Microbiology (Bio 206) #15:
Viruses: How Can Something Non-Living Cause Trouble?

Terms you should know:

- virus
- helical
- enveloped
- host cell
- complex
- attachment
- obligate intracellular parasite
- envelope
- receptor
- genome
- spikes
- host range
- capsid
- virion
- bacteriophage (phage)
- icosahedral
- naked

Questions you should be able to answer:

- Why are viruses considered non-living? Why could they also be considered living?
- What are the parts of a virus? Do all viruses have all the parts?
- What are the three major classes of virus shapes?
- How does a virus attach to a host cell?
- Why can’t we get many viral diseases from our pets?

Lecture outline:

I. Virus structure:
   A. Size: much smaller even than prokaryotic cells
   B. Obligate intracellular parasites: can replicate only within a host cell; inert outside
   C. No membrane, cytoplasm, organelles, ribosomes, metabolism, etc.
   D. Parts
      1. Genome (genetic material): DNA or RNA, single- or double-stranded
      2. Capsid: protein coat (icosahedral, helical or complex)
      3. Envelope: phospholipid bilayer surrounding only some animal viruses
      4. Enveloped viruses and some naked viruses have protein spikes
      5. Some viruses carry one or a few enzymes needed for replication

II. Attachment and host range
   A. Viruses attach to specific receptors
      1. Receptors are proteins in the host-cell membrane, usually with other functions
      2. Attachment is by the spikes for an enveloped virus or by capsid proteins if naked
   B. Receptors determine the host-range of the virus:
      1. Animal viruses, plant viruses and bacteriophages are specific for those classes of hosts
      2. Most viruses are able to infect only one or a few specific species
      3. Most viruses infect only one or a few specific cell types
   C. The virus must be able to attach in order to infect a cell
THE VIRAL REPLICATION CYCLE

1. Attachment (adsorption)
2. Penetration
3. Uncoating
4. Biosynthesis of Viral Components
5. Assembly (Maturation)
6. Release
Virus Structure

Naked Viruses

- icosahedral
  - capsid (proteins)
  - genetic material (DNA or RNA)
  - enzymes (in some viruses)
  - spikes

Enveloped Viruses

- envelope (phospholipid)