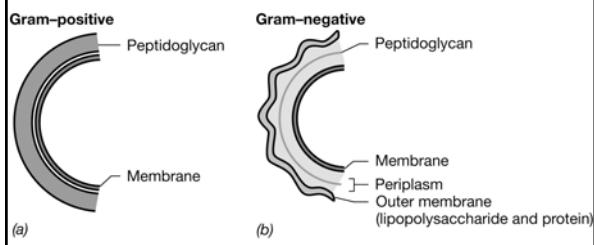


Comparing Prokaryotic and Eukaryotic Cells

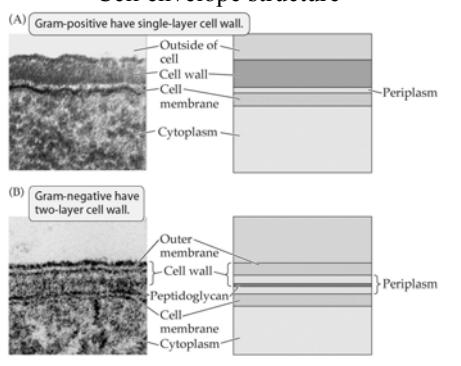
Classification of prokaryotic cellular features: Variant (or NOT common to all)

- Cell Wall (multiple barrier support themes)
- Endospores (heavy-duty life support strategy)
- Bacterial Flagella (appendages for movement)
- Gas Vesicles (buoyancy compensation devices)
- Capsules/Slime Layer (exterior to cell wall)
- Inclusion Bodies (granules for storage)
- Pili (conduit for genetic exchange)

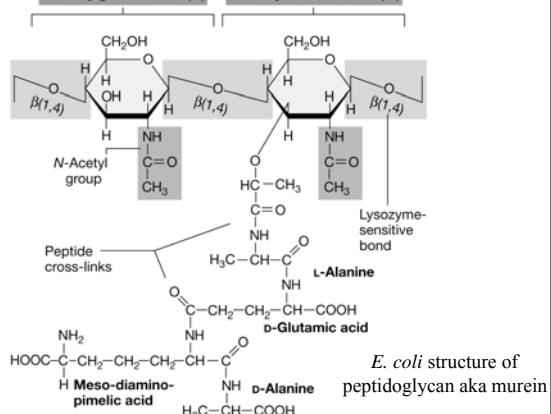
Cell walls of Bacteria



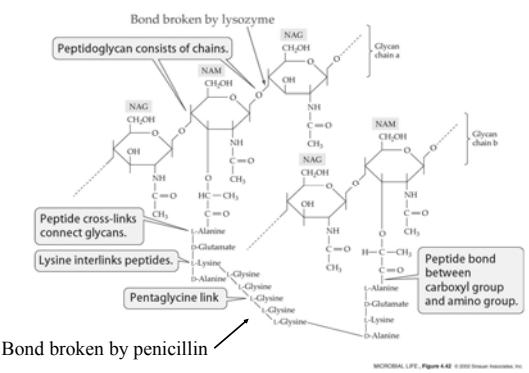
Cell envelope structure



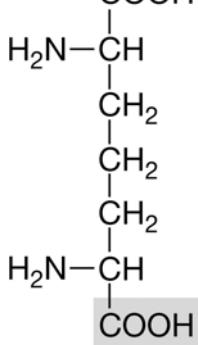
N-Acetylglucosamine (G) N-Acetylmuramic acid (M)



Peptidoglycan of a gram-positive bacterium

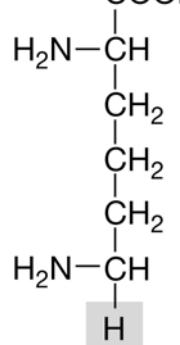


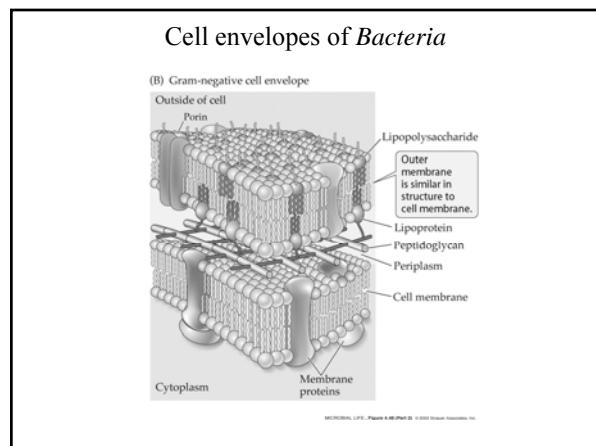
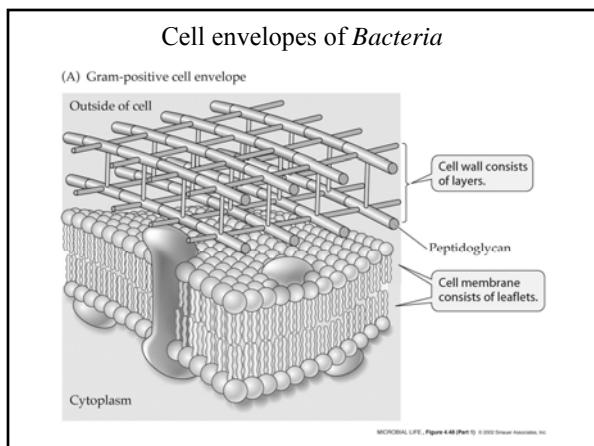
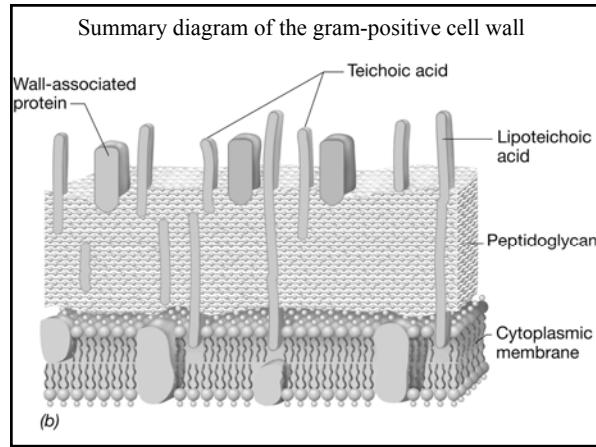
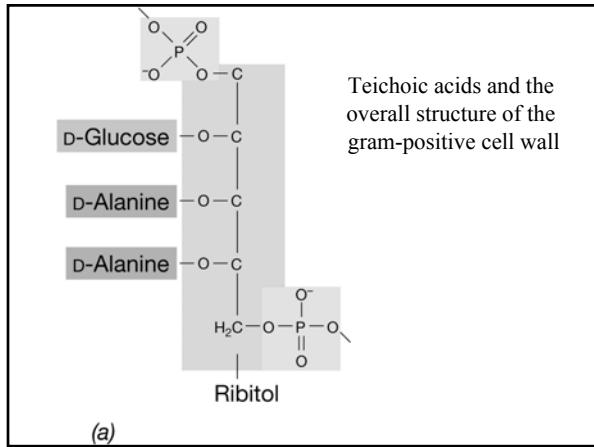
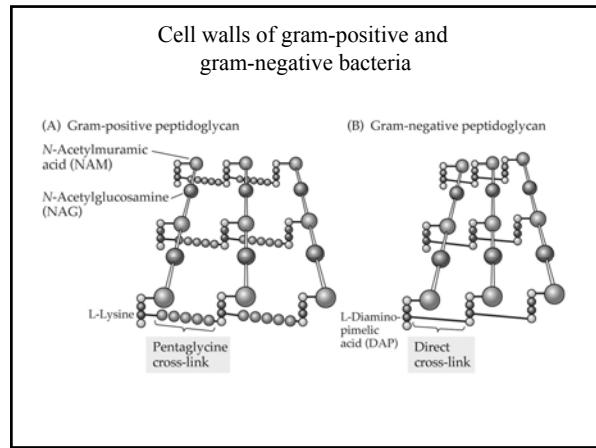
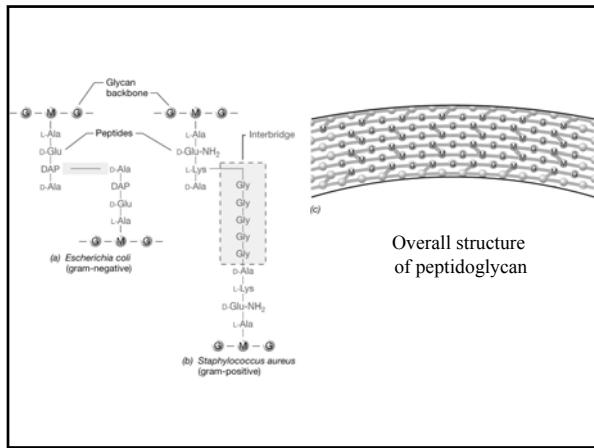
DAP or Diaminopimelic acid



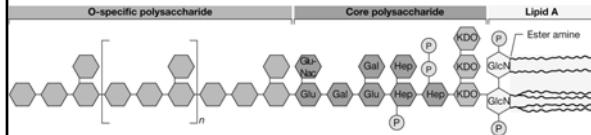
(a) DAP or Diaminopimelic acid

Lysine

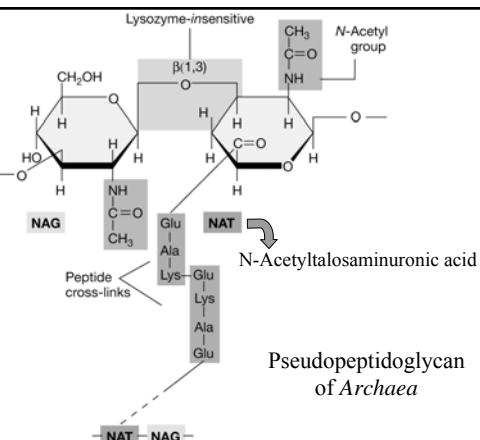
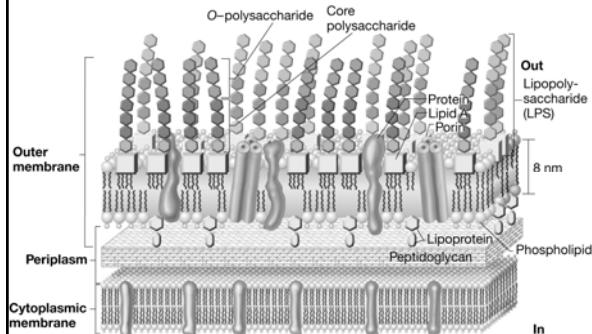




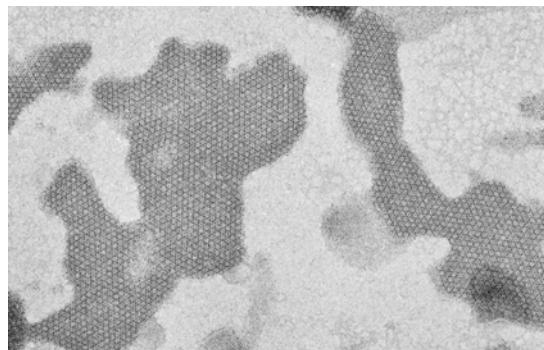
Structure of the lipopolysaccharide of gram-negative *Bacteria*



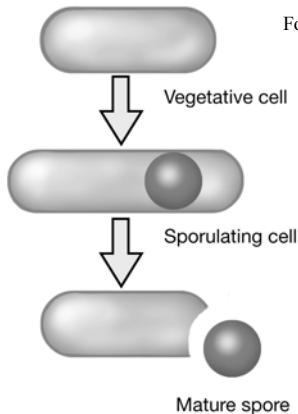
The gram-negative cell wall



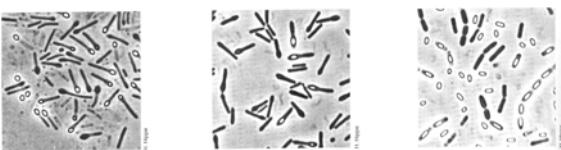
Paracrystalline S-layer: A protein jacket for *Bacteria & Archaea*



Formation of the endospore



Morphology of the bacterial endospore
(a) Terminal (b) Subterminal (c) Central



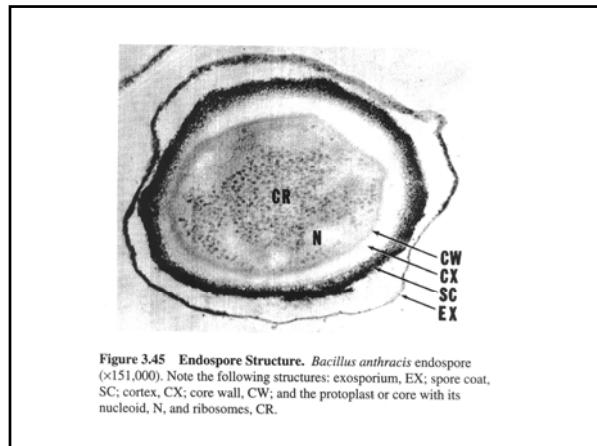


Figure 3.45 Endospore Structure. *Bacillus anthracis* endospore ($\times 151,000$). Note the following structures: exosporium, EX; spore coat, SC; cortex, CX; core wall, CW; and the protoplast or core with its nucleoid, N, and ribosomes, CR.

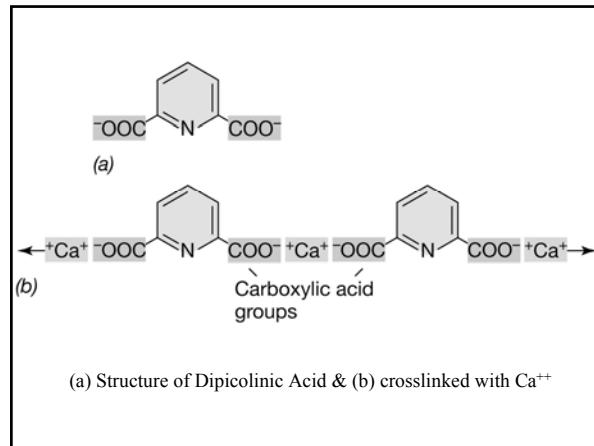
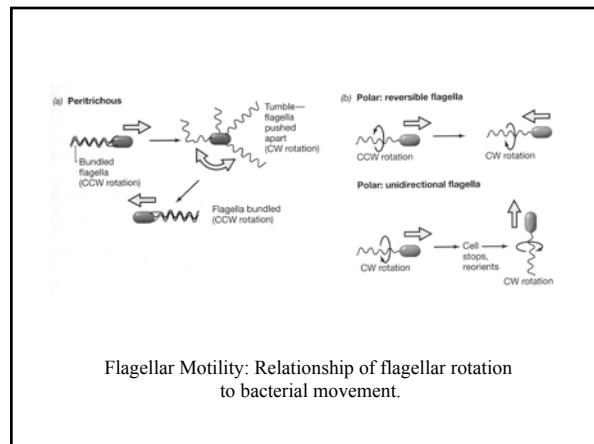
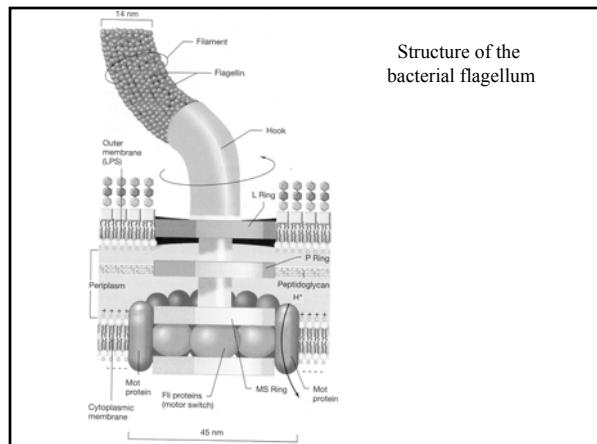
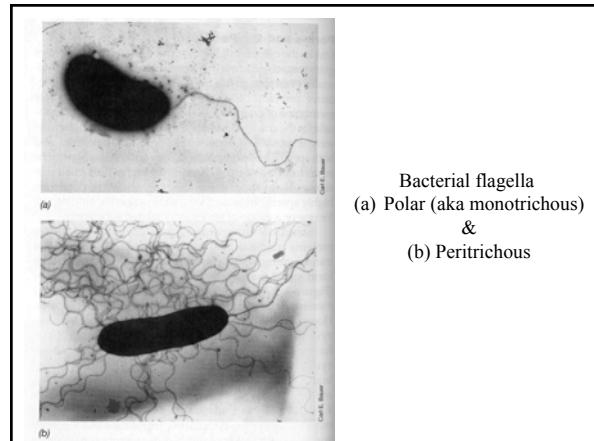
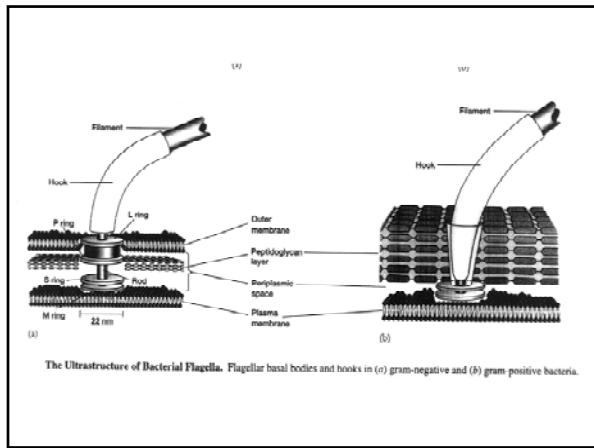
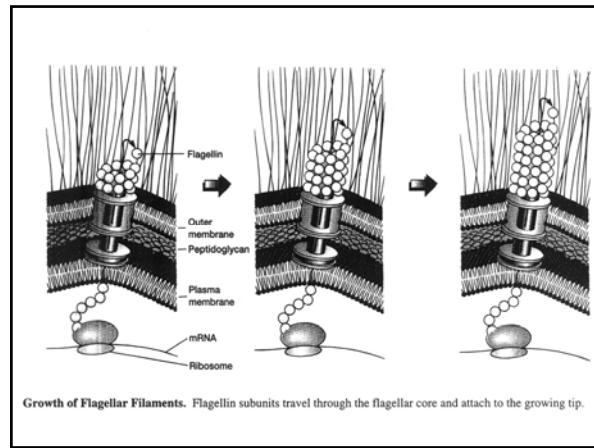


Table 4.2 Differences between endospores and vegetative cells		
Characteristic	Vegetative cell	Endospore
Structure	Typical gram-positive cell; a few gram-negative cells	Thick spore cortex Spore coat Exosporium Refractive
Microscopic appearance	Nonrefractive	High
Calcium content	Low	Present
Dipicolinic acid	Absent	Low
Enzymatic activity	High	Low or absent
Methionine (O_2 uptake)	High	Absent
Macromolecular synthesis	Present	Low or absent
mRNA	Present	Low or absent
Heat resistance	Low	High
Radiation resistance	Low	High
Resistance to chemicals (for example, H_2O_2) and acids	Stainable	Stainable only with special methods
Susceptibility to dyes	Stainable	Resistant
Action of lysozyme	Sensitive	Low, 10–25% in core
Water content	High, 80–90%	Present
Small acid-soluble proteins (product of <i>syp</i> genes)	Absent	About pH 5.5–6.0 (in core)
Cyttoplasmic pH	About pH 7	

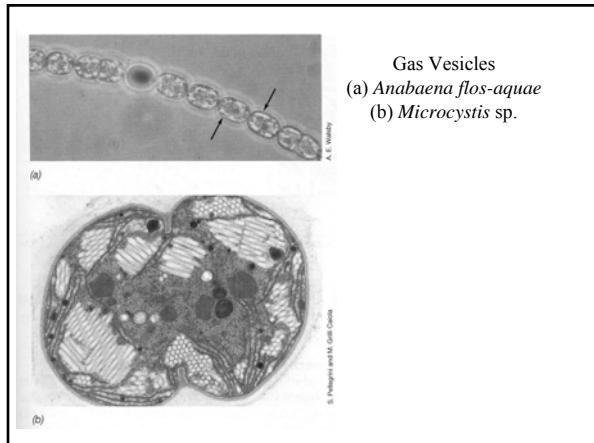




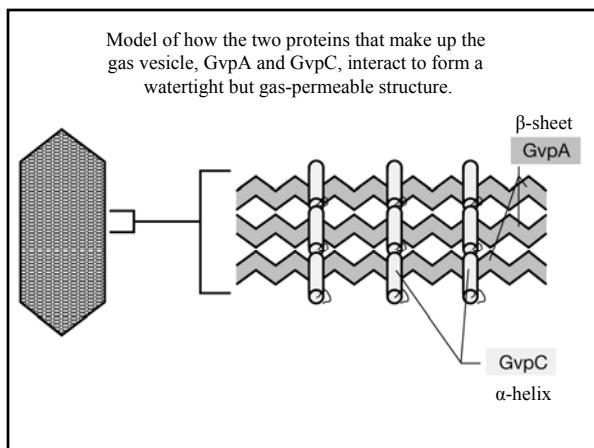
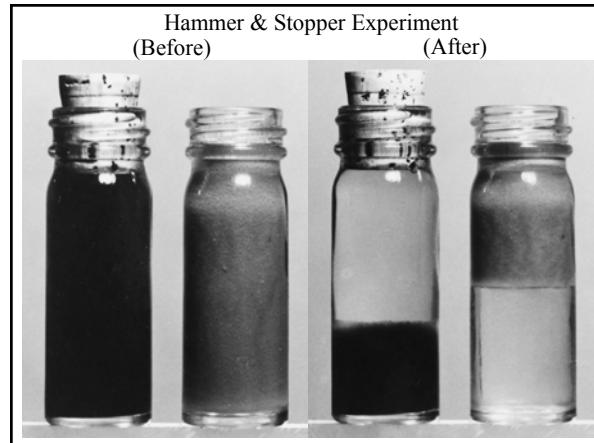
The Ultrastructure of Bacterial Flagella. Flagellar basal bodies and hooks in (a) gram-negative and (b) gram positive bacteria.



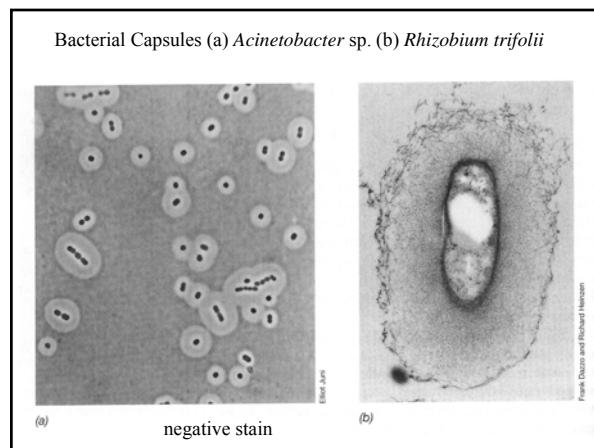
Growth of Flagellar Filaments. Flagellin subunits travel through the flagellar core and attach to the growing tip.



Gas Vesicles
(a) *Anabaena flos-aquae*
(b) *Microcystis* sp.



Model of how the two proteins that make up the gas vesicle, GvpA and GvpC, interact to form a watertight but gas-permeable structure.



Bacterial Capsules (a) *Acinetobacter* sp. (b) *Rhizobium trifolii*

