

VIRUSES AND EXAMPLE DISEASES

7/27/87, rvsd 15 August 1993, 12 Aug 1996, 8/7/98, 7 Aug 06, 20Feb08, 20Feb09, 15Feb12

TFC, P.346, Black's 2nd, p. 266- , Alcamo 323-, Campbell 6th: , Black's 6th: 264-294, tbl: 270, Sadava: 282-290, Campbell 9th: 307, 381-394

DISCOVERY:

Chamberland	1884	developed porcelain filter to remove bacteria
Iwanowski	1892	used filter to try to remove tobacco mosaic disease, "filterable virus"
Beijerinck	1898	showed could be diluted out, destroyed by heat
Forsh & Loeffler	1898	foot and mouth disease caused by filterable agent
Walter Reed	1901	yellow fever also filterable disease (in Cuba)
Twort & d'Herrelle	1917	bacteriophage

TRAITS: All viruses possess: (p 284)

capsid	protein coat composed of capsomeres, can contain penetration enzymes
genome	may be DNA or RNA, double stranded , single stranded, (+ = mRNA) or (-)

Spikes: glycoprotein for attachment, enzymes to assist attachment
 Host range = which species infected
 specificity = which tissue affected, determined by ability to attach, multiply and release

three morphologies, mammalian viruses: icosahedral (20 faces) herpes, polio, cytomegaly
 (p 383 for sizes and shapes) helical rabies, TMV
 complex small pox, coronavirus, influenza

VARIETY OF VIRUSES, p 383, characterized by comp of genome, enveloped or not, geometry, size

VIRAL REPLICATION:

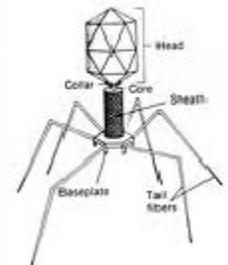
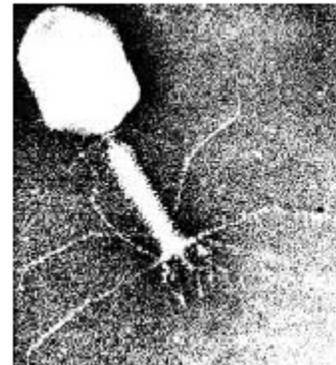
Obligate Intracellular parasites, replicate inside: Absorption
 Penetration
 Synthesis
 Maturation
 Release

infection: http://www.youtube.com/watch?v=9hzUjx_oD8E

Bacteriophage parts (p 383, 306-307): capsid, genome, tail assembly, tail piece, tail fibers, tail sheath, tailcore

bacteriophage replication: p 385

lysogeny: p 386 (lysogen. In mammalian cells, called provirus)



enveloped viruses: upon release by budding from host.

replication of enveloped virus (p 388)

Enveloped viruses inactivated by hi temp, hi or lo pH, lipid solv, some disinfectants (Cl, H₂O₂, phenol)

Naked viruses lack an envelope, resist many of the above

EXAMPLES (perhaps not presented during this lecture?)

COMMON COLD: caused in decreasing frequency by : rhinoviruses, paramyxoviruses, enteroviruses, corona viruses, reoviruses, adenoviruses. Can be mixed infection.

Portal of Entry: mucous membrane of nose and eyes.

Influenza: (p 287) H = hemagglutinin, N = neuraminidase

Alterations in H and N make virus undetected by immune system until after infection

1918: Change to H3N2, killed 20 million world wide. More troops died of flu than combat

Herpes form provirus, integrated for life into your DNA: Chicken Pox, Herpes simples I and II

HIV (p 389) Primarily parenteral POE, through wound or sore. Infects T cells.

TABLE SUMMARIZING MAJOR CLASSES OF VIRUSES

David B. Fankhauser, PhD

15 August 1993, rvsd 12 August 1994, 15 Feb 02, 15 Feb 06, 26Apr06, 7 Aug 06, 8 Aug07, 20Feb08

Bauman 2nd: 680-740

Cls	genome	env?, shape	example	diseases
DNA VIRUSES:				
Ia	dsDNA linear	naked polyhedral	Adenovirus	40+: respiratory 1 cause of "common cold" & of pinkeye Glitis (20% severe diarrhea in children) sudden onset, short duration
Ib	dsDNA linear	Enveloped polyhedral,	Herpesvirus	80+, latency characteristic, usually nerves: (p 682) Herpes simplex 1: oral, fever blisters (p 684) Herpes simplex 2: genital (p 685) Varicella zoster: chicken pox, shingles (p 687, 688) cytomegalovirus leading teratogenic virus (TORCH) Rhadinovirus: Kaposi's Sarcoma (p 692) Epstein-Barr: mononucleosis. Burkitt's lymphoma
Ic	ds DNA linear	Enveloped largest, mst complex,	Poxvirus	brick shaped, cause inclusion bodies small pox (p 681) cowpox = vaccinia certain warts (molluscum contagiosum)
II	dsDNA circular	naked polyhedral	Papovavirus	<i>papilloma</i> : 25+ in humans: str'n 18: cervical CA (p 693) <i>polyoma</i> : 2 in humans, <i>vasculating</i> . Warts (SV-40 : simian virus)
		enveloped	Hepadnaviridae	Hepatitis B virus "Serum" PoE: minor skin break (razor, toothbrush) risk of liver CA (p 698)
	ssDNA	linear, naked polyhedral	Parvovirus	parvo ("small") (p 699)
RNA VIRUSES:				
Ia	positive (mRNA) ssRNA, smallest rna	naked polyhedral	Picornavirus	enteroviruses: repl. 1st in mucous, then GI: polio (70+) rhinoviruses: cannot surv in GI tract, 100+, most common cause of colds. (P 704) Hepatoviruses: hepatitis A (fecal/oral) (compare: p 709)
Ib	positive (mRNA) ssRNA	enveloped polyhedral	Togavirus	rubella german measles many arboviruses (arthropod borne viruses): EEE, St. Louis Enceph., yellow fever, dengue
II	negative ssRNA	Enveloped helical	Paramyxovirus	measles rubeola mumps infection of salivary glands, testes viral pneumonia upper resp and bronchitis
	negative ssRNA	Enveloped helical	Rhabdovirus	some arboviruses, only rabies infects man newcastle virus in chickens
III	negative ssRNA	enveloped helical	Orthomyxovirus	influenza A, B, C, can agglutinate RBC typed H: hemagglutinin, N: neuraminidase (H ₁ N ₁ , etc)
IV	pos ssRNA	envel,	Coronavirus	helical, 2 nd cause, Common Cold, "infectious bronchitis"
V	positive ssRNA	enveloped helical	Retroviruses	requires reverse transcriptase, becomes provirus: leukemia, Human Immunodeficiency Virus (AIDS)