

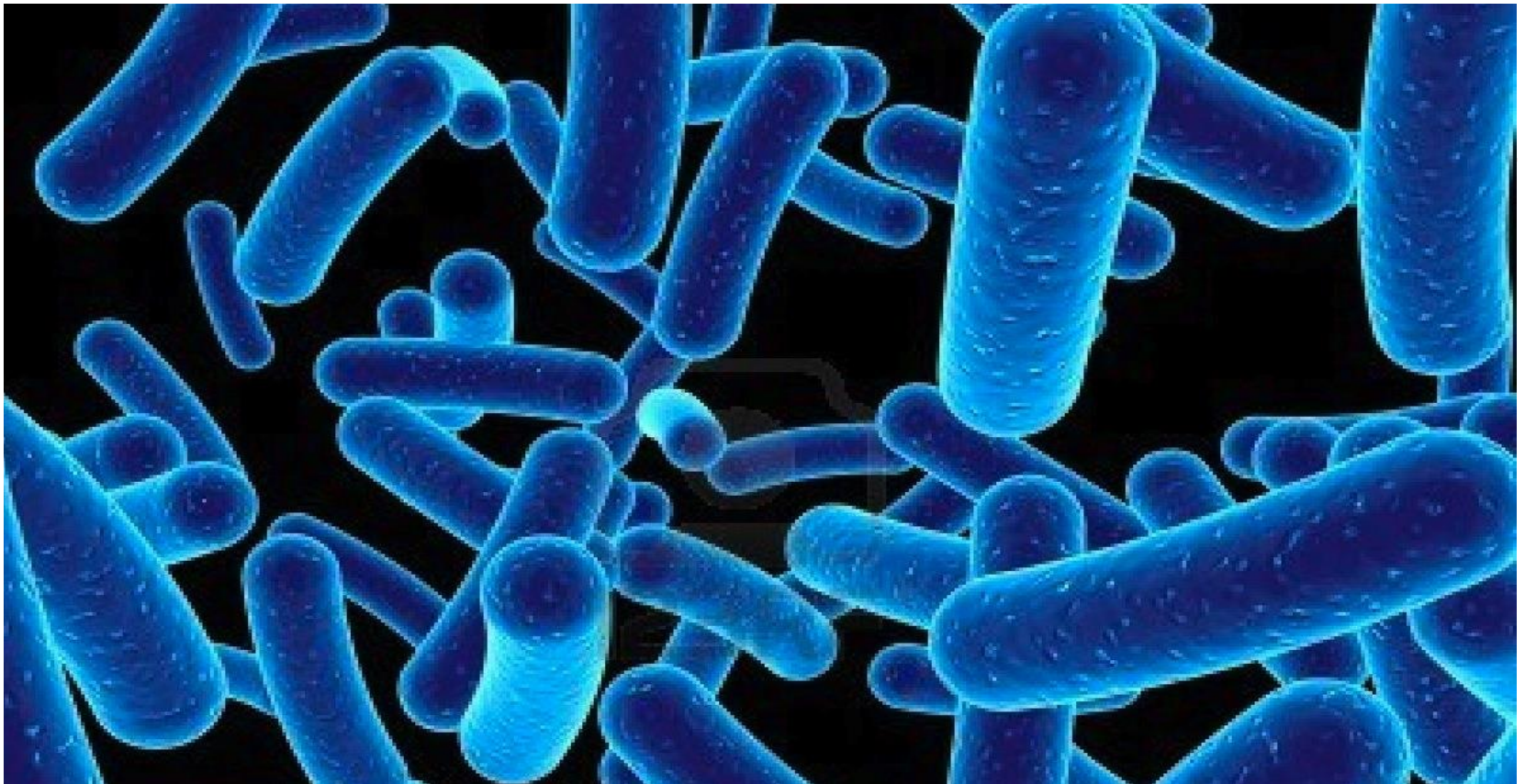
PHARMACEUTICAL MICROBIOLOGY-1

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BACTERIOLOGY



Bacteria.....

- Bacteria are a large group of unicellular, prokaryote microorganisms
- Bacteria are by far the smallest living cells.
- Different bacterial species that colonize or infect humans range from 0.1 to 10 μm .

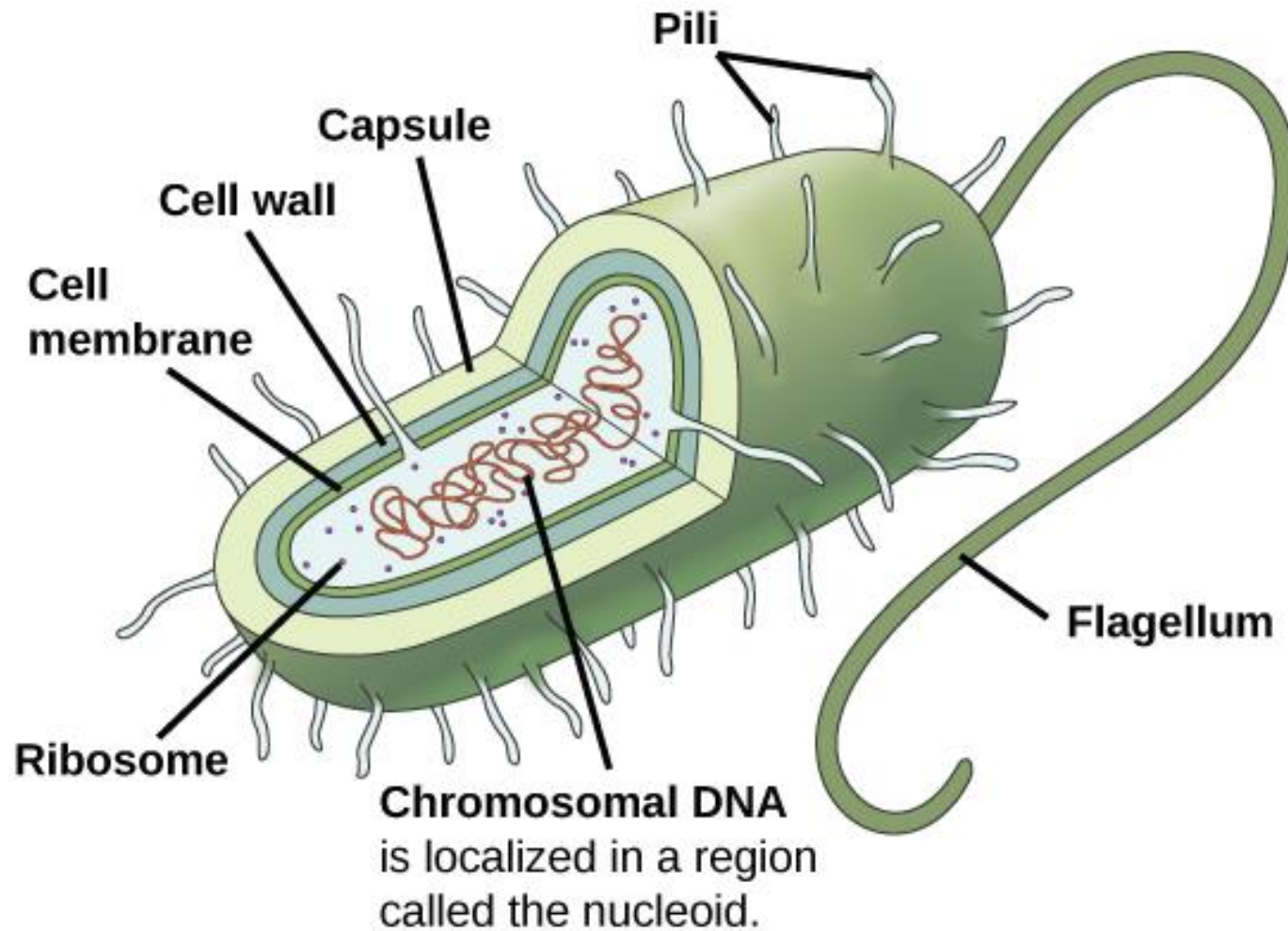
- **Bacteria are ubiquitous in every habitat on Earth**, growing in soil, acidic hot springs, radioactive waste, water, and deep in the Earth's crust, as well as in organic matter and the live bodies of plants and animals



Philippe Guillaume
Costa Rica



Bacterial cell structure



Capsule

- The capsule is a gelatinous layer covering the entire bacterium.
- It is composed of polysaccharide.
- Protects against phagocytosis & adhere bacteria to human tissues.

Cell Wall

- Found in all bacteria **except mycoplasma** which are surrounded *only* by a cell membrane.
- Internal to the capsule.
- It protects bacteria against osmotic pressure.
- It gives the bacteria its shape.

Cytoplasmic membrane

- Semipermeable phospholipid bilayer.
- **Function:**
- Active transport of molecules into bacteria (**selective permeability**).
- Secretion of **enzymes** and **toxins**

Nucleoid

- It is the area of the cytoplasm in which DNA is located.
- DNA is a single circular molecule.
- It has no nuclear membrane, no nucleolus & no histones.

Ribosomes

- The size is 70s with 50s & 30s subunits.
- It is the site for protein synthesis.

Flagella

- Flagella are long, whiplike appendages that move the bacteria toward nutrients and other attractants, a process called **chemotaxis**.
- Is made of protein called **flagellin**.
- Mediate motility of bacteria.
- It can make the bacterial infection spread in the body.

Plasmid

- It is an extra-chromosomal double stranded DNA.
- It carries the genes for:
 1. Antibiotic resistance
 2. Pili
 3. Exotoxin

Endospores

- Highly resistant structures produced in response to nutrient limitation or a related sign that tough times are coming.
- Produced only by 2 genera:
 1. Bacillus
 2. Clostridium
- **Characteristics:**
 1. Metabolically inactive
 2. Resistant to heat & chemicals
 3. Remain dormant for many years especially in the soil

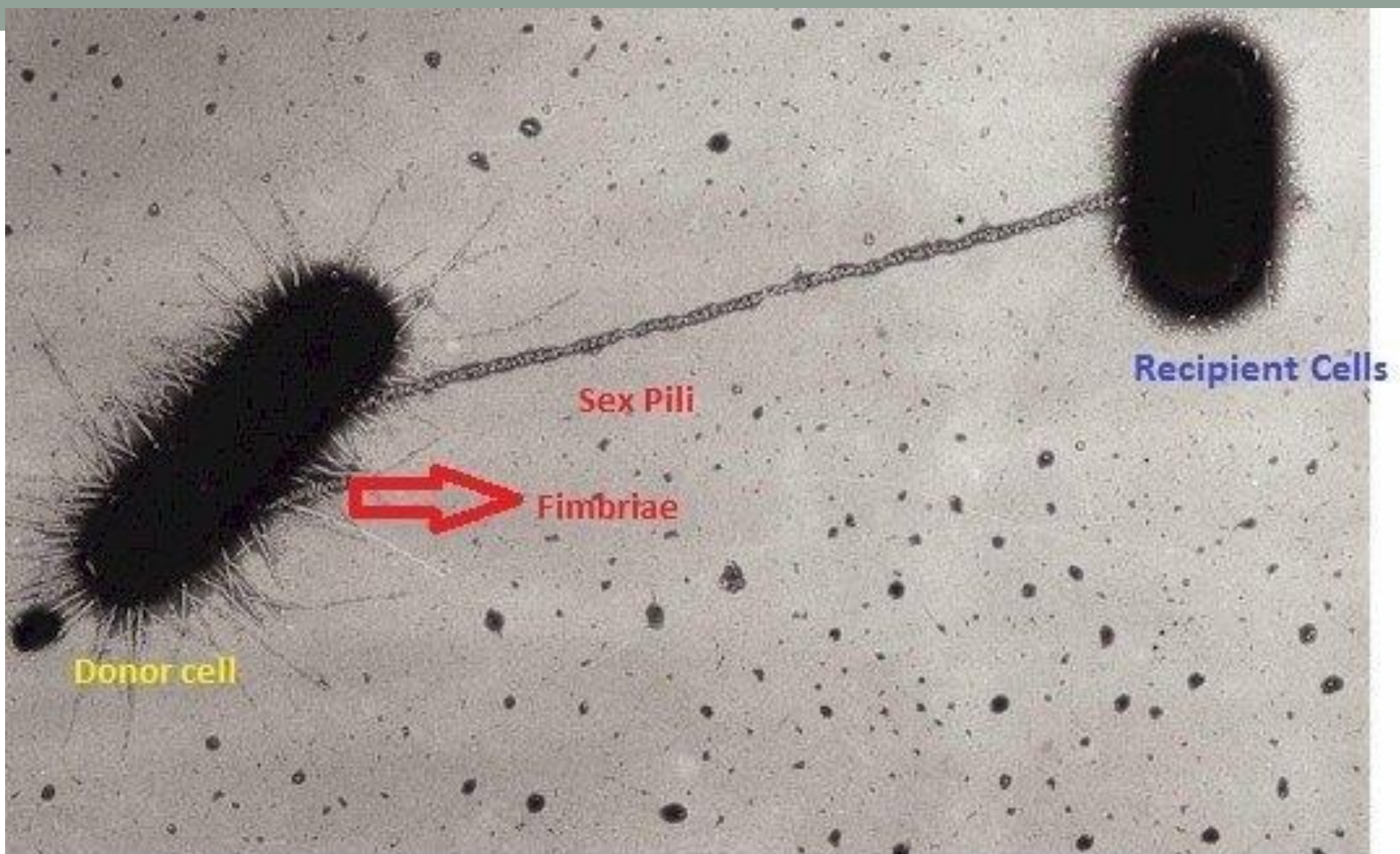
- One cell forms one spore under adverse conditions (the process is called **sporulation**)
- The spore may persist for a long time and then, on appropriate stimulation, give rise to a single bacterial cell (**germination**).

Pili (Fimbriae)

- Pili are molecular hair-like projections found on the surface of bacterial cell.
- Composed of molecules of a protein called pilin.
- They mediate the **attachment** of bacteria to specific receptors on the human cell surface, which is a necessary step in the initiation of infection for some organisms.

- **They are of two types:**

1. **Common pili:** mediate attachment to human cells
2. **Sex pili:** for gene transfer between bacteria (transfer of plasmid)



always

believe

in

YOURSELF

even when others don't