TABLE 2.3 Characteristics of Various Components of Bacteria

Part	Size	Composition and comments
Slime layer		
Microcapsule	5–10 nm	Protein–polysaccharide–lipid complex responsible for the specific antigens of enteric bacteria and other species.
Capsule	0.5–2.0 μm	Mainly polysaccharides (e.g., *Streptococcus*); sometimes polypeptides (e.g., *Bacillus antracis*).
Slime	Indefinite	Mainly polysaccharides (e.g., *Leuconostoc*); sometimes polypeptides (e.g., *Bacillus subtilis*).
Cell wall		
Gram-positive species	10–20 nm	Confers shape and rigidity upon the cell. 20% dry weight of the cell. Consists mainly of macromolecules of a mixed polymer of *N*-acetyl muramic-peptide, teichoic acids, and polysaccharides.
Gram-negative species	10–20 nm	Consists mostly of a protein–polysaccharide–lipid complex with a small amount of the muramic polymer.
Cell membrane	5–10 nm	Semipermeable barrier to nutrients. 5% to 10% dry weight of the cell, consisting of 50% protein, 28% lipid, and 15% to 20% carbohydrate in a double-layered membrane.
Flagellum	10–20 nm by 4–12 μm	Protein of the myosin–keratin–fibrinogen class, MW of 40,000. Arises from the cell membrane and is responsible for motility.
Pilus (fimbria)	5–10 nm by 0.5–2.0 μm	Rigid protein projections from the cell. Especially long ones are formed by *Escherichia coli*.
Inclusions		
Spore	1.0–1.5 μm by 1.6–2.0 μm	One spore is formed per cell intracellularly. Spores show great resistance to heat, dryness, and antibacterial agents.
Storage granule	0.5–2.0 μm	Glycogenlike, sulfur, or lipid granules may be found in some species.
Chromatophore	50–100 nm	Organelles in photosynthetic species. *Rhodospirillum rubrum* contains about 6000 per cell.
Ribosome	10–30 nm	Organelles for synthesis of protein. About 10,000 ribosomes per cell. They contain 63% RNA and 37% protein.
Volutin	0.5–1.0 μm	Inorganic polymetaphosphates that stain metachromatically.
Nuclear material		Composed of DNA that functions genetically as if the genes were arranged linearly on a single endless chromosome, but that appears by light microscopy as irregular patches with no nuclear membrane or distinguishable chromosomes. Autoradiography confirms the linear arrangement of DNA and suggests a MW of at least 1000×10^6.

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