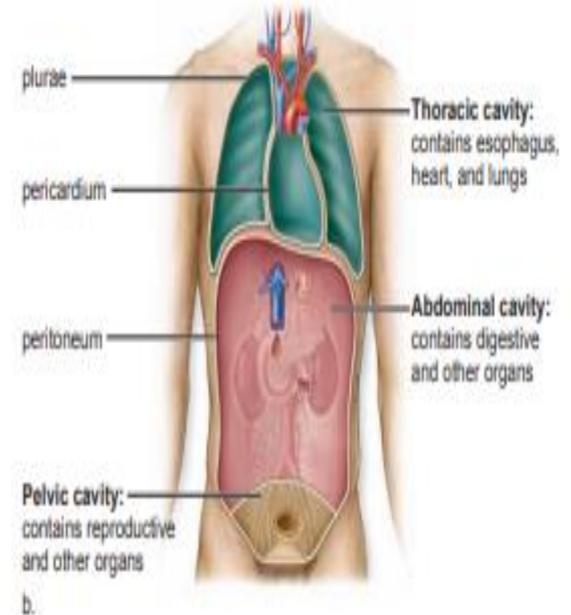
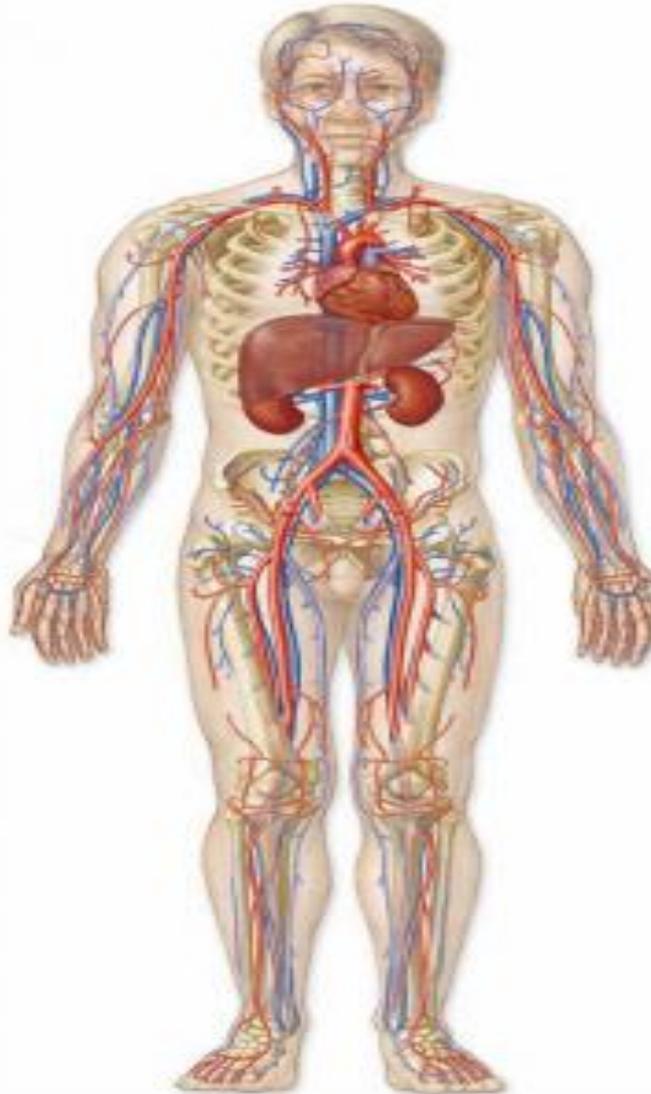
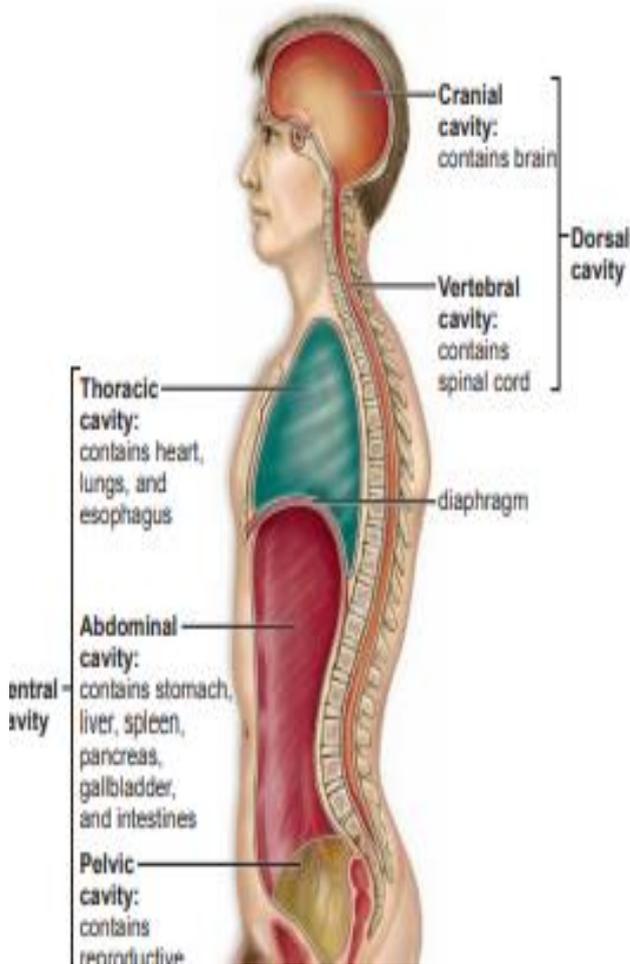


Medical Biology



Organization

- Atom—molecule-organelles-cell-tissue—organ-
system-organism-population-community-
ecosystem-biosphere



TISSUE



ORGAN



ORGAN SYSTEM

How many cells?

The number of cells in a human body varies depending on the *size of the person* and whether *cells have been damaged or lost*. However, most estimates suggest that there are well over **100 trillion cells in a human body**

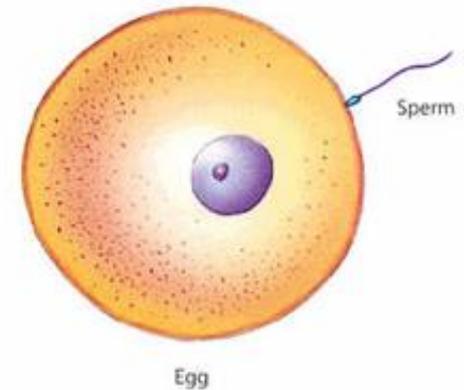
Growth

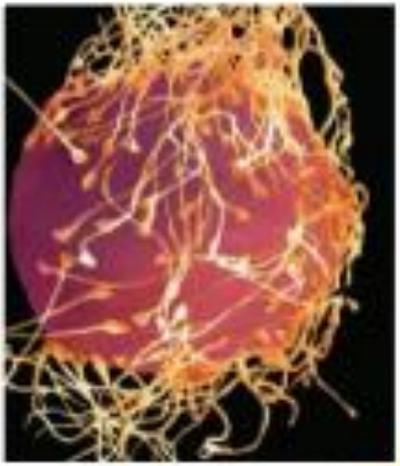
- **Grow** occurs as the result of **cell division and cell enlargement**
- **Cell division** is the formation of two cells from a **preexisting cell**
- **New cells enlarge as they mature**
- **When a cell grows to a size where its surface area isn't big enough for its volume, the cell divides**

	1 mm 	2 mm 
Surface area (square mm)	$6 \times 1 \text{ mm}^2 = 6 \text{ mm}^2$	$6 \times 4 \text{ mm}^2 = 24 \text{ mm}^2$
Volume (cubic mm)	$(1 \text{ mm})^3 = 1 \text{ mm}^3$	$(2 \text{ mm})^3 = 8 \text{ mm}^3$
<u>Surface area</u> Volume	$\frac{6}{1}$	$\frac{24}{8} = \frac{3}{1}$

Sexual Reproduction

- Hereditary information from **two different organisms** of the same species are combined
- Egg (**haploid**) and sperm → **zygote (fertilized egg)**
- Zygote contains hereditary information from **both parents (diploid)**





b.

Asexual Reproduction

- Hereditary information from **one, usually unicellular, organism** that divides
- **Resulting cells** contain **identical hereditary information**
- Genetic information from **single parent (time generation)**



Scientific Method

Observations

Hypothesis

Experiment/
Observations

Conclusion

Scientific Theory

Observation

New observations are made, and previous data are studied.

Hypothesis

Input from various sources is used to formulate a testable statement.

Experiment/Observations

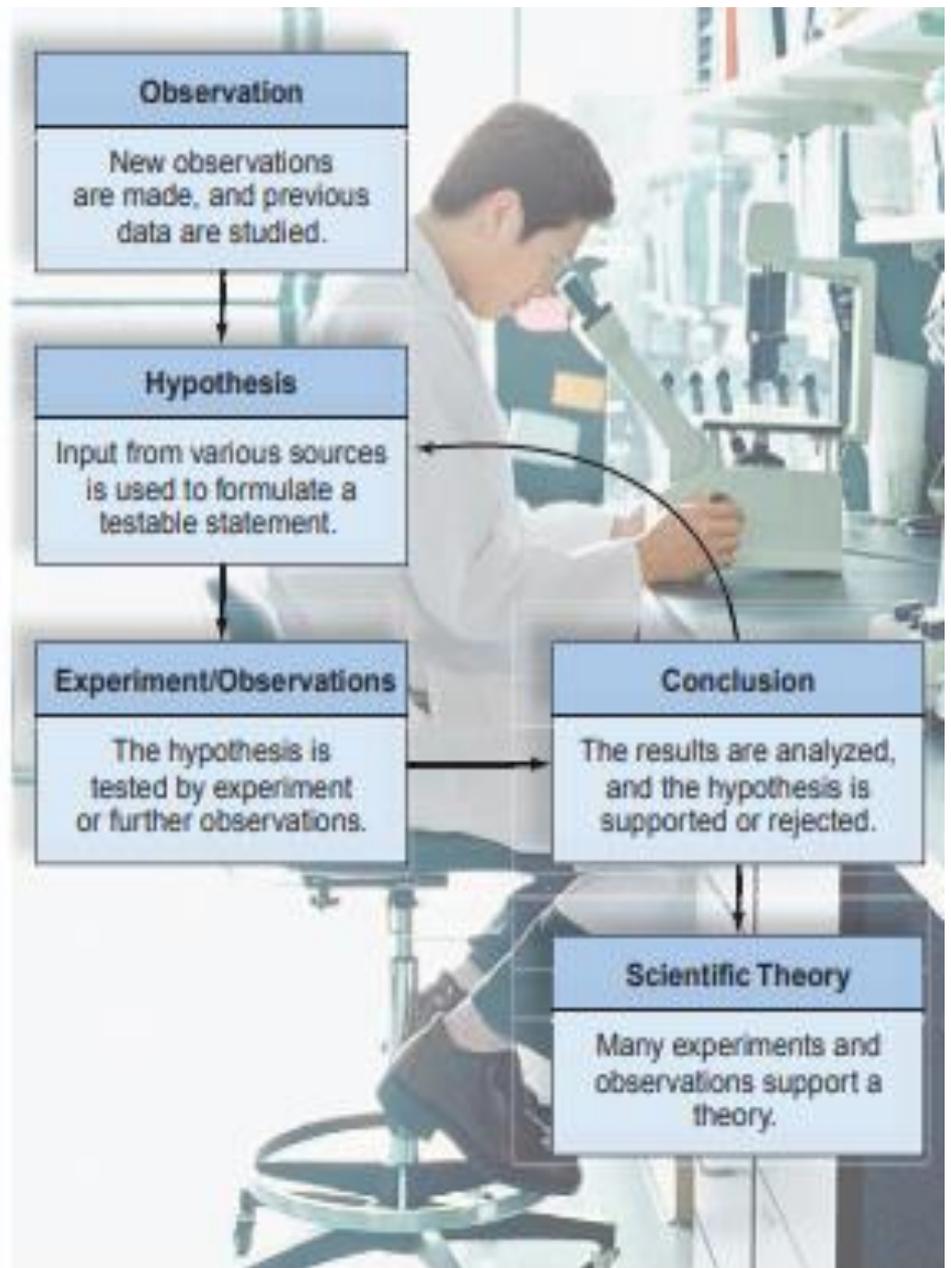
The hypothesis is tested by experiment or further observations.

Conclusion

The results are analyzed, and the hypothesis is supported or rejected.

Scientific Theory

Many experiments and observations support a theory.



How the scientific method works

1974 physician Dr. Marshall... Dr. Robin Warren

Many cases of gastritis (bleeding stomach ulcer)

Other Drs. Acidity + stress

Kochs

.The suspected pathogen (virus or bacterium) must be present in every case of the disease;

- the pathogen must be isolated from the host and grown in a lab dish;
- the disease must be reproduced when a pure culture of the pathogen is inoculated into a healthy susceptible host; and
- the same pathogen must be recovered again from the experimentally infected host

He isolated b. no volun, animal

Dr. Marshall received all sorts of prizes and awards, but he and Dr. Warren were especially gratified to

Eat bacteria receive a Nobel Prize in Medicine in 2005. The Nobel committee reportedly thanked Marshall and Warren for their "pioneering discovery," stating that peptic ulcer disease now could be cured with antibiotics

and acid- secretion inhibitors rather than becoming a

"chronic, frequently disabling condition



a. **State Hypothesis:**
Antibiotic B is a better treatment for ulcers than antibiotic A.

Large number of subjects were selected.



Subjects were divided into three groups.



b. **Perform Experiment:**
Groups were treated the same except as noted.



Control group:
received placebo

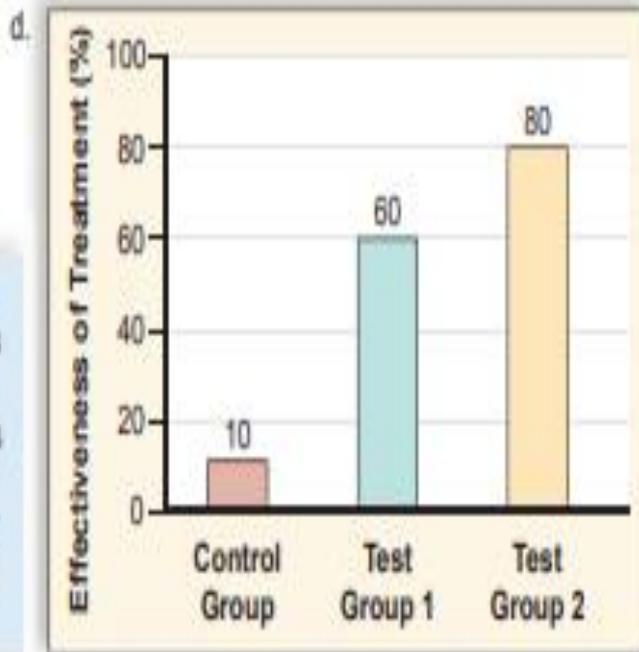


Test group 1:
received antibiotic A



Test group 2:
received antibiotic B

Conclusion:
Hypothesis is supported.
Antibiotic B is a better treatment for ulcers than antibiotic A.



PROKARYOTIC CELL & EUKARYOTIC CELL

Prokaryotic Cells

- Generally very small and relatively simple (less than 5 μm).

• External Features

- Boundary is the plasma membrane

May have membrane infoldings called mesosomes

- Rigid wall May secrete a slime sheath or capsule for protection

- May have motile structures called flagella, .

flagella of eukaryotic cells. Their motion is caused by basal rotors.

- Some have tiny protein projections called pili, which help to attach bacteria to surfaces. Some hollow pili are used to transfer genetic material.

• Interior of Prokaryotic Cell

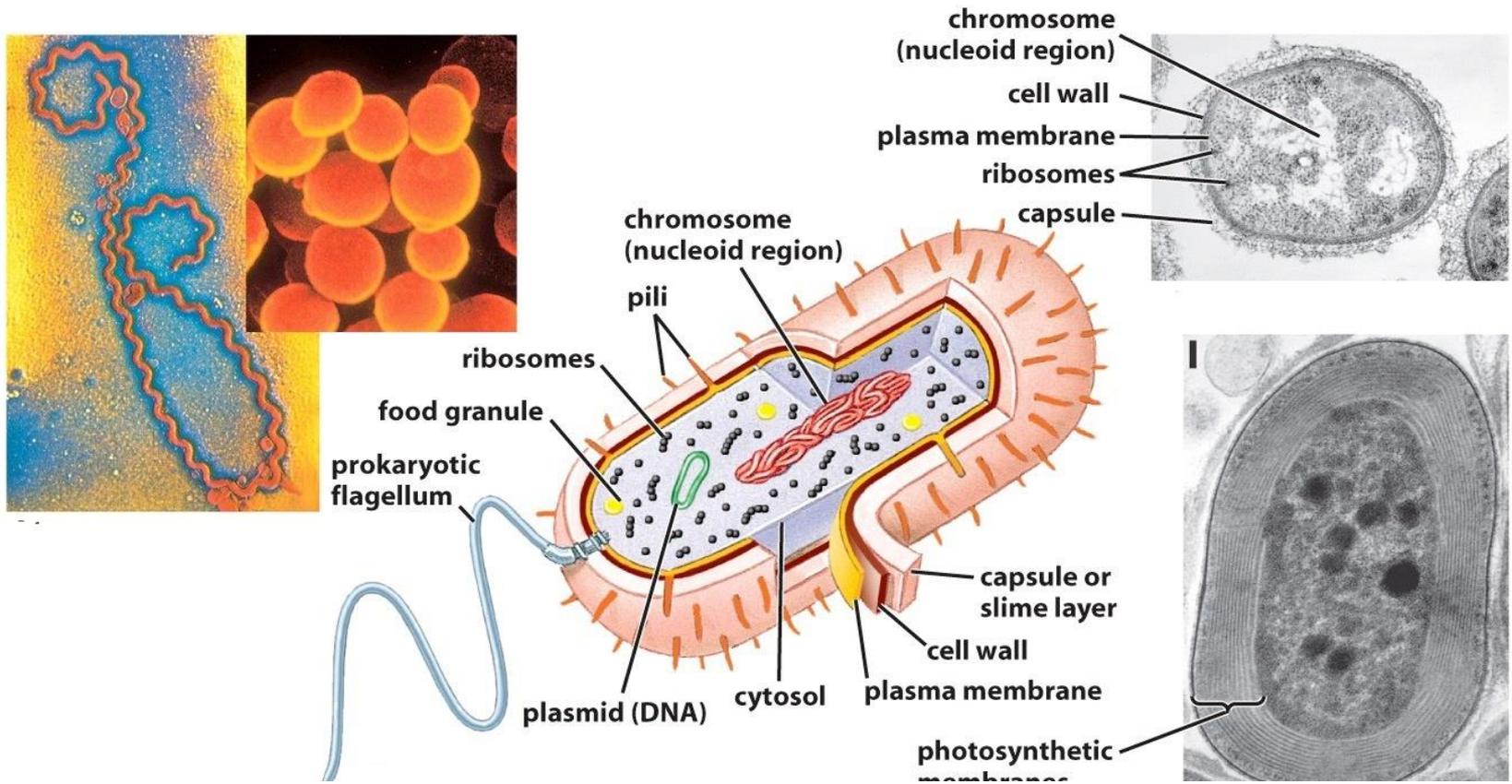
- Single DNA molecule (circular), concentrated in one area of the cytoplasm called a nucleoid. The DNA is not surrounded by protein. Bacteria may have more than one copy of the DNA molecule.

- May have plasmids, independent DNA fragments that carry specific pieces of genetic information. • Cytoplasm

- Ribosomes, composed of RNA and protein, of 70s density.

- NO internal membrane-bounded structures (organelles)

Small
Cw—peptidoglycan
Capsule-flagella-pili
No nucleus
Single DNA-no histone
plasmid
70s
No organelles



Features of the Eukaryotic Cell

- Eukaryotic cells have a system of internal membrane-bounded structures, called **organelles**.
- **Nucleus** bounded by the nuclear envelope (Eukaryotic means true nucleus)
- **Cytoplasm** of cytosol in which specialized organelles are suspended
- Greater efficiency for cell activities
- Organelles physically separate different types of cell activities in the cytoplasm space
- May (plants, fungi and some protists) or may not (animals and some protists) secrete an external **cell wall**

