Viruses

- Viruses contain DNA or RNA
- And a protein coat
- Some are enclosed by an envelope
- Some viruses have spikes
- Most viruses infect only specific types of cells in one host
- Host range is determined by specific host attachment sites and cellular factors

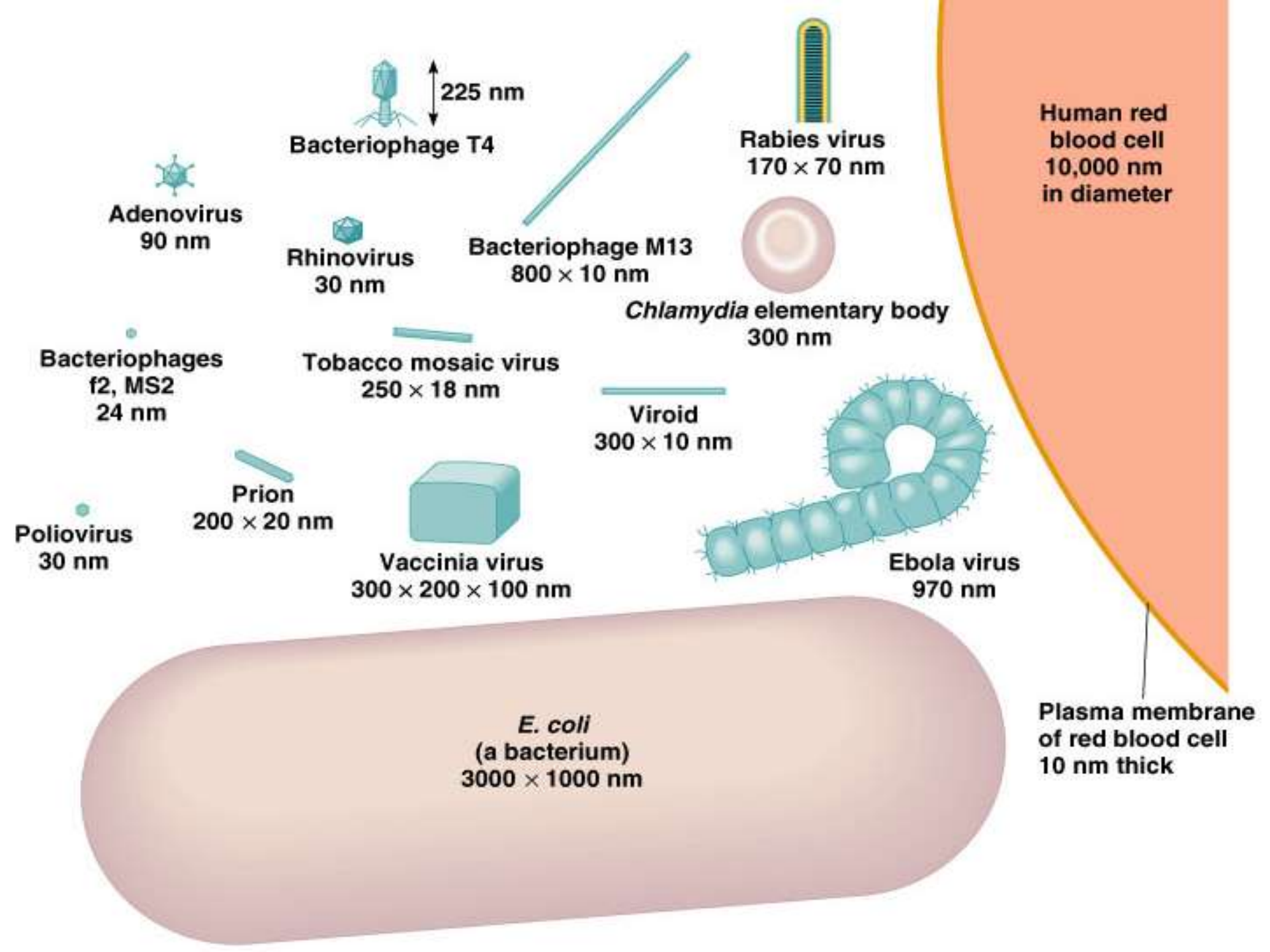
Viruses versus cellular organisms

Viruses

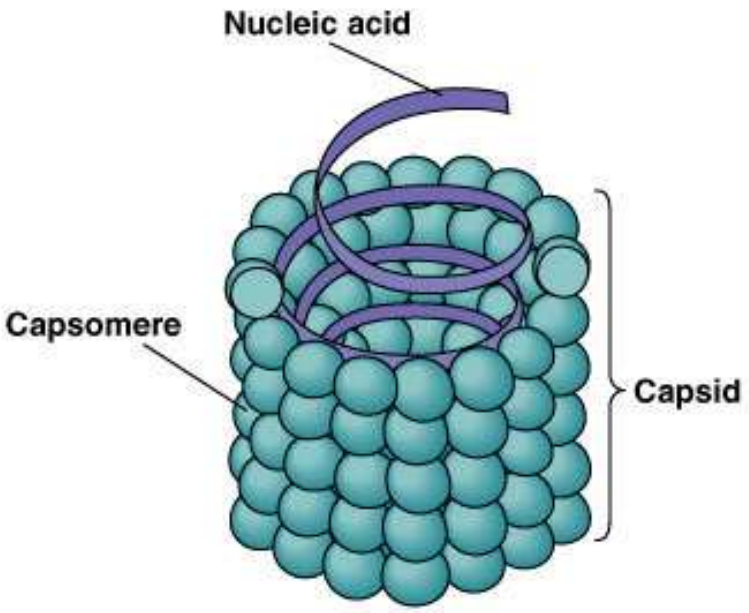
- simple organization
- DNA or RNA but not both (one exception)
- unable to reproduce outside of living cells
- obligate intracellular parasites

Cellular Organisms

- complex organization
- both DNA and RNA
- carry out cell division
- some are obligate intracellular parasites


225 nm
Bacteriophage T4
Rabies virus
170 × 70 nm
Human red blood cell 10,000 nm in diameter
Adenovirus
90 nm
Rhinovirus
30 nm
Bacteriophage M13
800 × 10 nm
Chlamydia elementary body
300 nm
Bacteriophages f2, MS2
24 nm
Tobacco mosaic virus
250 × 18 nm
Viroid
300 × 10 nm
Prion
200 × 20 nm
Poliovirus
30 nm
Vaccinia virus
300 × 200 × 100 nm
Ebola virus
970 nm
E. coli
(a bacterium)
3000 × 1000 nm
Plasma membrane of red blood cell 10 nm thick

Helical Viruses

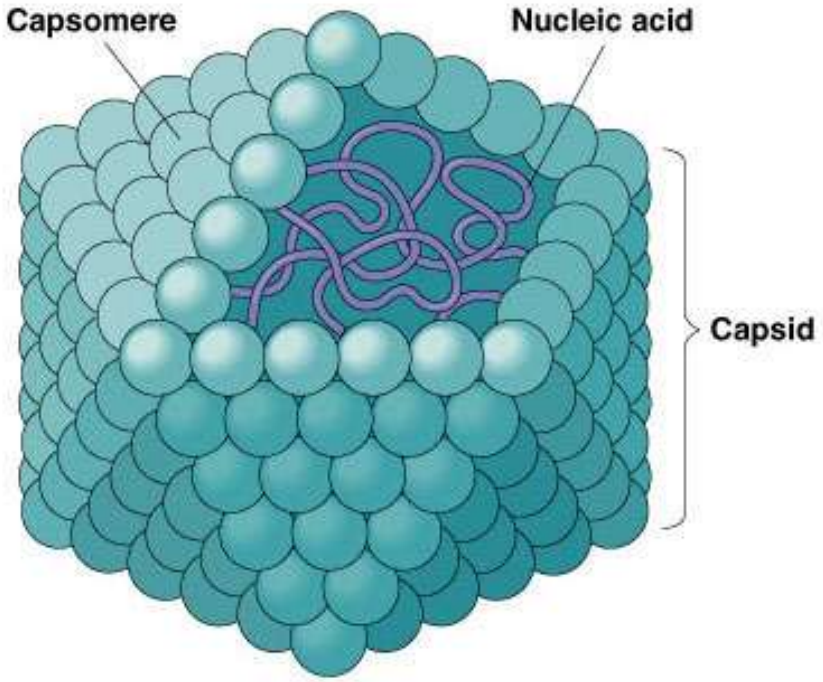


(a) A helical virus

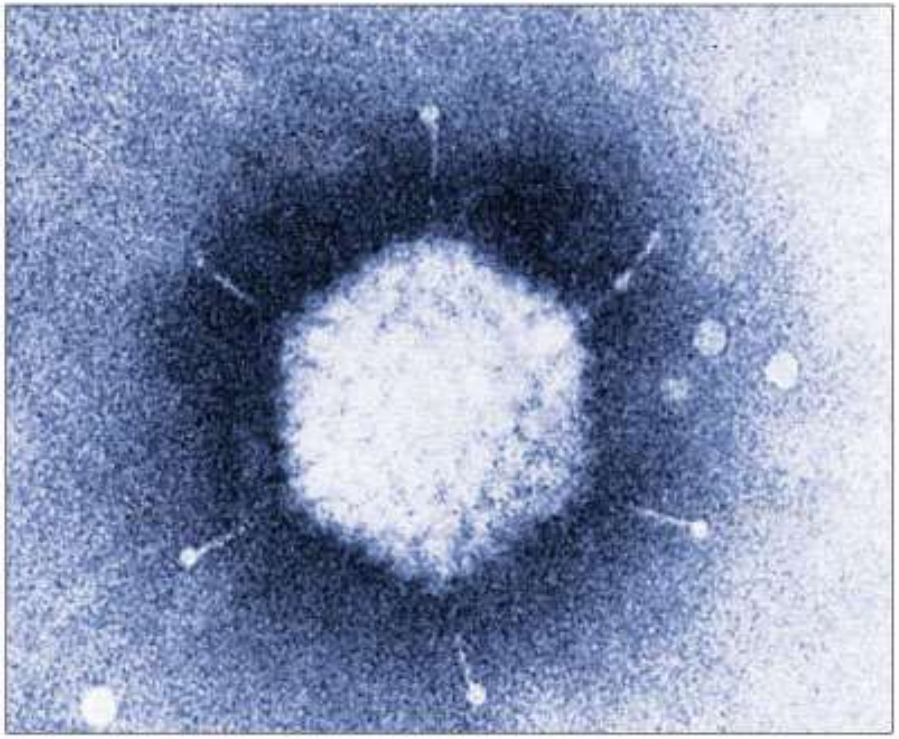
(b) Ebola virus

Figure 13.4a, b

Polyhedral Viruses



(a) A polyhedral virus



(b) A *Mastadenovirus*

Figure 13.2a, b

Complex Viruses

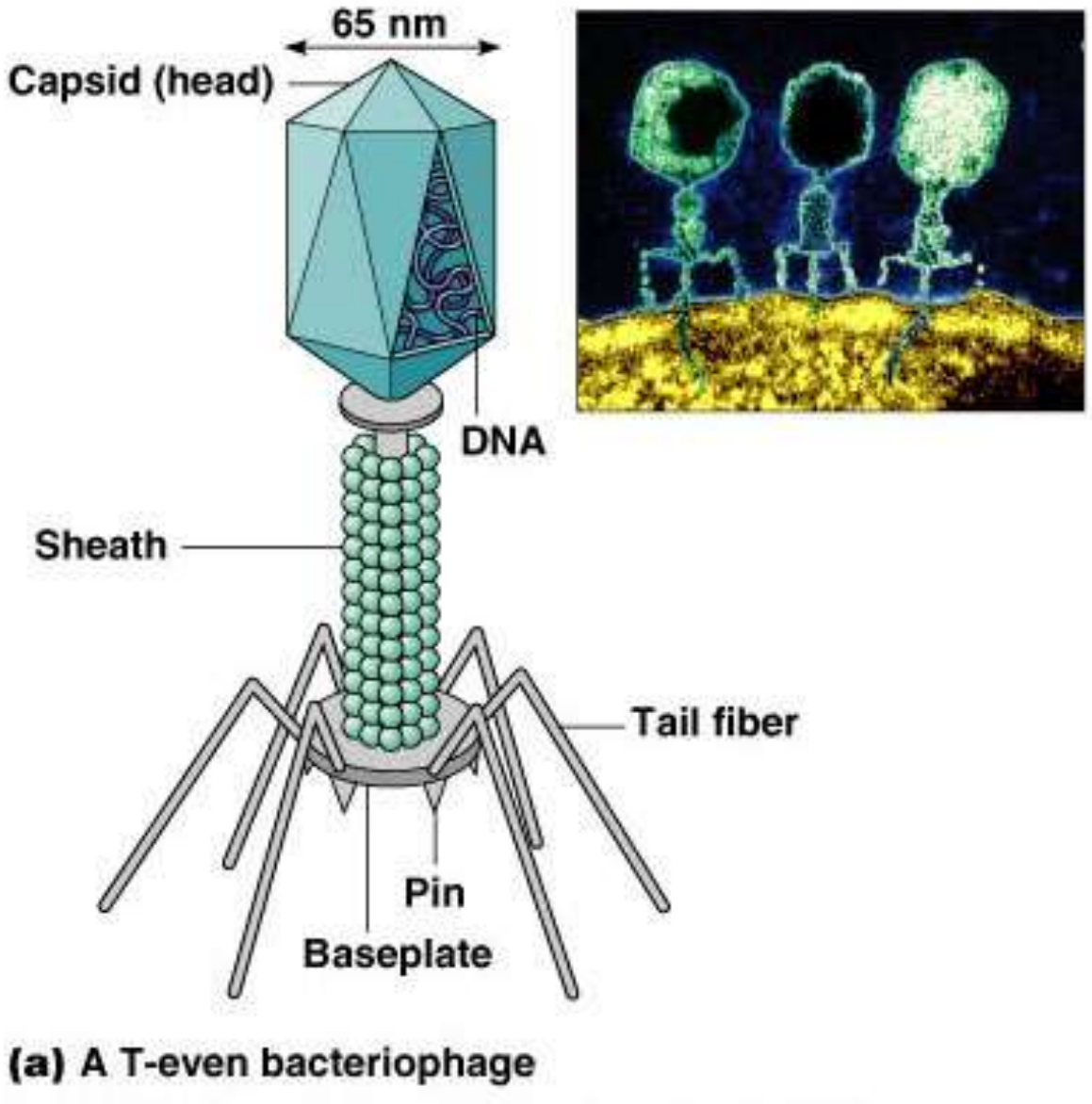


Figure 13.5a

BACTERIO PHAGE

A bacteriophage is a type of virus that infects bacteria. In fact, the word "bacteriophage" literally means "bacteria eater," because bacteriophages destroy their host cells. All bacteriophages are composed of a nucleic acid molecule that is surrounded by a protein structure.

Hosts for bacteriophages

- usually cultivated in broth or agar cultures of suitable, young, actively growing bacteria
- broth cultures lose turbidity as viruses reproduce
- plaques observed on agar cultures

Multiplication of Bacteriophages (Lytic Cycle)

- Attachment — Phage attaches by tail fibers to host cell
- Penetration — Phage lysozyme opens cell wall, tail sheath contracts to force tail core and DNA into cell
- Biosynthesis — Production of phage DNA and proteins
- Maturation — Assembly of phage particles
- Release — Phage lysozyme breaks cell wall

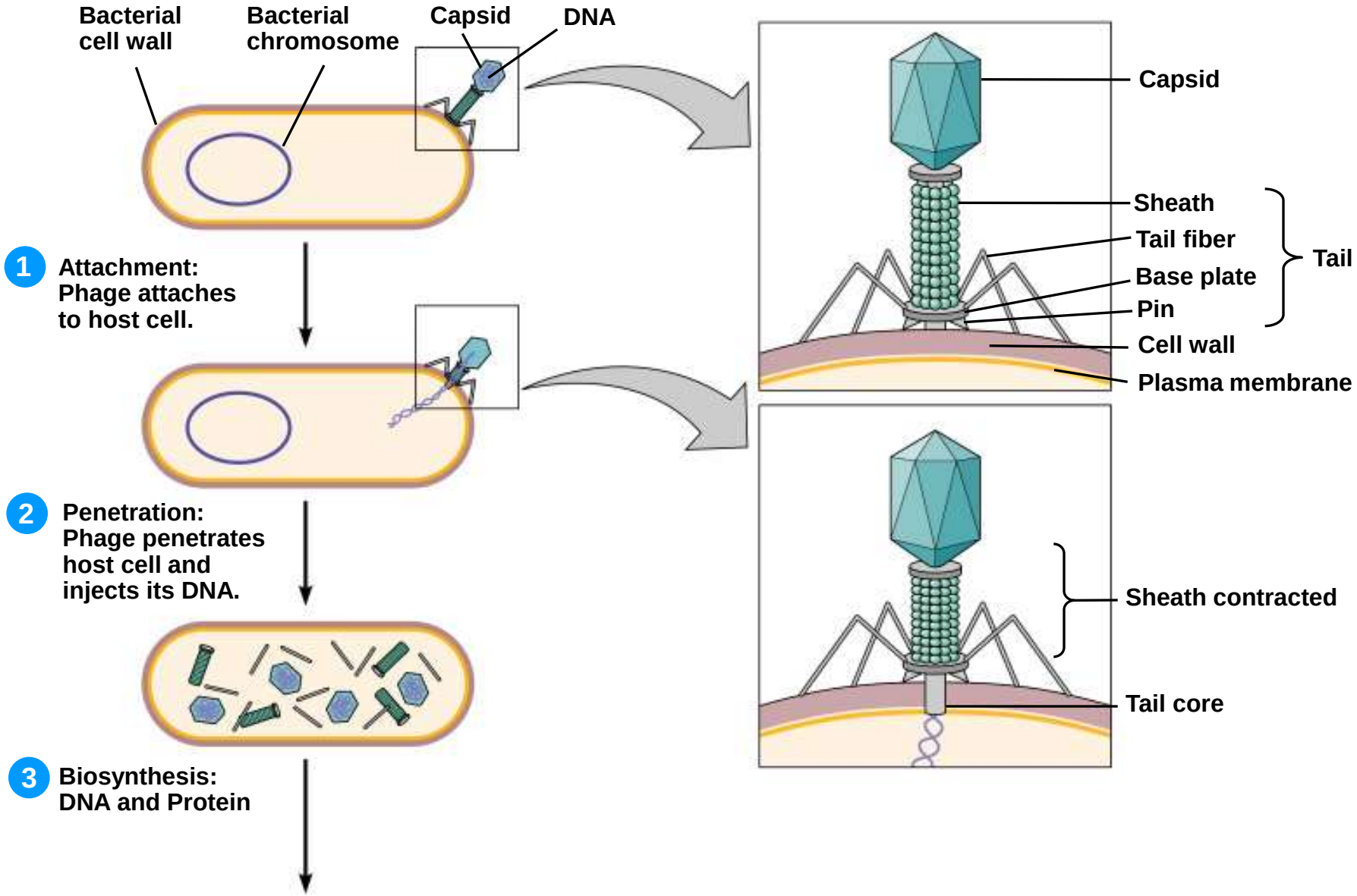


Figure 13.10.1

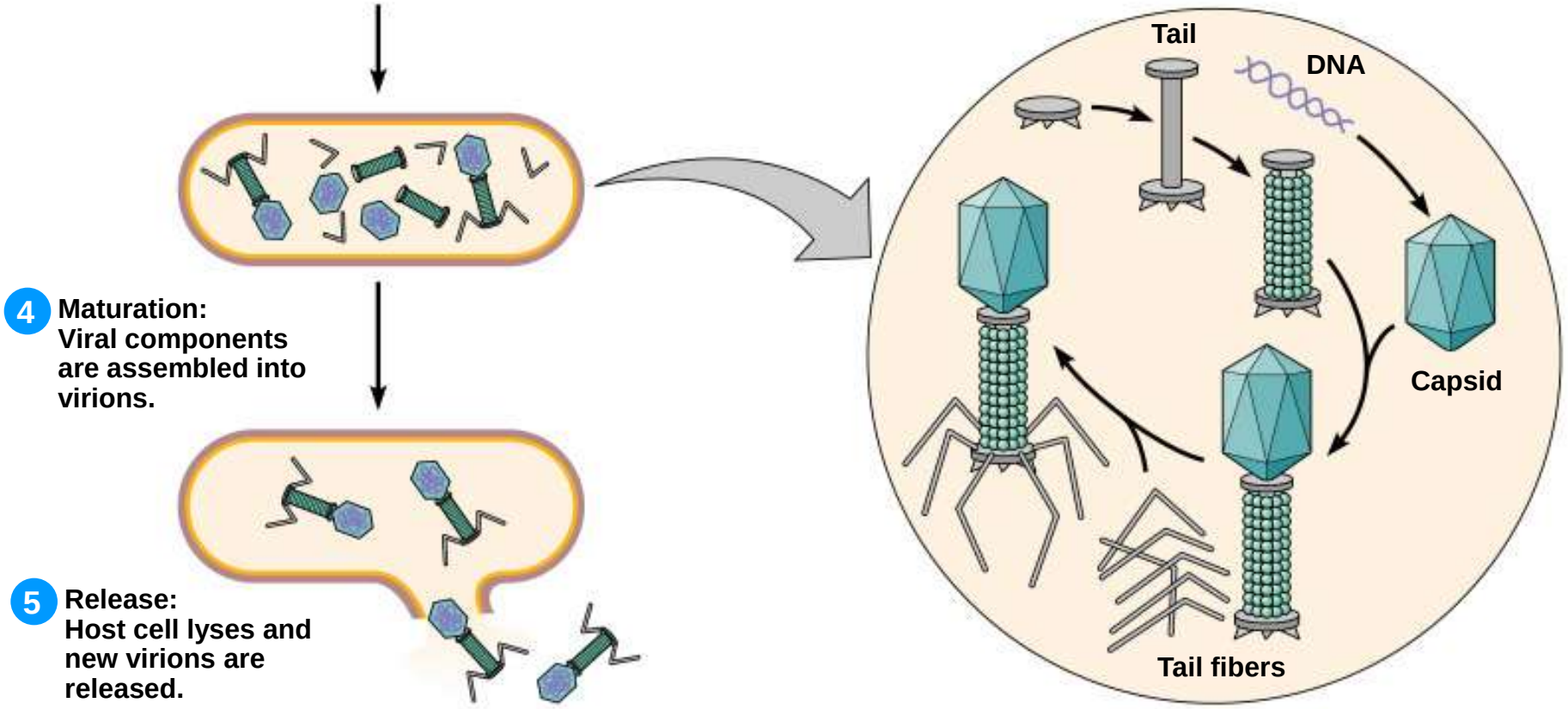


Figure 13.10.2

One-step Growth Curve

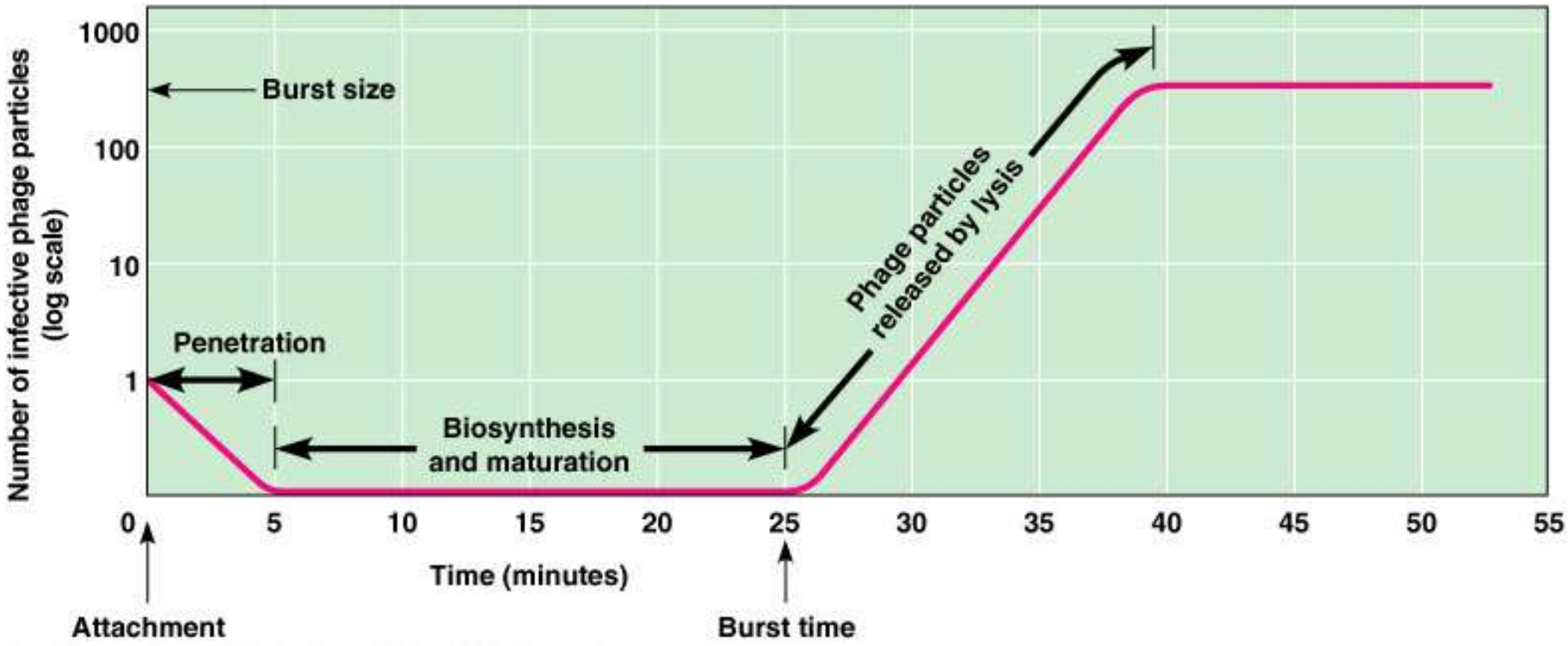


Figure 13.11

- Lytic cycle — Phage causes lysis and death of host cell
- Lysogenic cycle — Prophage DNA incorporated in host DNA

The Lysogenic Cycle

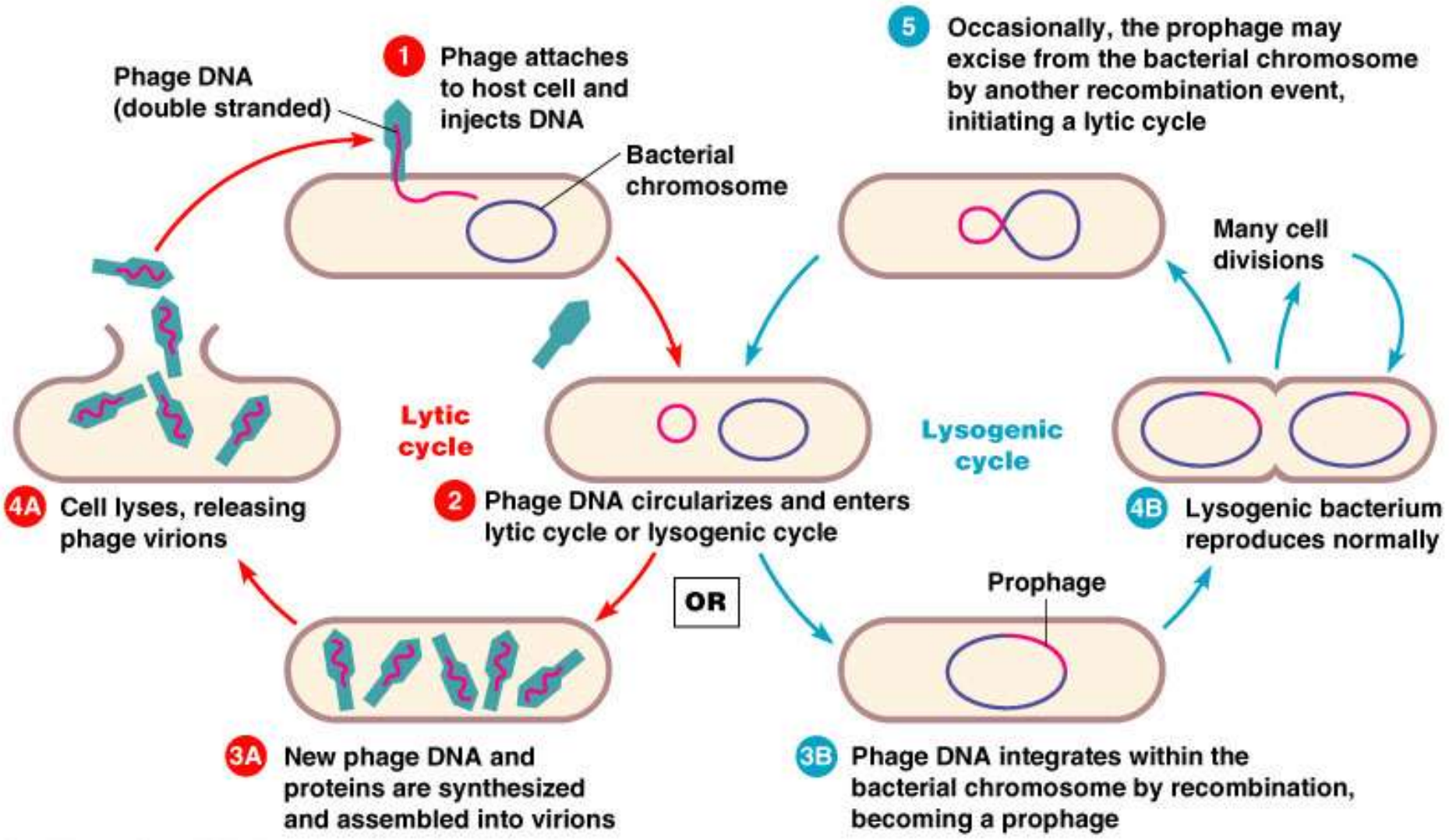


Figure 13.12

Multiplication of Animal viruses

- Attachment — Viruses attaches to cell membrane
- Penetration — By endocytosis or fusion
- Uncoating — By viral or host enzymes
- Biosynthesis — Production of nucleic acid and proteins
- Maturation — Nucleic acid and capsid proteins assemble
- Release — By budding (enveloped viruses) or rupture