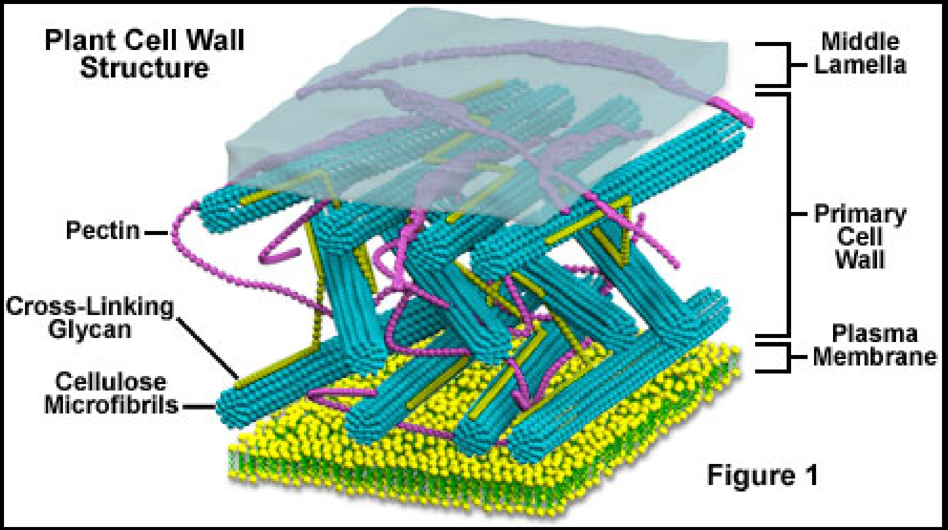
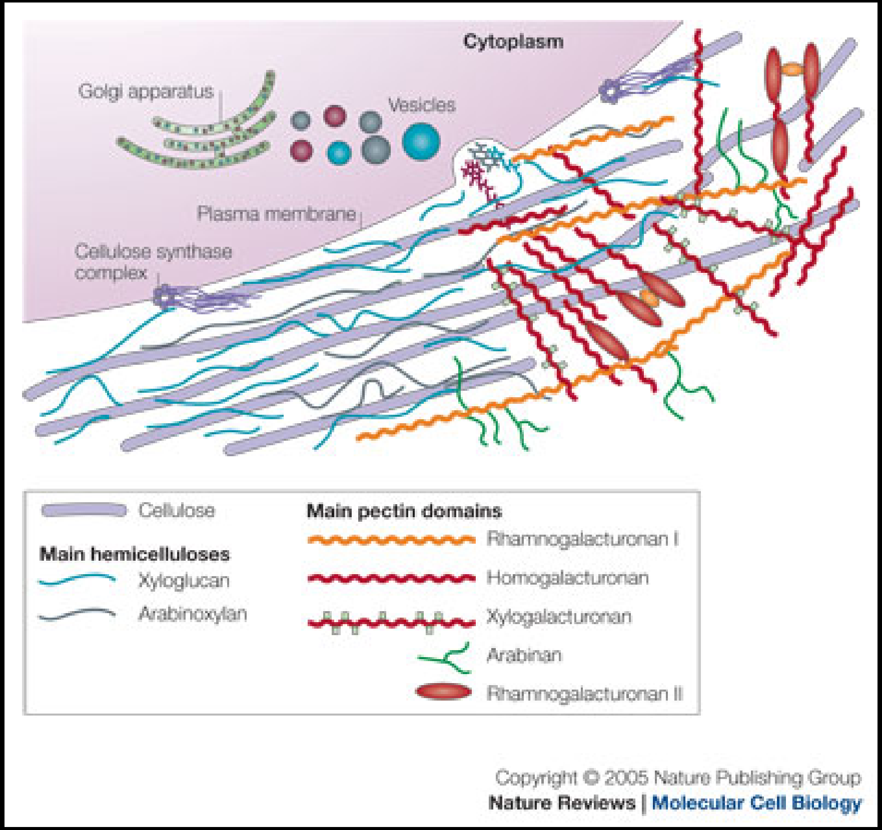
What's in a Cell?

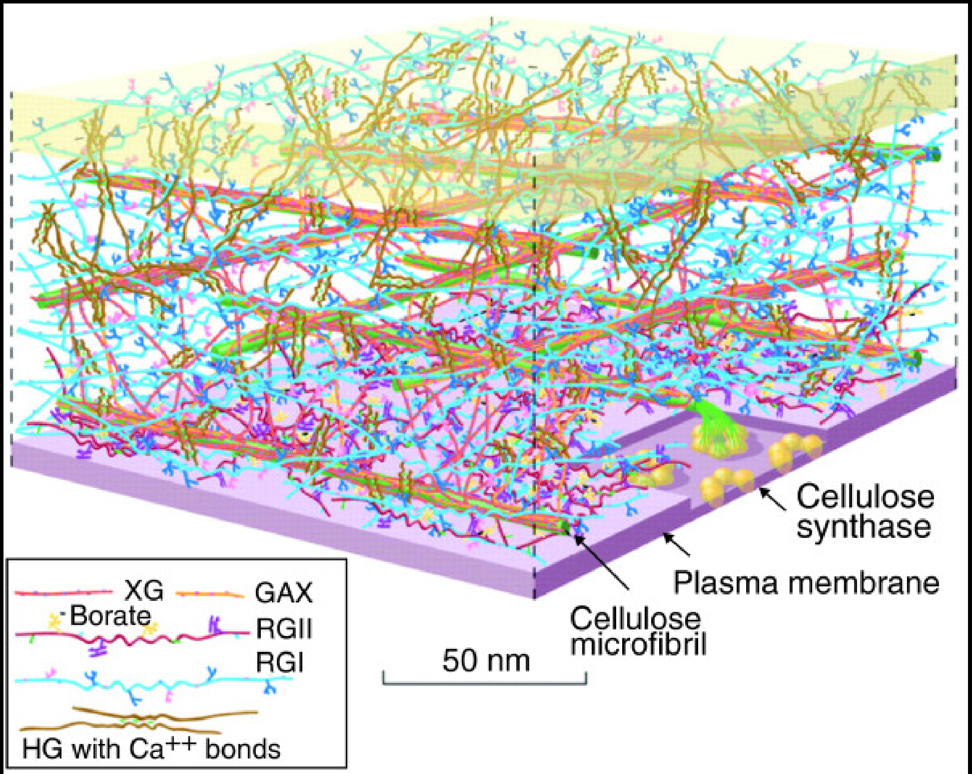
From Ch. 4

Plant cell walls



Amit1b.files.wordpress.com





genomebiology.com

Figure 4.1 Arrangements of cocci.

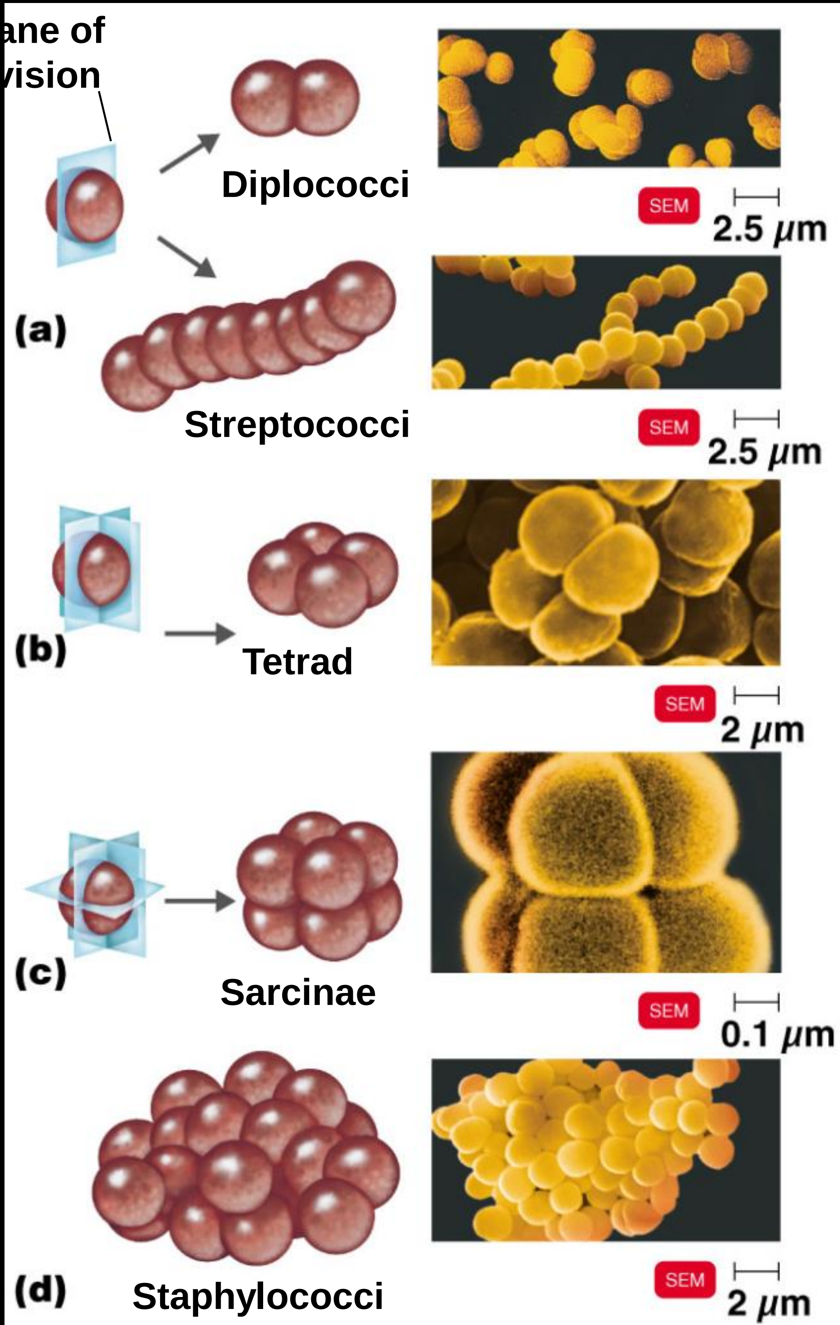


Figure 4.2 Bacilli.

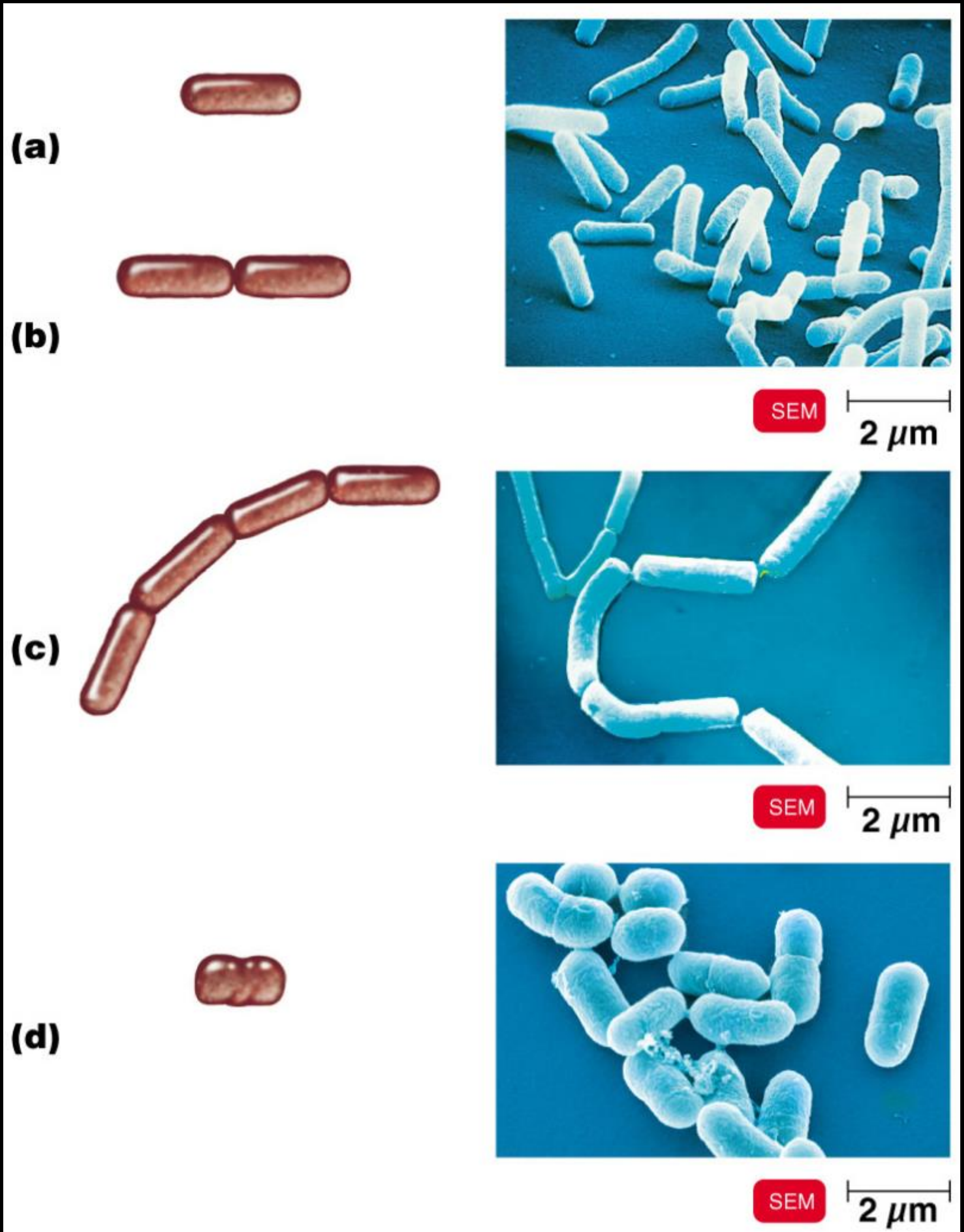


Figure 4.3 A double-stranded helix formed by *Bacillus subtilis*.

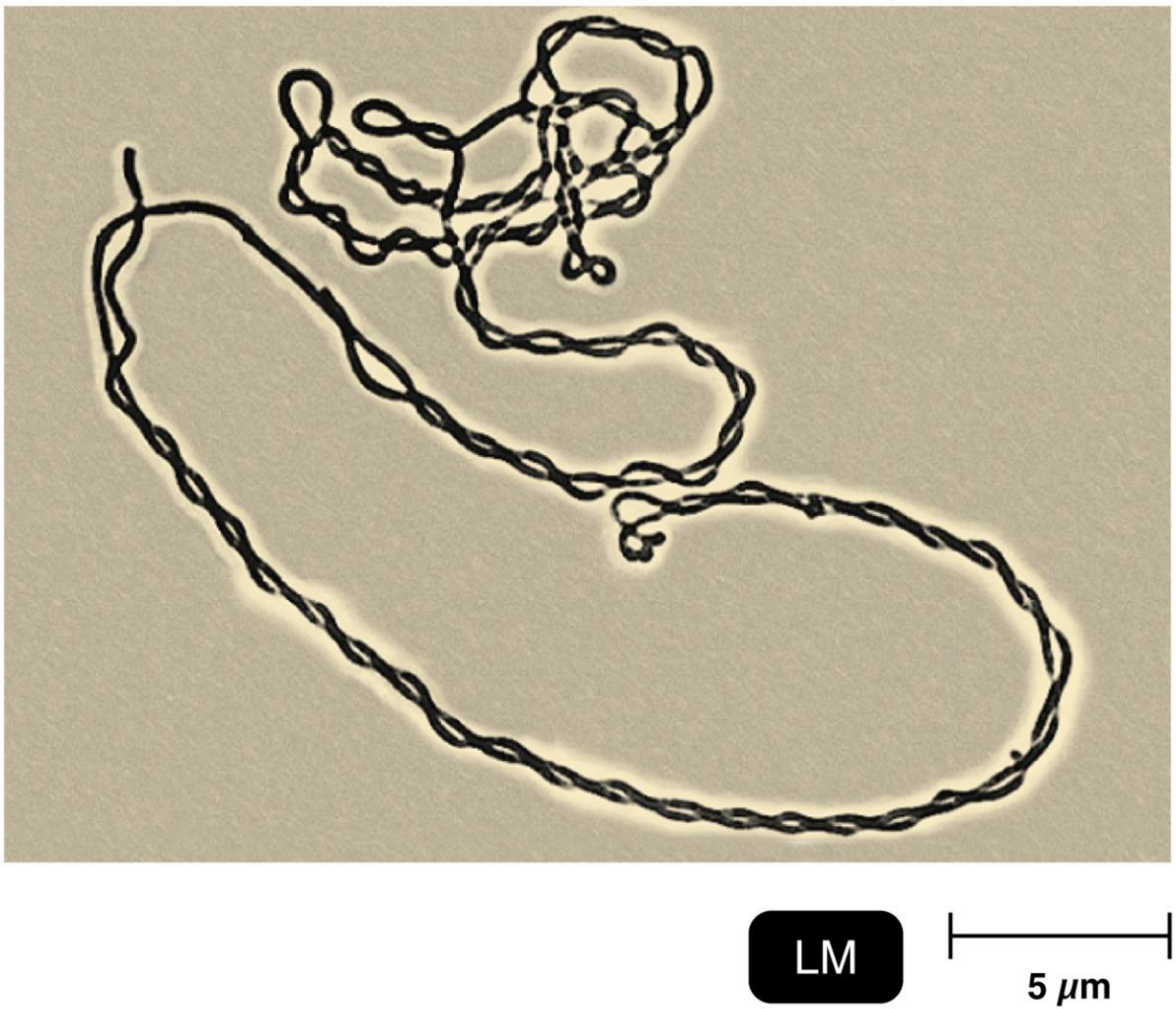


Figure 4.4 Spiral bacteria.

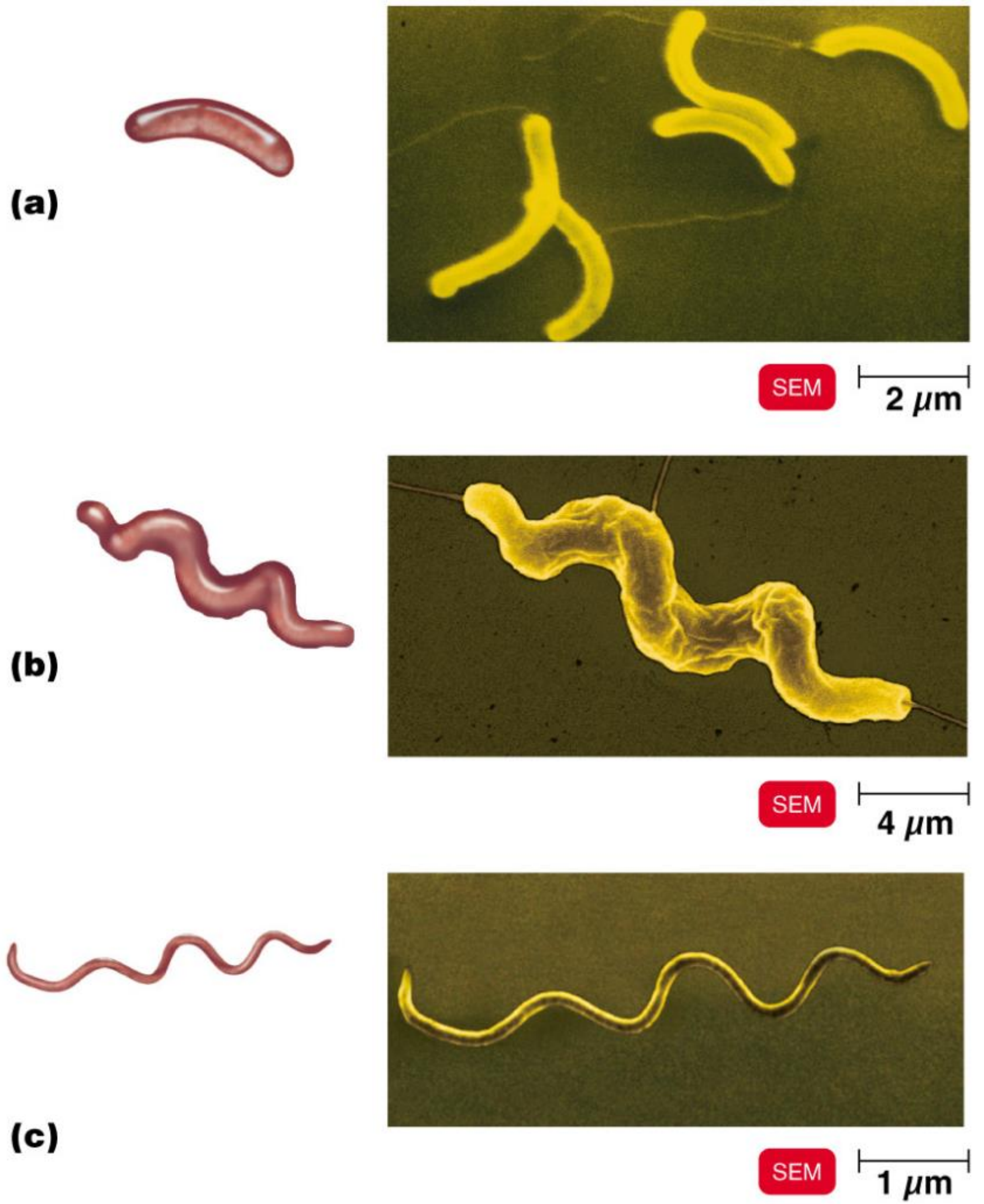


Figure 4.5 Star-shaped and rectangular prokaryotes.

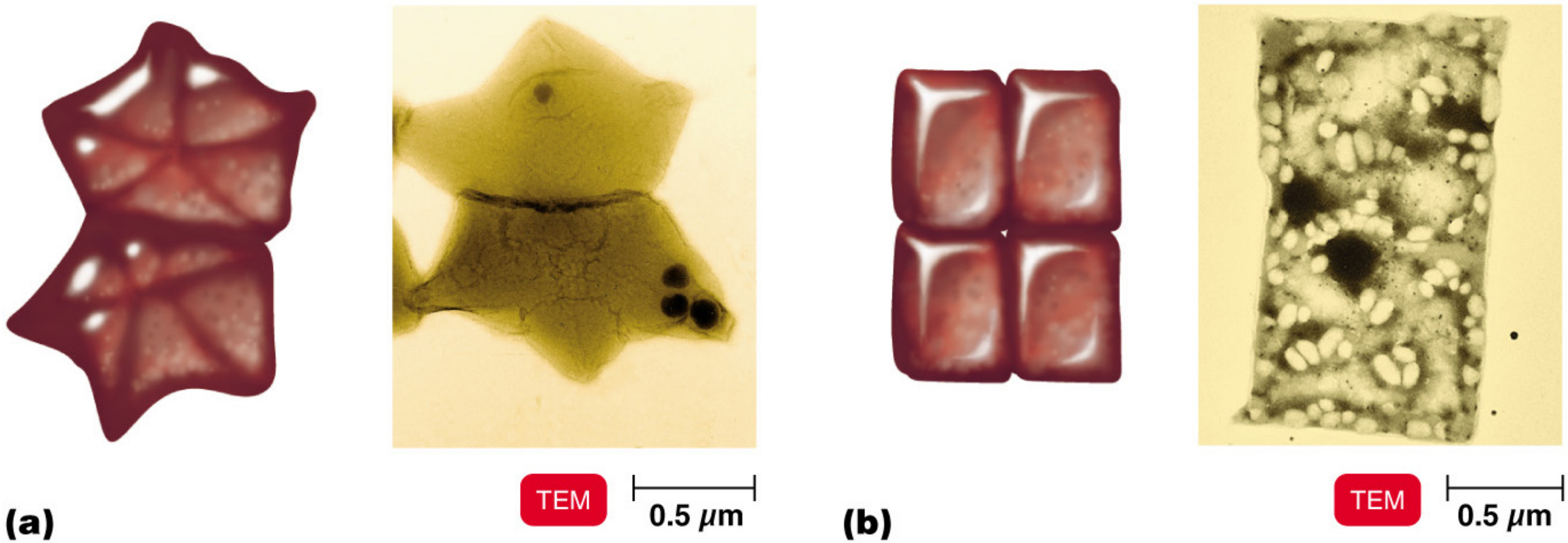


Figure 4.7 Arrangements of bacterial flagella.

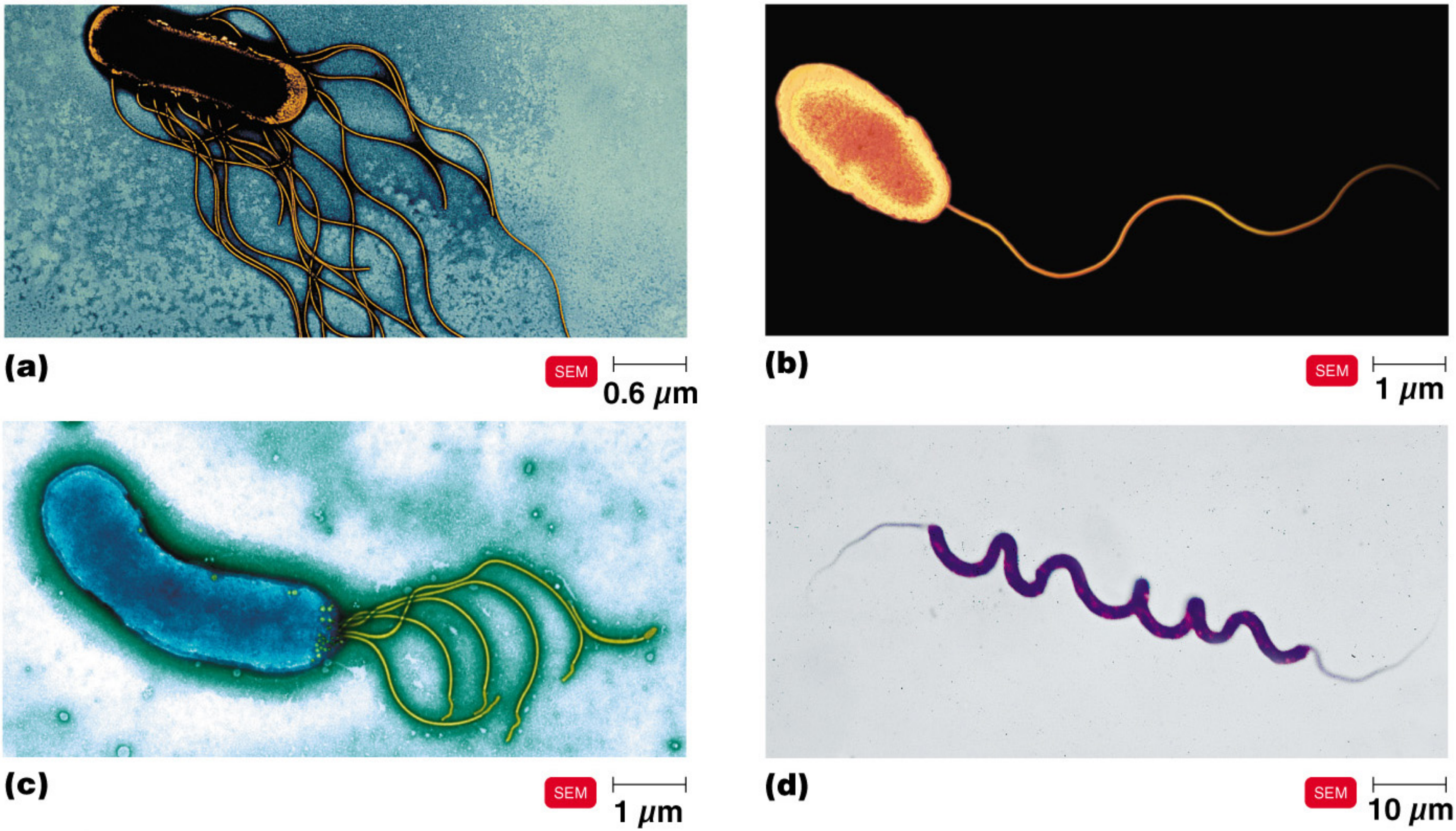


Figure 4.8 The structure of a prokaryotic flagellum.

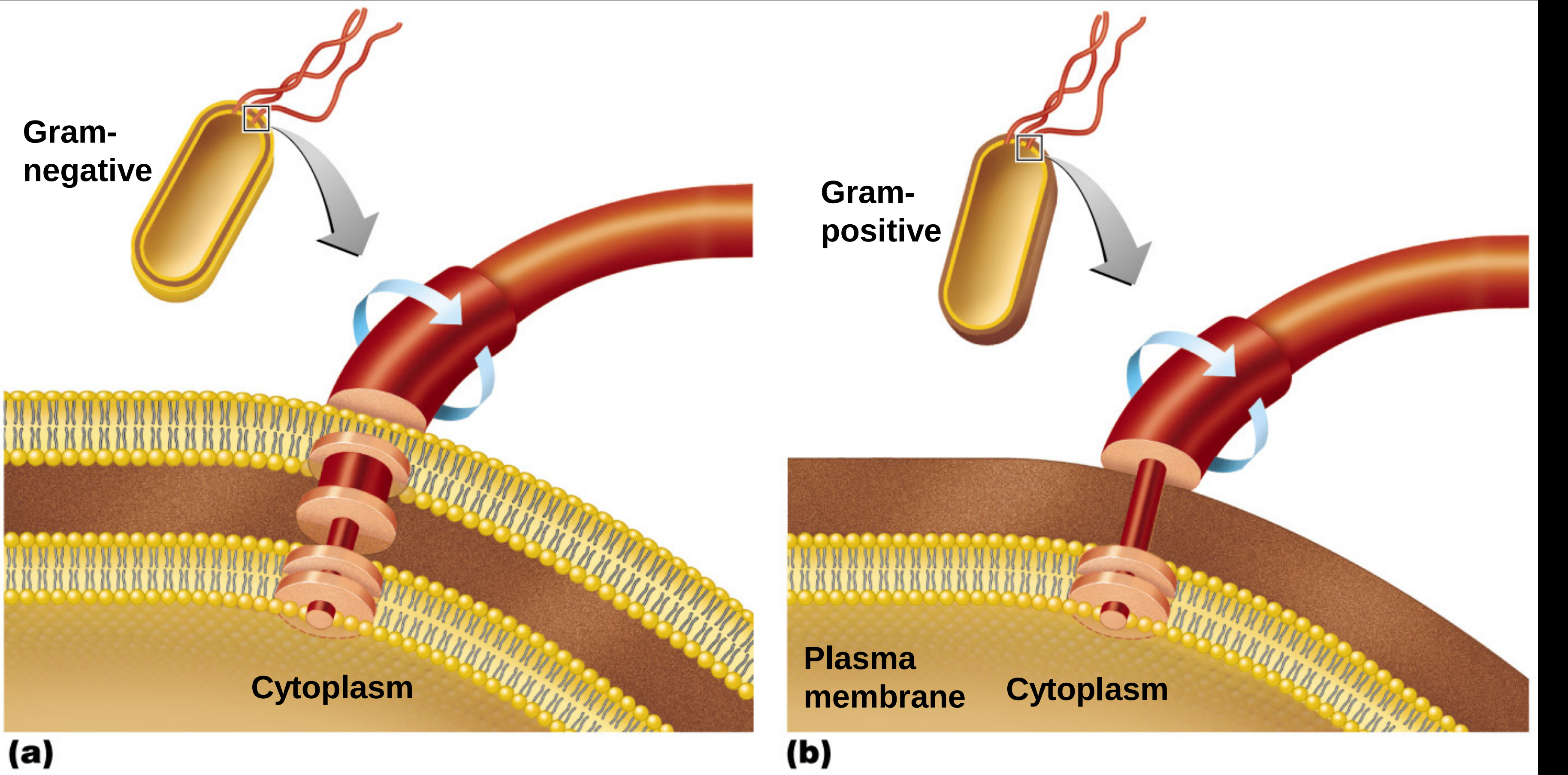
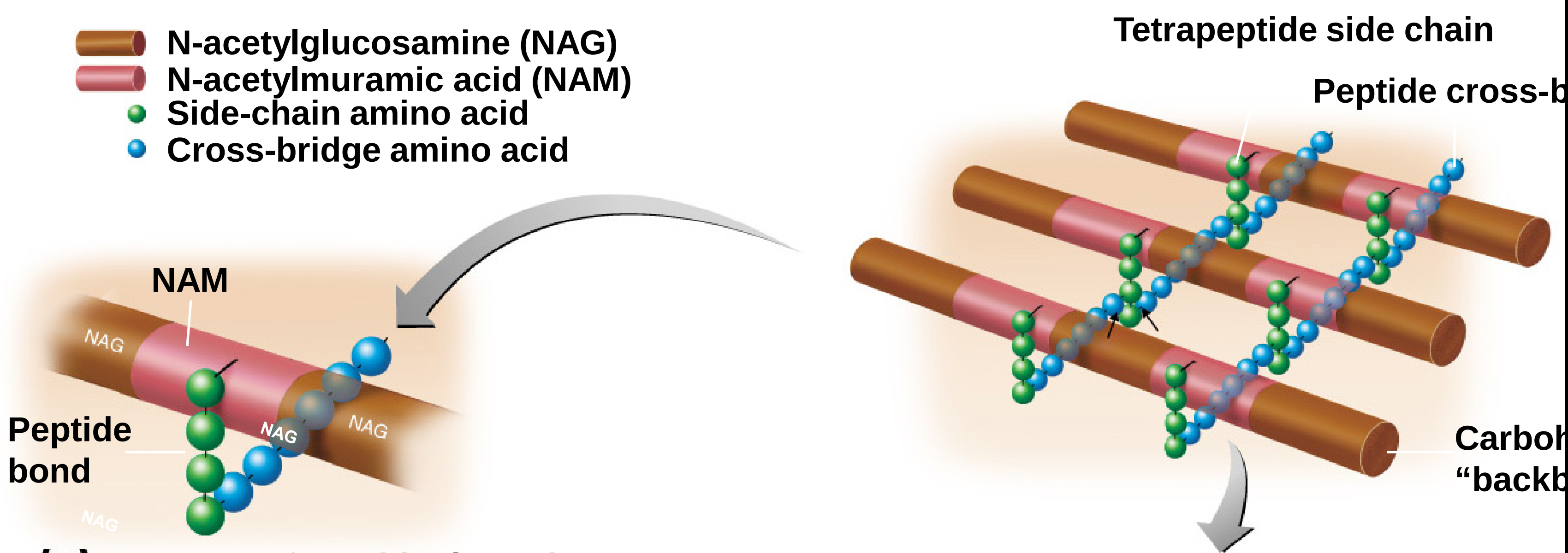
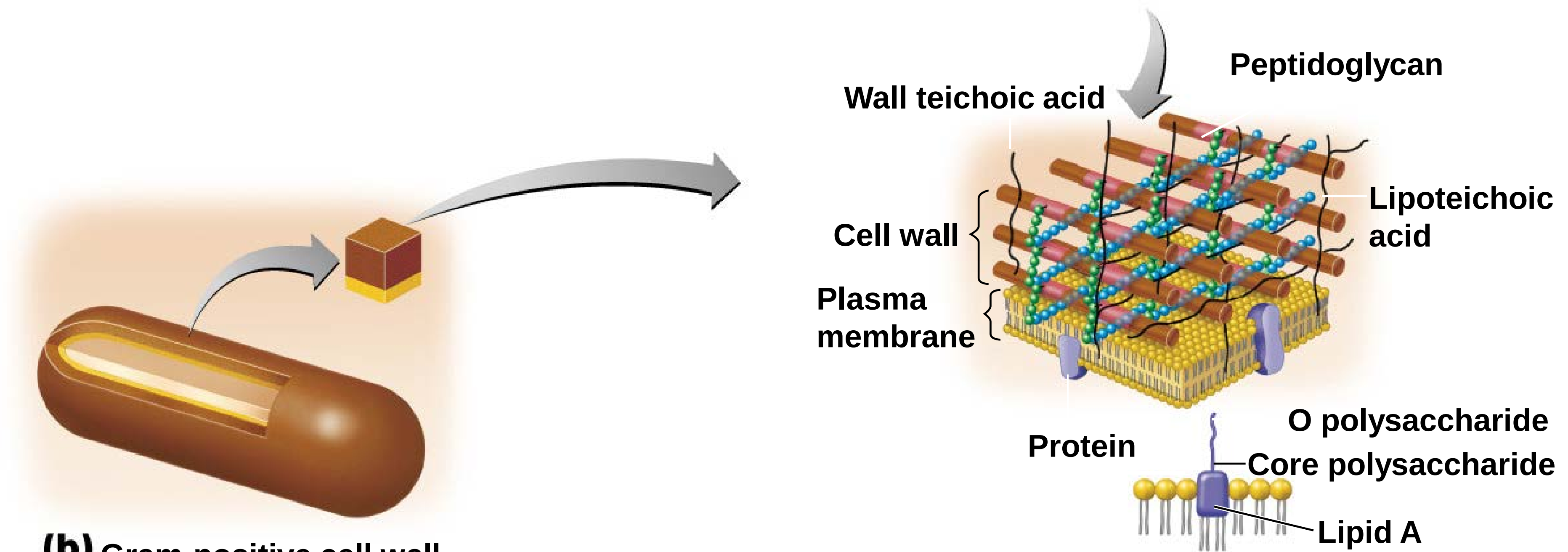


Figure 4.13a Bacterial cell walls.



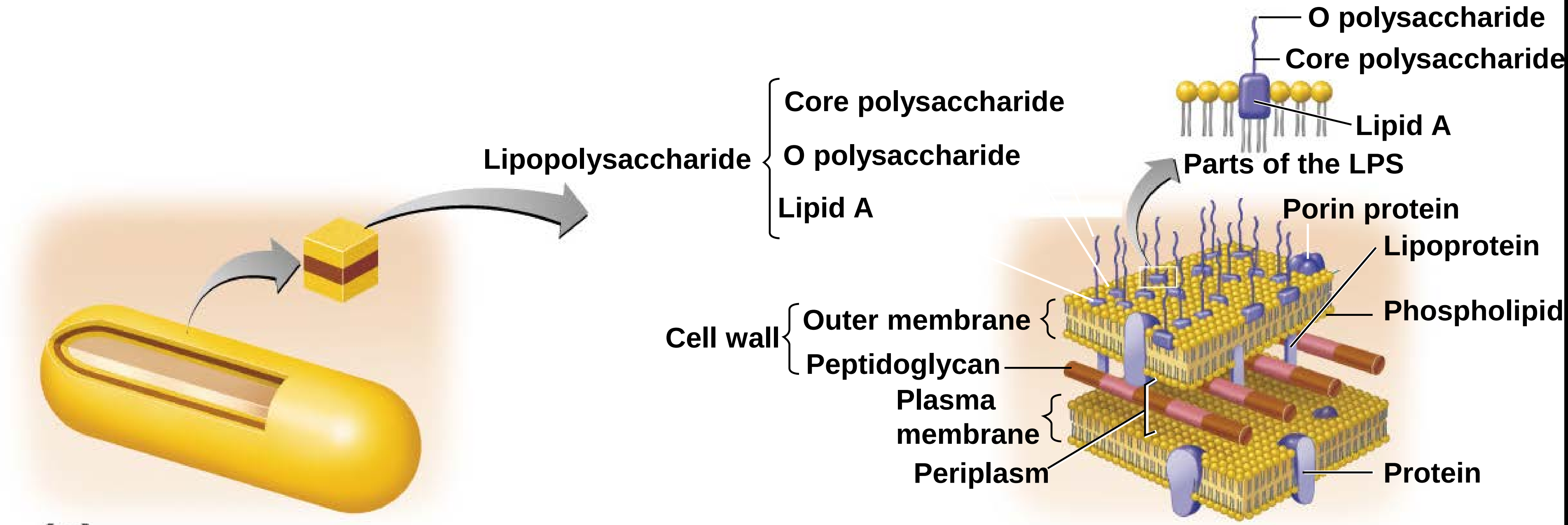
(a) Structure of peptidoglycan in gram-positive bacteria

Figure 4.13b Bacterial cell walls.



(b) Gram-positive cell wall

Figure 4.13c Bacterial cell walls.



(c) Gram-negative cell wall

Figure 4.13 Bacterial cell walls.

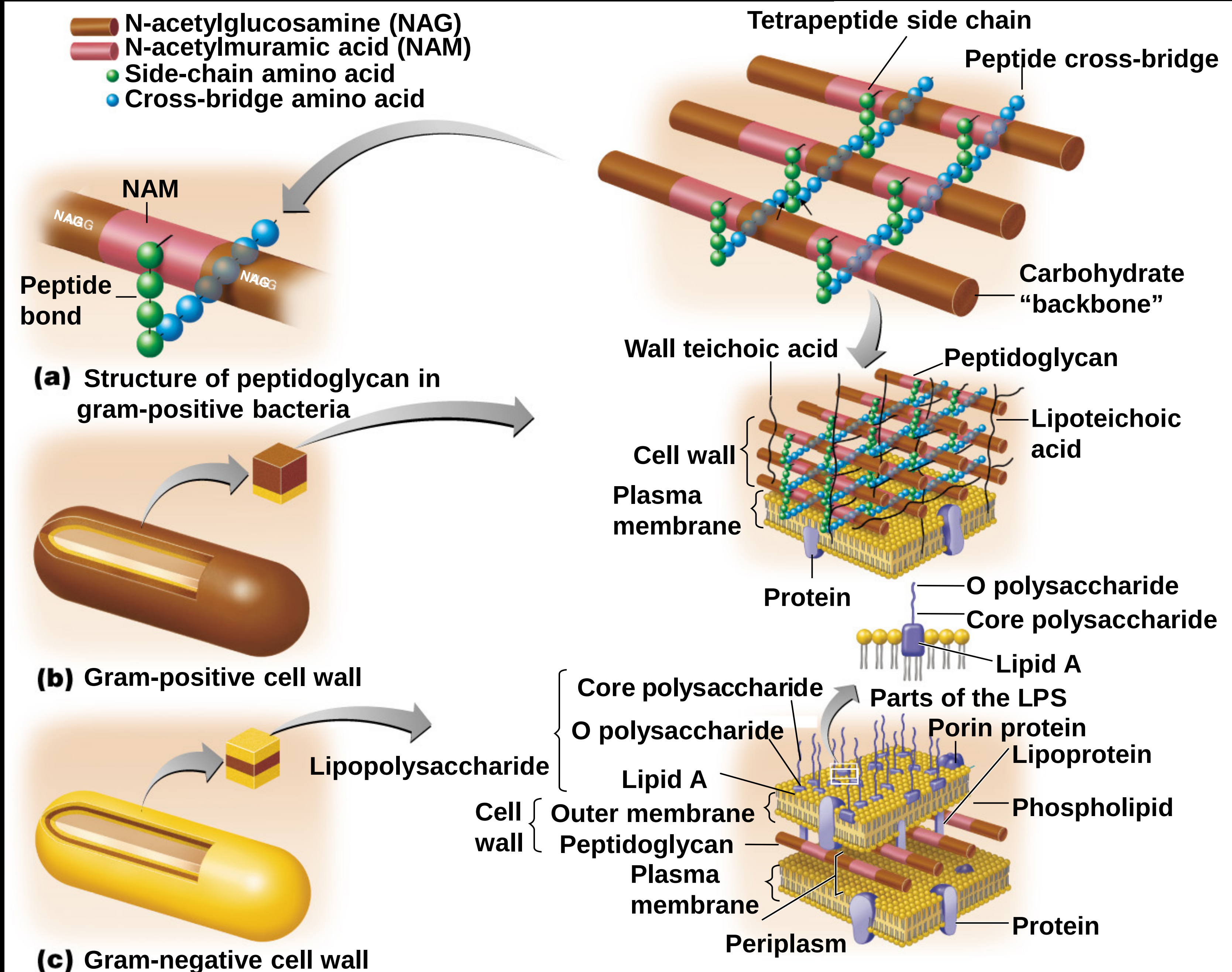


Figure 4.14 Plasma membrane.

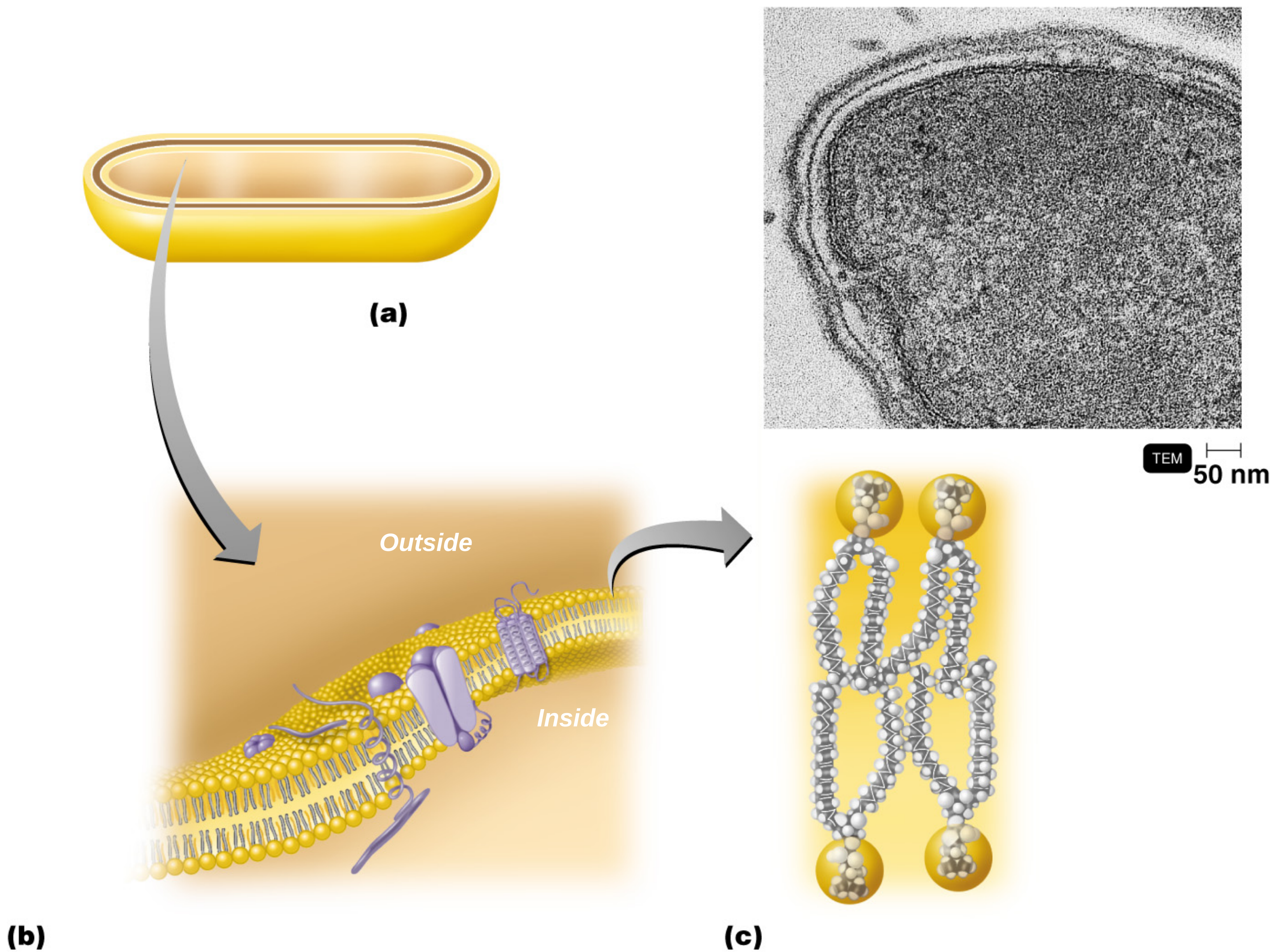
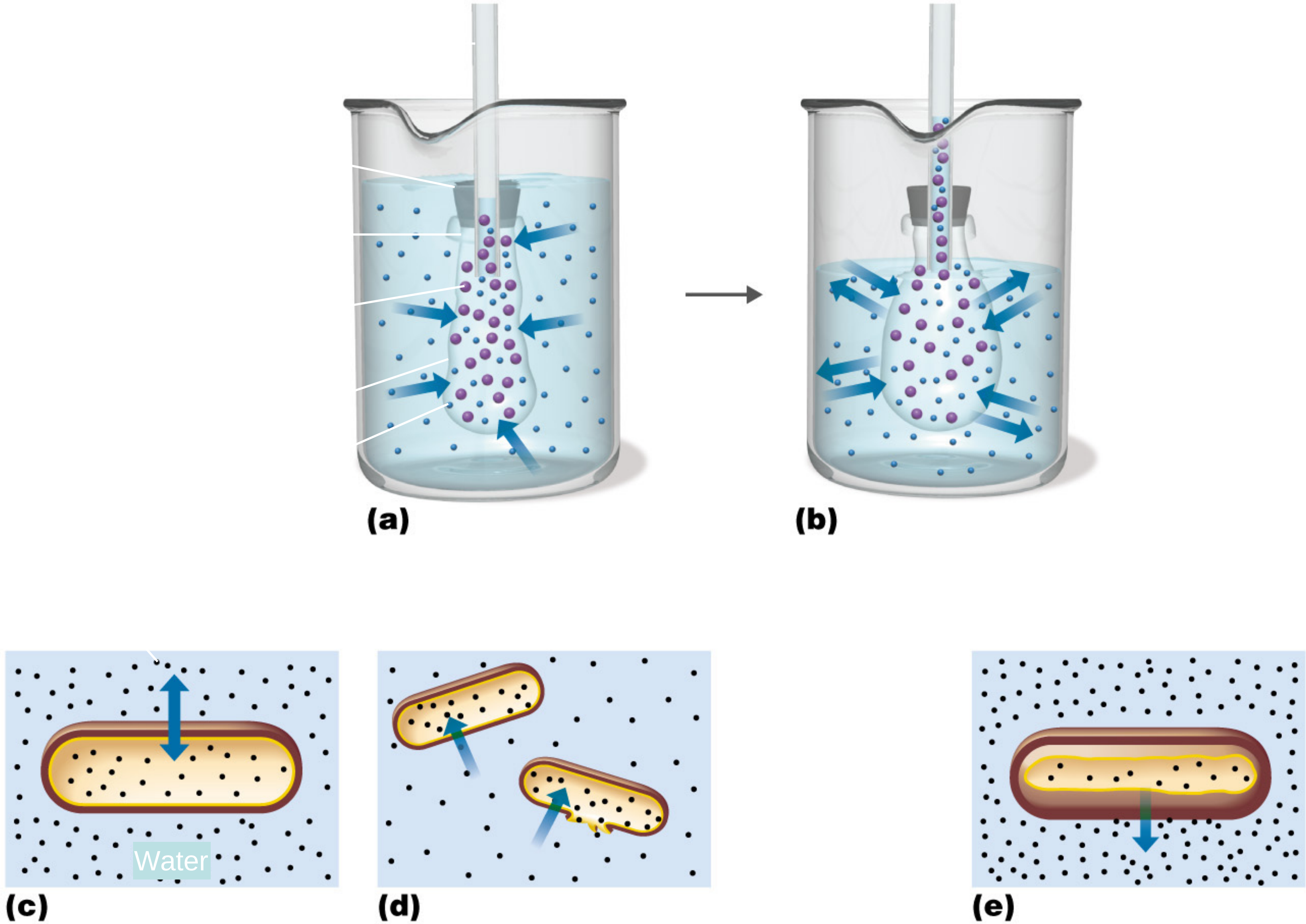


Figure 4.16 The principle of simple diffusion.

(a) (b)

Figure 4.18 The principle of osmosis.

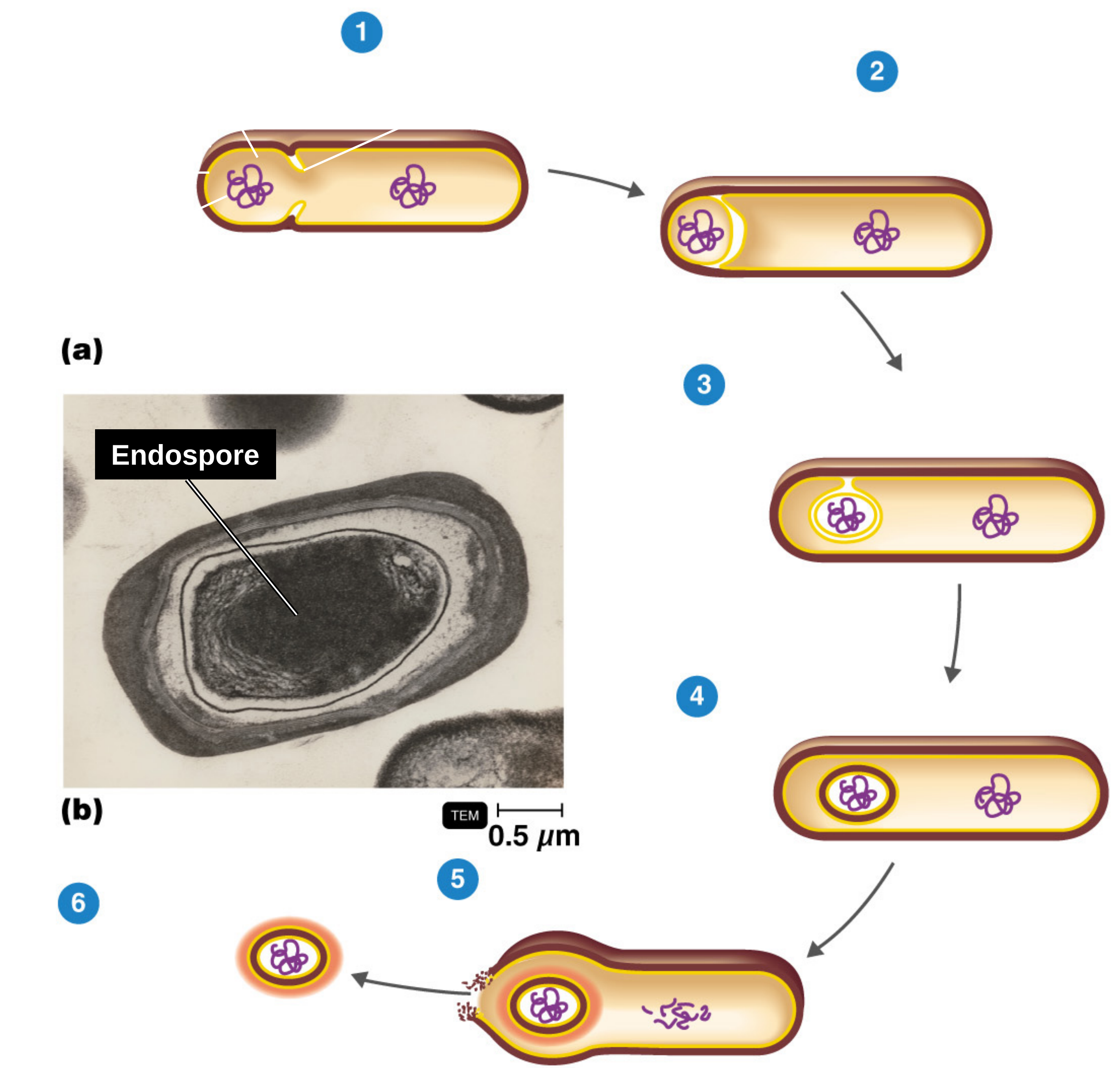


***E. coli* in pure water:**

- **What is likely to move into or out of the cell?**
- **What can the cell do about it?**

Figure 4.20 Magnetosomes.

Figure 4.21 Formation of endospores by sporulation.



Ancient endospores

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Rapid Communication

Characterization of Ancient DNA Supports Long-Term Survival of Haloarchaea

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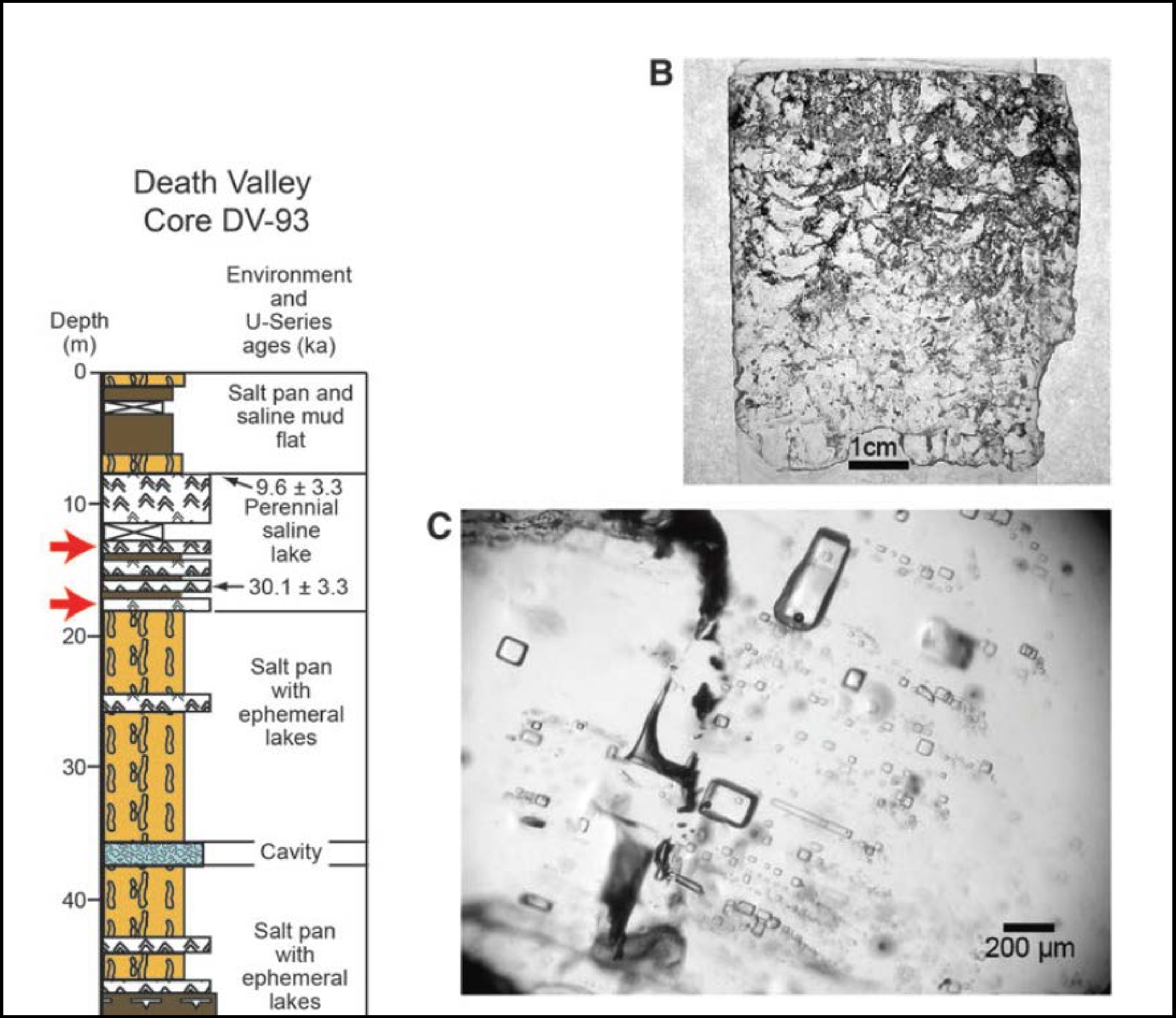
Abstract

Bacteria and archaea isolated from crystals of halite 10^4 to 10^8 years old suggest long-term survival of halophilic microorganisms, but the results are controversial. Independent verification of the authenticity of reputed living prokaryotes in ancient salt is required because of the high potential for environmental and laboratory contamination. Low success rates of prokaryote cultivation from ancient halite, however, hamper direct replication experiments. In such cases, culture-independent approaches that use the polymerase chain reaction (PCR) and sequencing of 16S ribosomal DNA are a robust alternative. Here, we use amplification, cloning, and sequencing of 16S ribosomal DNA to investigate the authenticity of halophilic archaea cultured from subsurface halite, Death Valley, California, 22,000 to 34,000 years old. We recovered 16S ribosomal DNA sequences that are identical, or nearly so (>99%), to two strains, *Natronomonas* DV462A and *Halorubrum* DV427, which were previously isolated from the same halite interval. These results provide the best independent support to date for the long-term survival of halophilic archaea in ancient halite. PCR-based approaches

Ancient endospores



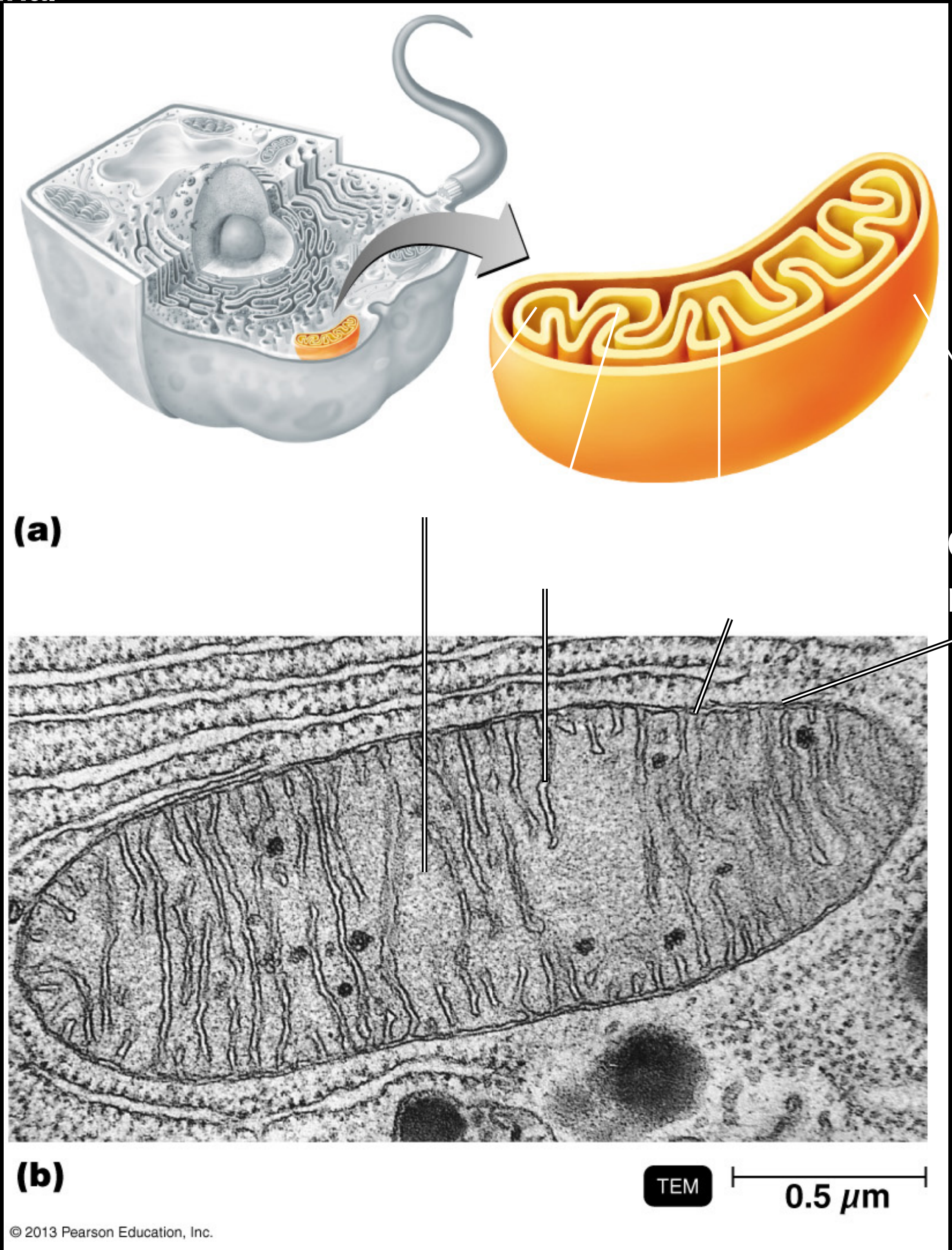
Clostridium botulinum **is a strict anaerobe; that is, it is killed by the molecular oxygen (O2) present in air. People can die of botulism from eating foods in which** ***C. botulinum*** **is growing.**

- **How does this bacterium survive on plants picked for human consumption?**

- **Why are home-canned foods most often the source of botulism?**

(Tortora, 11th ed., p. 110)

Figure 4.27 Mitochondria.



Outer membrane

Figure 4.28 Chloroplasts.

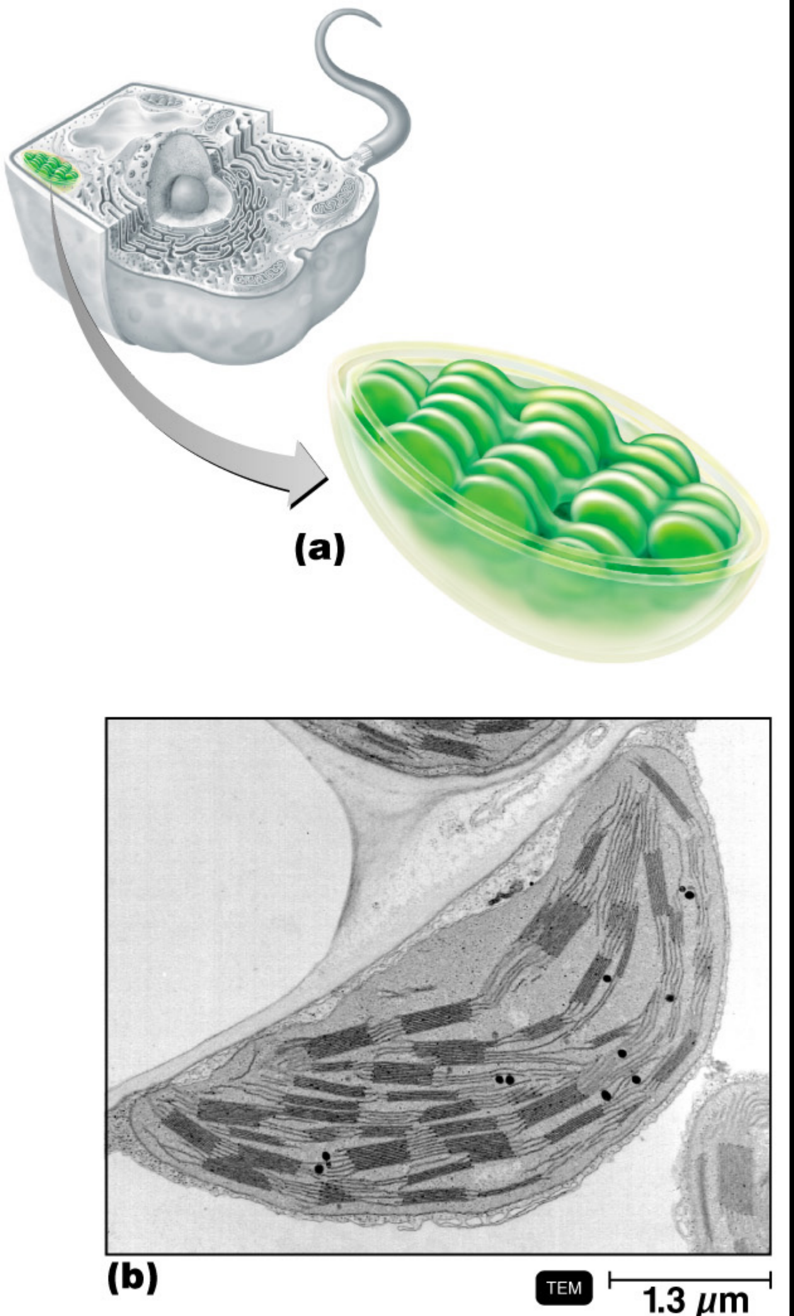
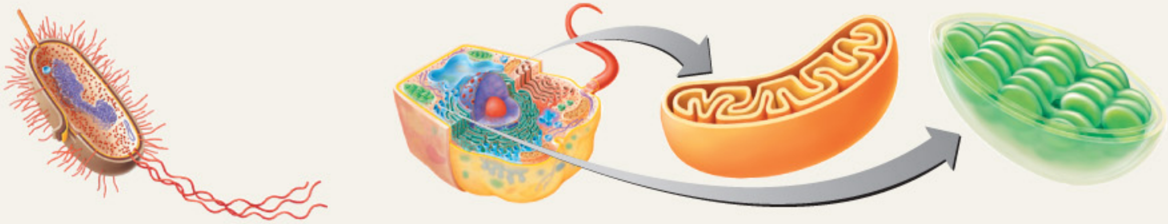
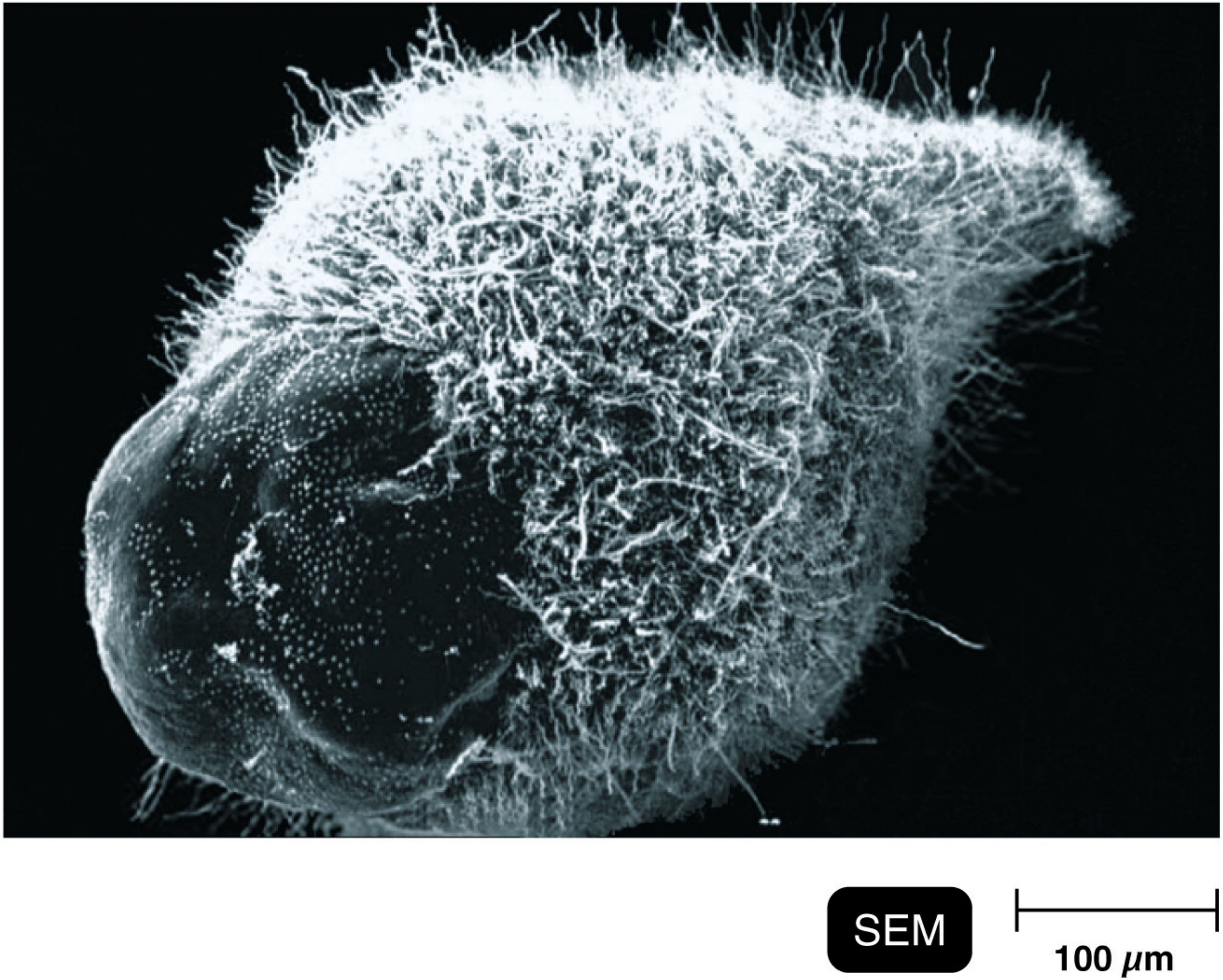


TABLE 10.2 Prokaryotic Cells and Eukaryotic Organelles Compared

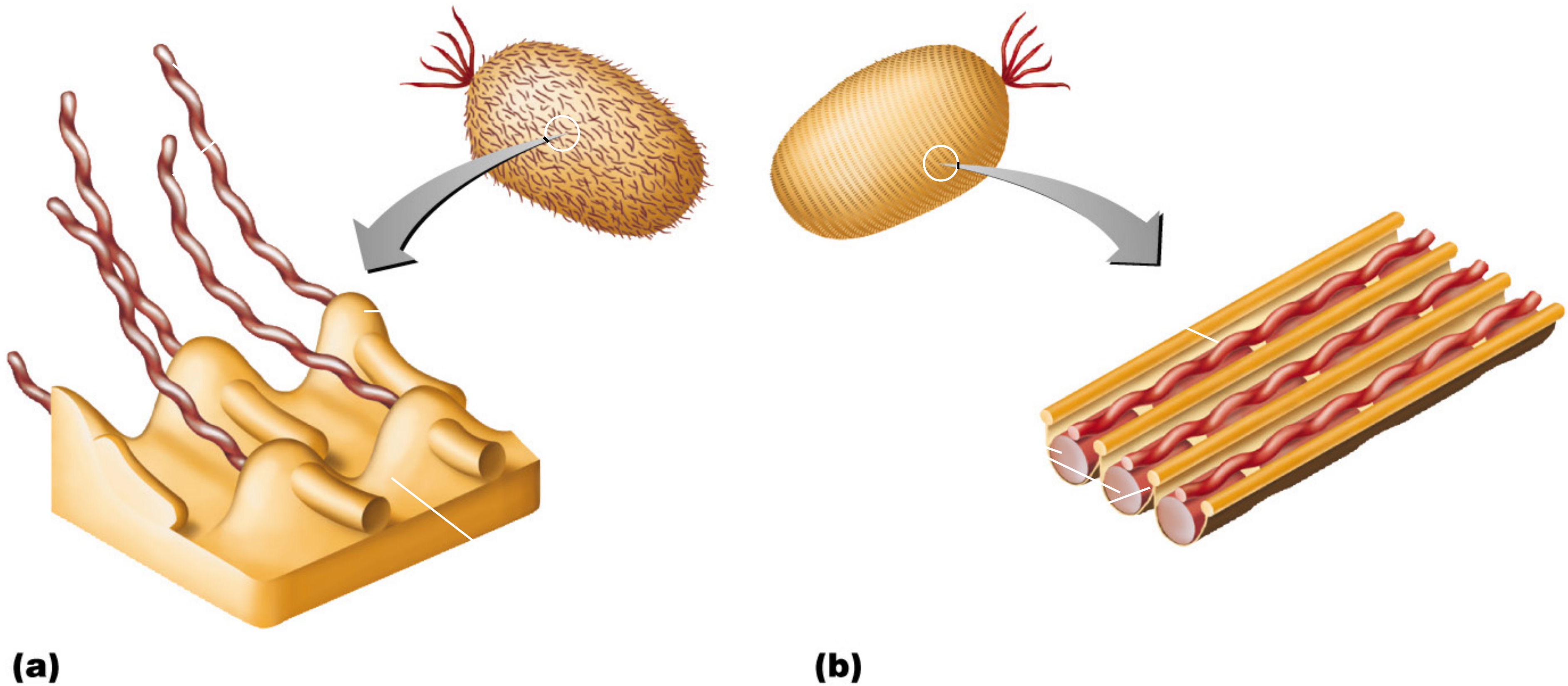
	Prokaryotic Cell	Eukaryotic Cell	Eukaryotic Organelles (Mitochondria and Chloroplasts)
DNA	One circular; some two circular; some linear	Linear	Circular
Histones	In archaea	Yes	No
First Amino Acid in Protein Synthesis	Formylmethionine (bacteria) Methionine (archaea)	Methionine	Formylmethionine
Ribosomes	70S	80S	70S
Growth	Binary fission	Mitosis	Binary fission



Applications of Microbiology 4.1 *Mixotricha*, a protozoan that lives in the termite gut.



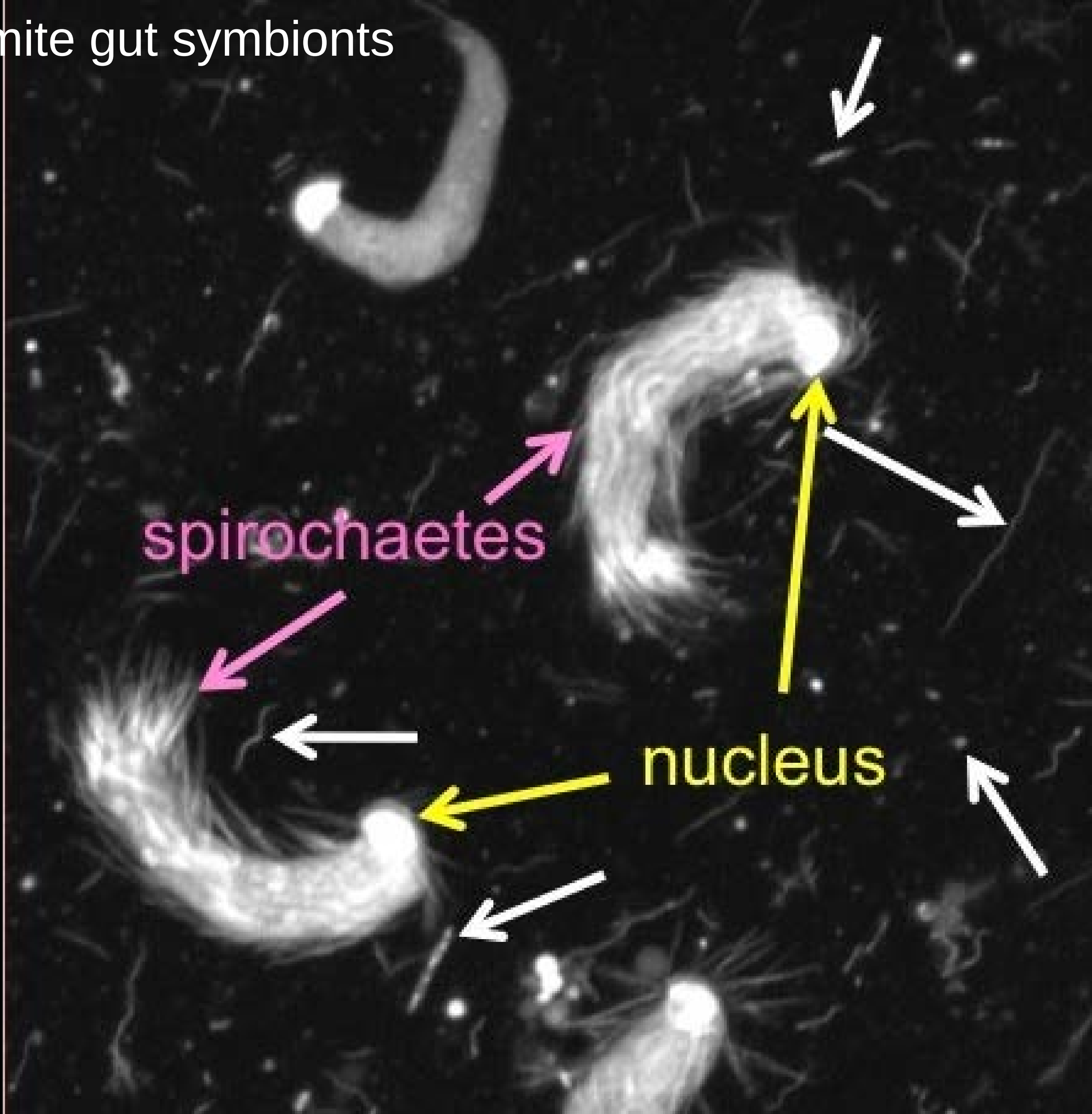
Applications of Microbiology 4.2 Arrangements of bacteria on the surfaces of two protozoans.



Termite gut symbionts:
https://www.youtube.com/watch?v=HOx7SDdIqyU

Termite gut symbionts

Termite gut symbionts



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