

The background is a vibrant, microscopic scene. It features several large, translucent blue, amoeba-like organisms with irregular shapes. Interspersed among them are numerous smaller, spherical particles, some appearing as simple dots and others as more complex, multi-layered structures. In the corners and scattered throughout, there are colorful, spiky structures resembling viruses or bacteria, in shades of yellow, orange, red, and pink. The overall lighting is bright and colorful, creating a sense of a bustling, microscopic world.

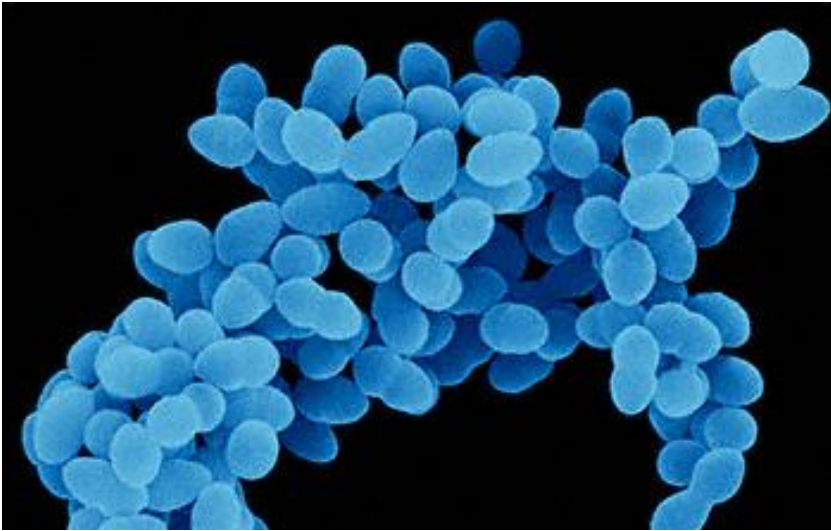
# BACTERIA & VIRUSES

**How do microorganisms influence our lives?**

# CHAPTER 19.1: BACTERIA

Microorganisms cover nearly every square centimeter of Earth.

**Prokaryotes**: the smallest and most common microorganism, unicellular (lack a nucleus)



# IDENTIFYING PROKARYOTES:

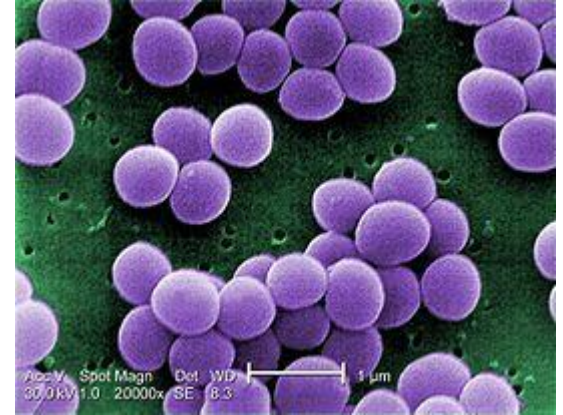
## 1. *Shape*



**baccilli**: Rod Shaped  
(example: E. coli)

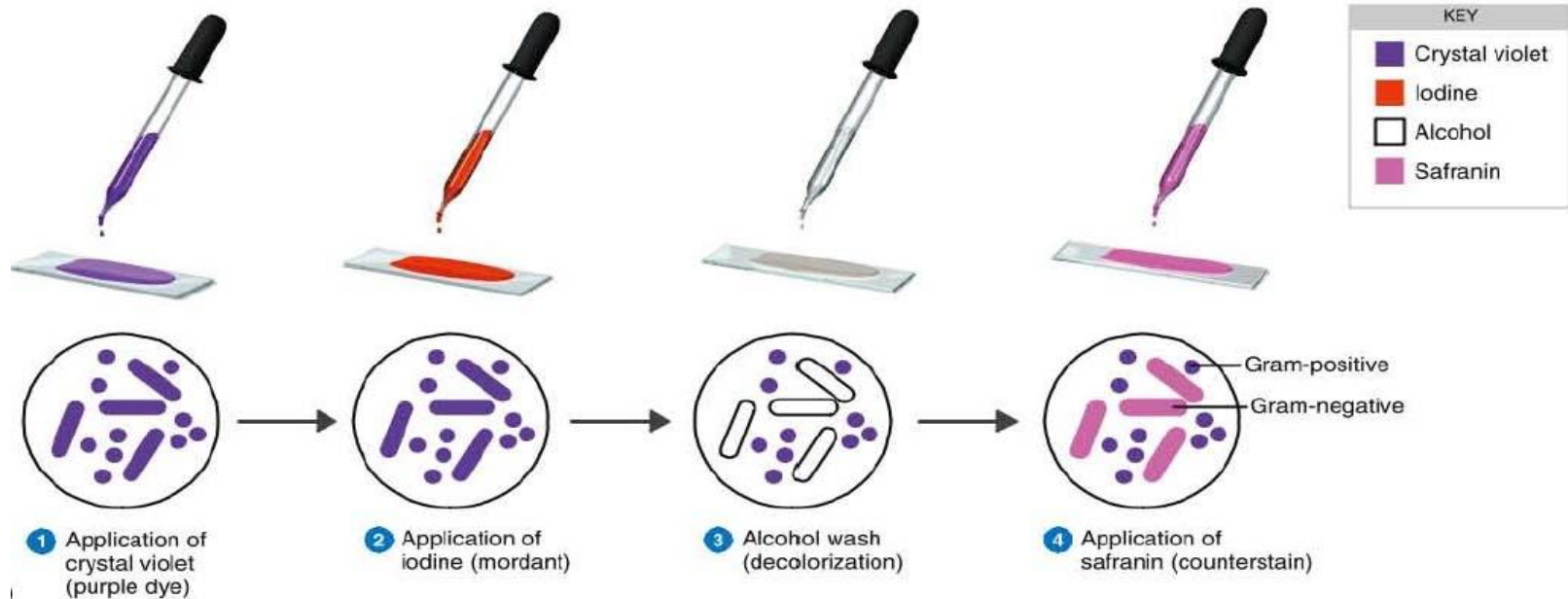


**Spirilla**: spiral or  
corkscrew shaped  
(example: syphilis)



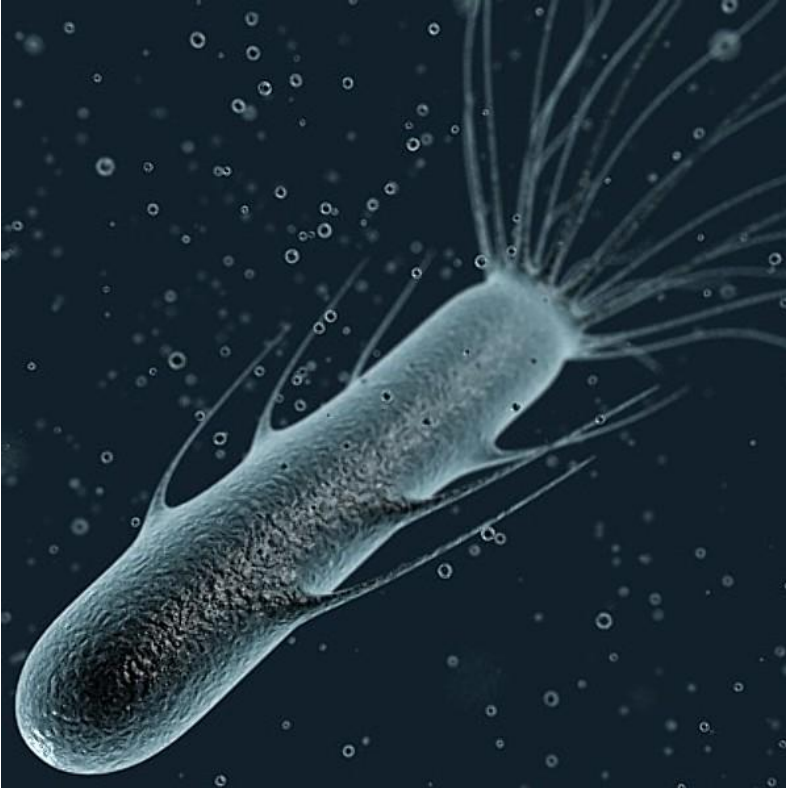
**cocci**: sphere shaped  
(example : gonorrhea)

2. the Gram staining method: cell walls which contain peptidoglycan can be determined by a violet stain..



2nd stain (counterstain) is red shows the Gram- negative bacteria making them appear pink or light red

3. **Movement** also can tell use what kind of prokaryote they are.



***Flagella***: whip-like structure, used for movement.

# METABOLIC DIVERSITY

The ways in which bacteria obtain energy and whether they use oxygen for cellular respiration

Mode of Nutrition	Energy Source	Carbon Source	Types of Organisms
-------------------	---------------	---------------	--------------------

## Autotroph

Photo-autotroph

Light

CO<sub>2</sub>

Photosynthetic prokaryotes, including cyanobacteria; plants; certain protists (algae)

Chemo-autotroph

Inorganic chemicals

CO<sub>2</sub>

Certain prokaryotes (for example, *Sulfolobus*)

## Heterotroph

Photo-heterotroph

Light

Organic compounds

Certain prokaryotes

Chemo-heterotroph

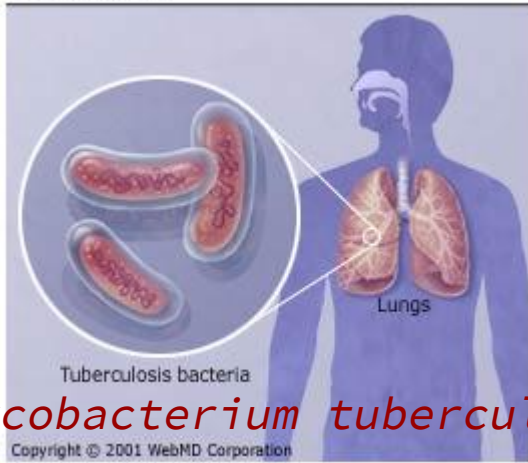
Organic compounds

Organic compounds

Many prokaryotes and protists; fungi; animals; some parasitic plants

Energy is released by cellular respiration or fermentation or both.

Tuberculosis



*mycobacterium tuberculosis*

**Obligate aerobes:**

organisms that require a constant supply of oxygen



*clostridium botulinum*

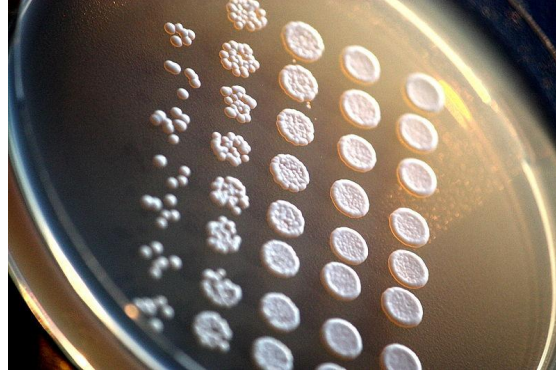
**obligate anaerobes:**

must live in the absence of oxygen, they are killed by it!

## Facultative

anaerobes: do not require oxygen but are not killed by it either.

They can switch between cellular respiration & fermentation!



*Saccharomyces cerevisiae*



# GROWTH & REPRODUCTION

**Binary Fission**: when a bacterium has doubled in size, it replicates its DNA and divides in half.

**Conjugation**: the exchange of genetic information by a hollow bridge



# GROWTH RATES

Some bacteria grow astonishingly quickly, some divide every 20 minutes!

Food and waste production limit bacteria from taking over the world...

