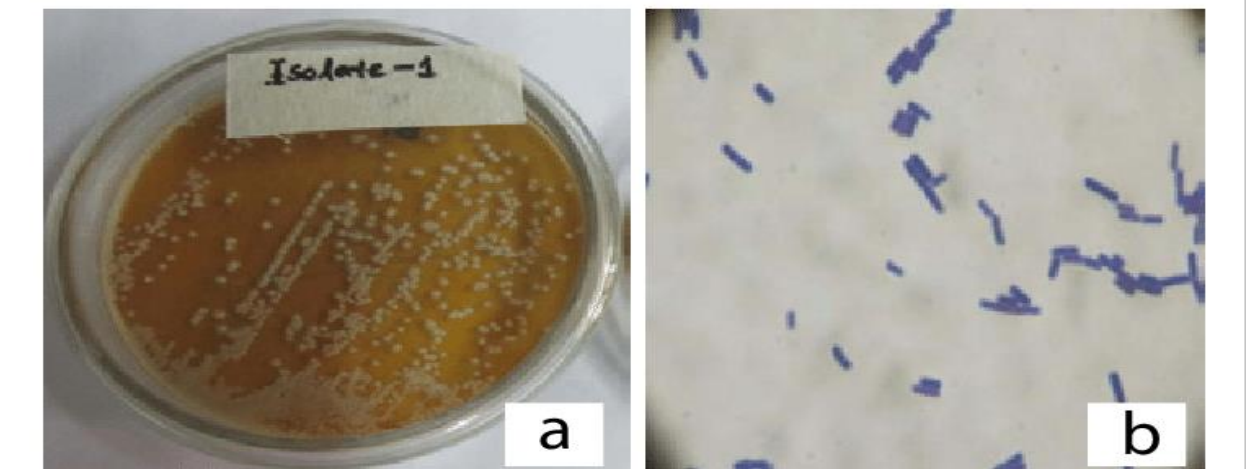
- ✓ Bacteria plays an important role in dental caries , the main pathogenic bacteria are *Streptococcus mutans* and *Lactobacillus*.
- ✓ Lactobacillus was the first known microorganism associated with dental caries. They appear during the first years of a child's life and are present in high numbers in saliva, on the dorsum of the tongue, mucous membranes, the hard palate, in dental plaque and, in fewer numbers, on tooth surfaces .

- ✓ The major characteristic of the Lactobacillus is the production of lactic acid by the sugar fermentation. Lactic acid can corrode teeth.
- ✓ **Dental Plaque Formation :-** The dental plaque development occurs due to the growth of bacteria which develops, of course on oral tissues and teeth. Microbial adhesion to the solid surface is the first step to dental plaque formation. After 4-12 hours of adhesion, colonization takes place in the dental plaque formation.



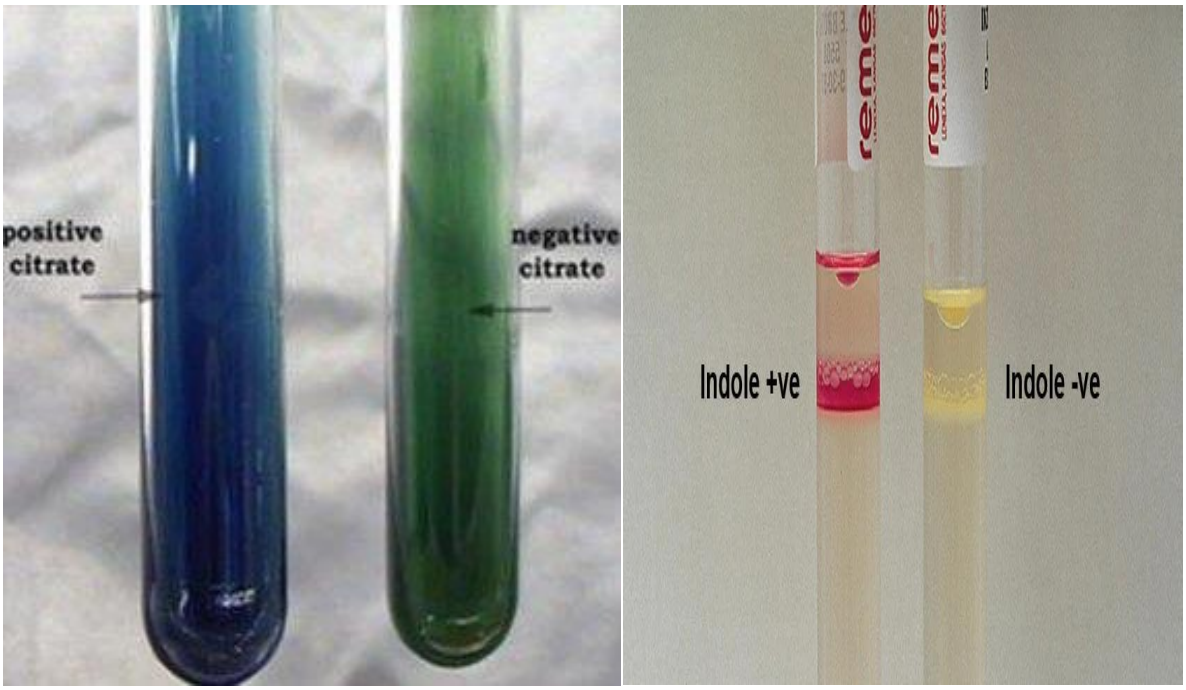
Keyes Diagram

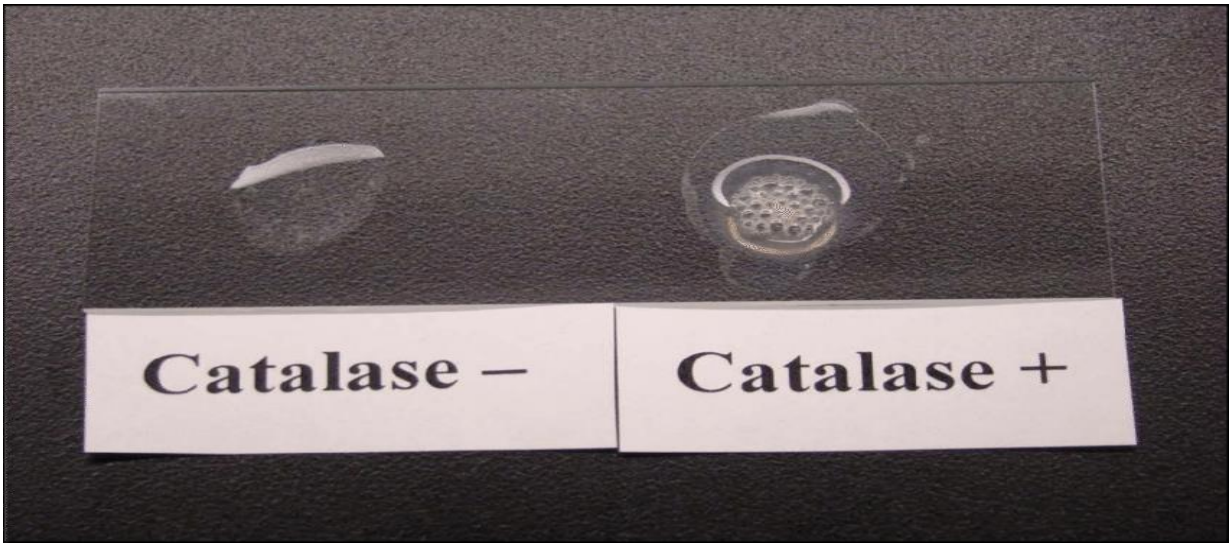
✓ **Lactobacillus MRS (deMan, Rogosa and Sharpe) Agar:-** It is selective media for isolation of all Lactobacillus species.



a) typical colony characteristics of the isolates grown on MRS agar medium; (b) Microscopic view of the isolates when Gram stained.

✓ For **biochemical characterization**, catalase, oxidase, indole, and simmons citrate agar **negative tests**.




Catalase –
Catalase +


oxidase (+)
oxidase (–)
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