

# برخی از جنس ها و گونه های مهم باکتری ها

گردآوری و تدوین:

علی مویدی

(عضو هیئت علمی گروه علوم و مهندسی صنایع غذایی - دانشگاه علوم کشاورزی و منابع طبیعی گرگان)

منابع:

1. Microbiology: An Introduction, 13<sup>th</sup> edition. Gerard J. Tortora, Berdell R. Funke, Christine L. Case. 2019, Pearson Education, Inc.

# Gram Negative Bacteria

- **Acetobacteraceae:** *Acetobacter* and *Gluconobacter* (glu<sup>-</sup>-kon'o<sup>-</sup>-BAK-ter) are industrially important aerobic organisms that convert ethanol into acetic acid (vinegar)
- **Rickettsia:** gram-negative rod-shaped bacteria, or coccobacilli. They reproduce only within a mammalian cell. One distinguishing feature of most rickettsias is that they are transmitted to humans by insect and tick bites. responsible for a number of diseases known as the spotted fever group. These include epidemic typhus.
- **Brucella:** *Brucella* (broo-SEL-lah) bacteria are small nonmotile coccobacilli. All species of *Brucella* are obligate parasites of mammals and cause the disease brucellosis. Of medical interest is the ability of *Brucella* to survive phagocytosis.
- **Nitrobacter and Nitrosomonas:** are genera of nitrifying bacteria that are of great importance to the environment and to agriculture. They are chemoautotrophs capable of using inorganic chemicals as energy sources and carbon dioxide as the only source of carbon, from which they synthesize all of their complex chemical makeup. *Nitrosomonas* species oxidize ammonium (NH<sub>4</sub><sup>+</sup>) to nitrite (NO<sub>2</sub><sup>-</sup>), which is in turn oxidized by *Nitrobacter* species to nitrates (NO<sub>3</sub><sup>-</sup>) in the process of *nitrification*.

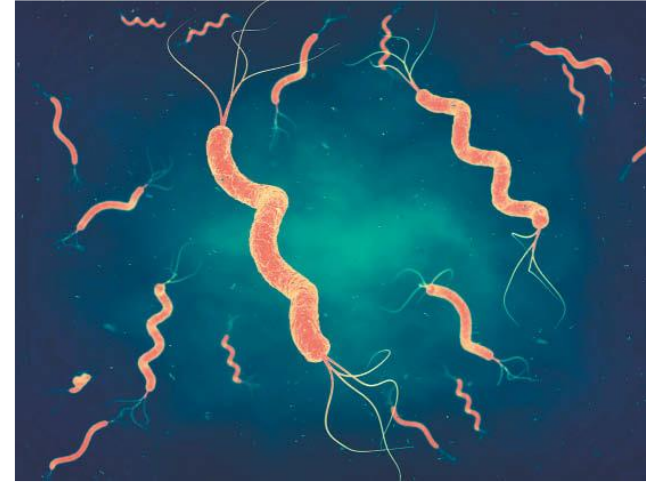
# Gram Negative Bacteria

- **Spirillum:**

The genus *Spirillum* (spi<sup>-</sup>-RIL-lum) is found mainly in freshwater.

*Spirillum* bacteria are motile by conventional polar flagella.

The spirilla are relatively large, gram-negative, aerobic bacteria.

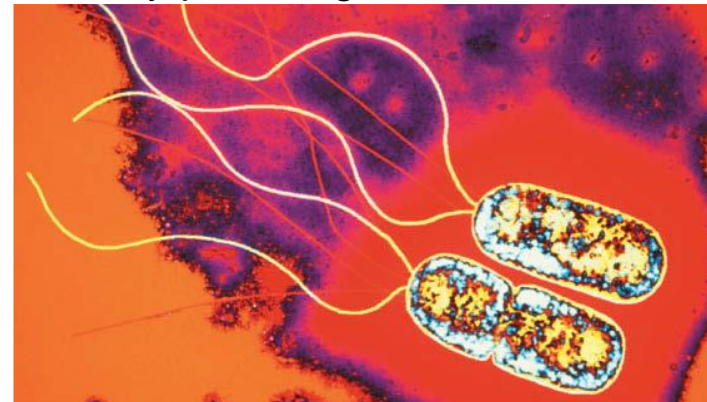


- ***Neisseria*:** Bacteria of the genus *Neisseria* are aerobic, gram-negative cocci that usually inhabit the mucous membranes of mammals. It includes the agent of meningococcal meningitis.

- ***Pseudomonas*:** Consists of aerobic, gram-negative rods that are motile by polar flagella. Pseudomonads are very common in soil and other natural environments.

Many pseudomonads can grow at refrigerator temperatures.

This characteristic, combined with their ability to utilize proteins and lipids, makes them an important contributor to food spoilage.



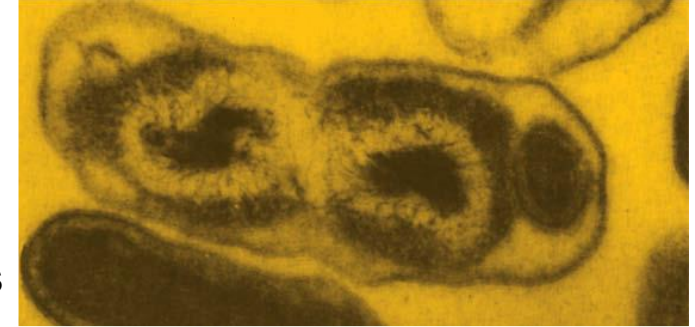
# Gram Negative Bacteria

- **Coxiella:** *Coxiella burnetii*, which causes Q fever.

*Coxiella* bacteria require a mammalian host cell to reproduce.

*Coxiella* is most commonly transmitted by contaminated milk.

A sporelike body is present in *C. burnetii*. This might explain the bacterium's relatively high resistance to the stresses and heat treatment.



- **Vibrio:** Facultatively anaerobic gram-negative rods. They are found mostly in aquatic habitats. *Vibrio* species are rods that are often slightly curved

One important pathogen is *Vibrio cholerae* the causative agent of cholera.



# Gram Negative Bacteria

- **Enterobacteriaceae:** Facultatively anaerobic, gram-negative rods that are, if motile, peritrichously flagellated. Morphologically, the rods are straight. This is an important bacterial group, often commonly called **enterics**. This reflects the fact that they inhabit the intestinal tracts of humans and other animals. Most enterics are active fermenters of glucose and other carbohydrates.
- Because of the clinical importance of enterics, there are many techniques to isolate and identify them.
- Biochemical tests are especially important in clinical laboratory work and in food and water microbiology.
- Enterics have fimbriae that help them adhere to surfaces or mucous membranes. Specialized sex pili aid in the exchange of genetic information between cells, which often include antibiotic resistance.
- Important genera of the order include *Escherichia*, *Salmonella*, *Shigella*, *Klebsiella*, *Serratia*, *Proteus*, *Yersinia*, *Erwinia*, *Enterobacter*, and *Cronobacter*.

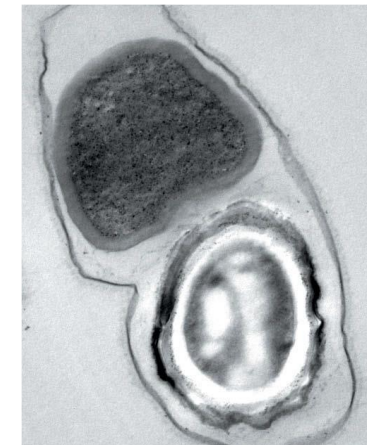
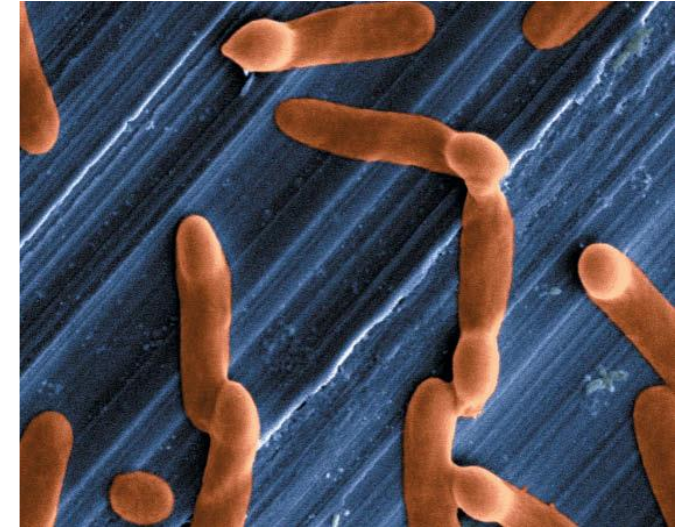


# Enterobacteriaceae

- ***Escherichia***: The bacterial species *Escherichia coli* is a common inhabitant of the human intestinal tract and is probably the most familiar organism in microbiology. Its presence in water or food is an indication of fecal contamination. *E. coli* is not usually pathogenic. However, it can be a cause of urinary tract infections, and certain strains produce enterotoxins that cause traveler's diarrhea and occasionally cause very serious foodborne disease.
- ***Salmonella***: Almost all members of the genus *Salmonella* are potentially pathogenic the rods are straight. Salmonellae are common inhabitants of the intestinal tracts of many animals, especially poultry and cattle.
  - Typhoid fever and gastrointestinal disease, salmonellosis, is caused by *Salmonella* species.
- ***Shigella***: Species of *Shigella* are responsible for a disease called bacillary dysentery, or shigellosis. Unlike salmonellae, they are found only in humans.
- ***Yersinia***: ***Yersinia pestis*** causes plague, the Black Death of medieval Europe.
- ***Cronobacter***: is a genus of gram-negative, rod-shaped bacteria that was introduced in 2007. *Cronobacter sakazakii* can cause meningitis and necrotizing enterocolitis in infants.

# The Gram-positive Bacteria

- The gram-positive bacteria can be divided into two groups: those that have [a high G + C ratio](#), and those that have a [low G + C ratio](#).
- **Low G + C content:** *Streptococcus* (33 – 44%) and *Clostridium* (21 – 54%)
- **High G + C content:** *Streptomyces* (69 – 73%) and *Mycobacterium* (62 – 70%)
- ***Clostridium*:** Members of the genus *Clostridium* are obligate anaerobes.
- The rod-shaped cells contain endospores.
- Diseases associated with clostridia include:  
tetanus, caused by *C. tetani*; botulism by *C. botulinum* and gas gangrene.
- ***Bacillus*:** *Bacillus* Bacteria of the genus *Bacillus* are typically rods that produce endospores. They are common in soil, and only a few are pathogenic to humans.
- *B. turingensis* as a biological warfare →
- *Bacillus cereus* is a common bacterium in the environment and occasionally is identified as a cause of food poisoning.

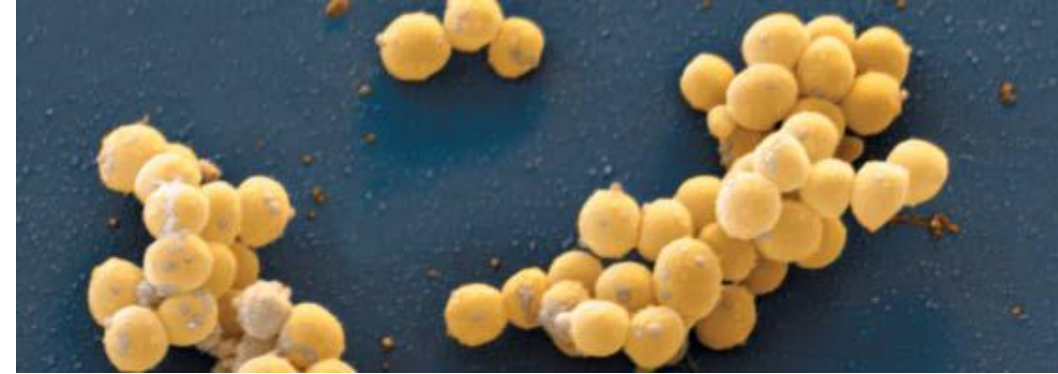


# The Gram-positive Bacteria

- ***Staphylococcus***: Staphylococci typically occur in grapelike clusters.

The most important staphylococcal species is *Staphylococcus aureus*

Which is named for its yellow-pigmented colonies.



- ***Streptococcus***: Members of the genus *Streptococcus* are spherical, gram-positive bacteria that typically appear in chain.
- ***Lactobacillus***: In humans, bacteria of the genus *Lactobacillus* are located in the vagina, intestinal tract, and oral cavity. Lactobacilli are used commercially in the production of sauerkraut, pickles, buttermilk, and yogurt. They are acid tolerant and participate in lactic acid fermentations.
- *L. delberueckii* subsp. *bulgaricus* and *Streptococcus thermophilus* are used as starter culture in yogurt production.
- Some lactobacillus species are considered as **probiotics** (i.e., *L. acidophilus*, *L. paracasei*, ...)



# Actinobacteria (High G+C Gram-Positive Bacteria)

- Several genera such as *Streptomyces* and *Actinomyces* grow only as extended, often-branching filaments.
- Superficially, their morphology resembles that of filamentous fungi; however, they are prokaryotic cells.
- *Mycobacterium*: aerobic, non–endospore forming rods. The name *myco*, meaning funguslike, was derived from their occasional exhibition of filamentous growth. Acid-fast staining, drug resistance, and pathogenicity, are related to their distinctive cell wall, which is structurally similar to gram-negative bacteria.
- *Mycobacterium tuberculosis* causes tuberculosis and *M. leprae* causes leprosy.
- *Streptomyces*: The genus *Streptomyces* is the best known of the actinomycetes and is one of the bacteria most commonly isolated from soil.
- *Streptomyces* bacteria characteristically produce a compound which gives fresh soil its typical musty odor.
- Species of *Streptomyces* are valuable because they produce most of our commercial antibiotics

