

OAKLAND CUSD #5

**BIOLOGY**  
**APRIL 13-17, 2020**

DEBRA WELCH

# Week of April 13-17, 2020

## High School Science

### Debra Welch

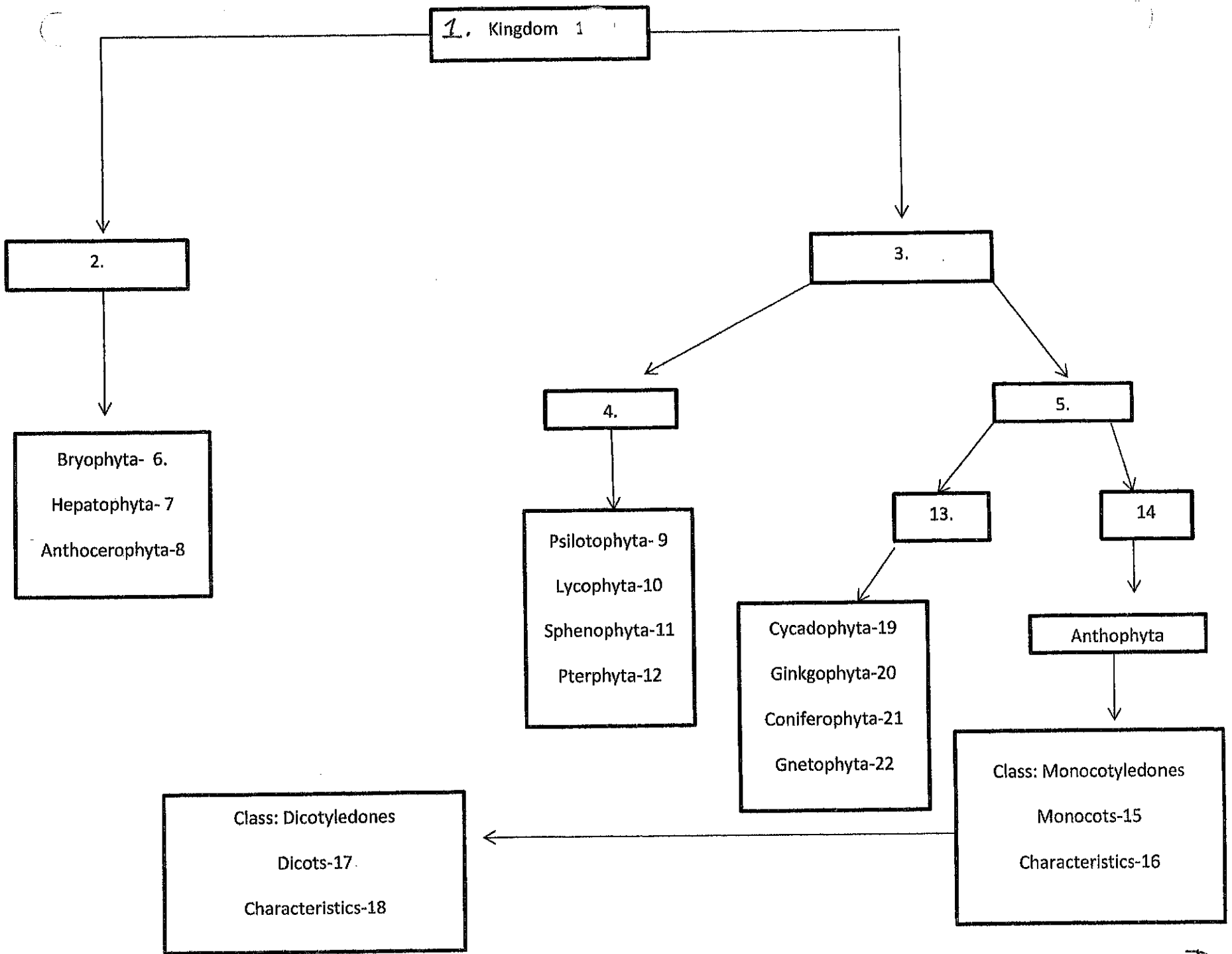
Hello students! I hope all of you are staying healthy. I just want everyone to know that I am thinking you and miss having school as normal. Remember to keep your immune systems strong! Basic directions are: You need to complete one lesson a week for only the class you were currently enrolled in and choose from the 3 choices. Choices 1 & 2 are for review of material we have already covered this year. I will start at the beginning and go through the year's material. Choice #3 will always be new work using your textbook or other handouts I include. I will make every effort to keep your work simple to do, considering that we are not learning together in the classroom. Your work should be turned in as a hard (paper) copy to the office or through email in a word or google document. My email is: [debra.welch@oakland5.org](mailto:debra.welch@oakland5.org). Please be sure all work has your name! If you have not turned in the assignment by the following Monday, I will need to email your parents and/or place a phone call home. Please be diligent to turn work in on time. I suggest you set up a schedule just as if you were at school and allow for the normal time period. Most assignments I send you will take less time than our normal 40 minutes. Comments will be made on paper copies and returned to you. If you send in homework answers as an email I will reply to your email and give my comments/reflections of your work. I will be supplying you with the necessary notes or you will need to use your book to find the answers. If you have any questions feel free to email me and I will get back to you by email during my office hours. If you can't email feel free to call the office and leave me a message. Good Luck and stay healthy!

Anatomy: for those of you who wanted to continue learning throughout the body systems I will be including notes and sending you powerpoints to use with Choice #3. If you plan to go into a medical field I advise you to go ahead and complete the Enrichment on the body systems we could not study due to school closure.

Lesson Choices on next page:



Class	Choice 1	Choice 2	Choice 3 (Enrichment)
Biology	'Fill out Plant Taxonomy form using wordlist.	Write a Brief review of how the Plant Taxonomy Chart is organized. (see Choice 1 & notes)	READ the powerpoint notes on Viruses & do the SG 18-2 p15-16 *in addition to hardcopy I will email a copy. Save this ppt notes for future work.
Anatomy	Take the Eye quiz and label all the structures.	Review how light travels into the eye and <u>include all appropriate structures</u> as light passes to the back of eye and the optic nerve.	List <u>step-by-step</u> how sound waves enter and travel through the ear. Include a brief discussion for EACH step. (there should be Several). Use the powerpoint I sent you in your emails.



NOTE: 1  
 11/13/17  
 P. 1 of 3

## Plant Classification

### Wordlist:

- a. Fern
- b. Angiosperm
- c. Moss
- d. 2 cotyledons, bundles along rim, flower in multiples of 5, netlike veins
- e. Vascular
- f. Horsetails
- g. Gymnosperms
- h. Lily, iris, tulip, corn, grasses
- i. Liverworts
- j. Cycad
- k. Seed plants
- l. Nonvascular
- m. gnetales
- n. Single cotyledon, parallel veins, flowers in multiples of 3, scattered vascular bundles
- o. Hornworts
- p. Sporebearing /Vascular (seedless)
- q. Ginkgo
- r. Rose, maple, oak, apple
- s. Whisk fern
- t. Conifers
- u. Club moss
- v. Plantae

# NOTES

BIO- Choice 1  
DWelch 4/13-17  
p. 3 of 3

## Plant Characteristics:

Eukaryotic

Autotrophs-photosynthetic

Cell wall-cellulose

Terrestrial (land) or aquatic (water)

Alternation of Generations (spores)

Embryophytes (protected embryo)

## There are 4 Main Groups:

1. Bryophytes-nonvascular.  
**Vascular:**
2. Ferns (seedless)
3. Gymnosperms-naked seed
4. Angiosperms-flowering seed plants

# NOTES

## BIOLOGY 2 & 2A

Choice 2 BIO  
Dwelch 4/13-17  
p. 1 of 2

### Classifying Plants

**Nonvascular:** have no vessels, no roots, no stems or leaves. Examples: Mosses & Liverworts

**Vascular:** have vessels to transport food and water. They have roots, stems and leaves.  
Example: Grass, corn, trees, flowers, bushes

**Xylem:** transports water

**Phloem:** transports food & nutrients

### Gymnosperms

- "naked seeds"
- cone bearing plants (seeds grow on cones)
- needle like leaves
- usually stay green year round
- wind pollinated
- Examples: pine trees & evergreens

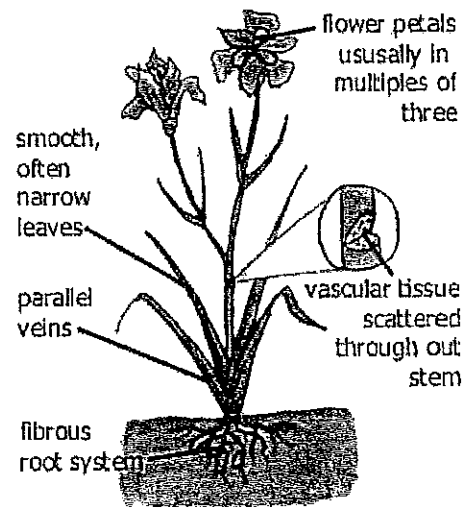
### Angiosperms

- flowering plants
- seeds are enclosed in a fruit
- most are pollinated by birds & bees
- have finite growing seasons
- Examples: grasses, tulips, oaks, dandelions
- Divided into two main groups: Monocots & Dicots

### Monocots

- Angiosperms have have 1 seed leaf (cotyledon)
- parallel veins on leaves
- 3 part symmetry for flowers
- fibrous roots
- Example: lilies, onions, corn, grasses, wheat

### Monocot



### Dicots

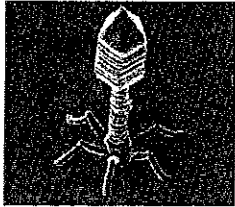
- Angiosperms that have 2 seed leaves (cotyledons)
- net veins on leaves
- flowers have 4-5 parts

2. Moss - simple land plants (moss & liverworts)
  - a. live in wet environment
  - b. do not hve vessels to transport nutrients
  - c. depends on osmosis to move water from cell to cell  
so plants are small
3. Ferns - vascular plants
  - a. true roots, stems and leaves with tubes
  - b. tube like tissue transport water and food
  - c. may grow on land
  - d. need moist environment for reproduction
  - e. fronds are leaves with stems underground
  - f. sori are spores or reproductive cells that develop  
under the leaves
4. Gymnosperms - vascular plants with seeds
  - a. produce "naked seeds" no protective cover
  - b. seed contains young plant - embryo
  - c. seeds produced in cones called conifers
  - d. most are evergreens with round pointed leaves
  - e. ex. pine, hemlock, spruce, fir and cedar trees
5. Angiosperms are vascular plants with seeds and flowers
  - a. seed produced in flowers
  - b. seeds covered by fruit
  - c. flowering plants most common (250,00 species)
  - d. Importance - cereal grains, trees, vegetables
6. Two kinds of angiosperms
  - a. monocotyledons (monocots)
    - 1) only one seed leaf
    - 2) flowers - petals in multiples of three
    - 3) leaves - veins are parallel
    - 4) example - corn
  - b. dicotyledons (dicots)
    - 1) two seed leaves
    - 2) flowers - petals occur in fours or fives
    - 3) leaves - veins branch out and make a net
    - 4) example - bean



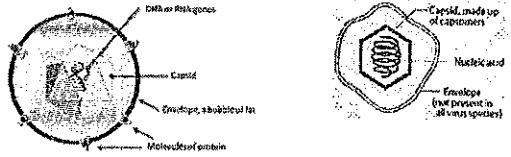
## Viruses

*"a piece of bad news wrapped up in a protein coat"*  
 Peter Haeckel, 1890 Nobel Prize in Medicine



### Components of Viruses:

- Nucleic Acid core
- Protein coat called a capsid
- Surrounding lipid bilayer around the membrane, called an envelope.
- A complete virus particle w/envelope is called a(n) virion.



- Viruses use their genome (genetic information) to replicate in host cells.
- Viral nucleic acid can be single or double-stranded and linear, circular, or segmented

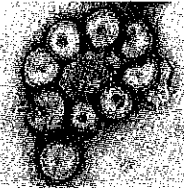
**Virus** - an infectious agent that is too small to be seen with the light microscope and are not considered cells.

*In Latin the term means "Poison"*

Described as "Obligate Intracellular Parasite"

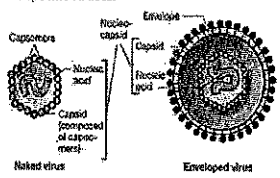
- No cell nucleus is present, or organelles, cytoplasm
- Appear to be on borderline between living and non-living
- Must have a host cell to replicate by injecting their DNA or RNA into the cell
- Viral particles contain either DNA or RNA but not both.
- Viral particles infect a host and program it to synthesize components required for the assembly of new viruses.

*Tissue damage* is the result of infection common in most diseases caused by Viruses.



### Capsids:

- Nucleic acid of a virion is usually enclosed in a capsid that protects it.
- The capsid accounts for most of the virus' mass.
- Each capsid is composed of protein subunits called capsomeres.
- The number of proteins & the arrangement of capsomeres are characteristic of specific viruses.

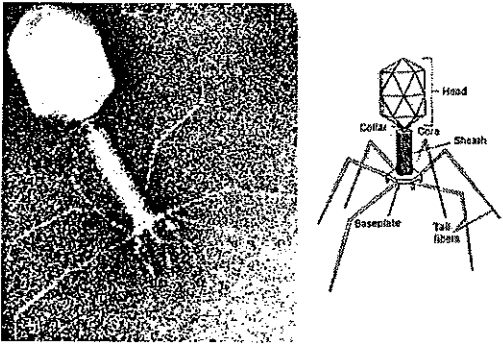


Projections called Spikes, may or maynot Extend from the envelope.

These surface projections serve to attach To receptor sites on host cell.

Nucleocapsid contains the viral genome & capsid. If no envelope is present, the virus is known as "naked" or nonenveloped.

### Structure of a Bacteriophage

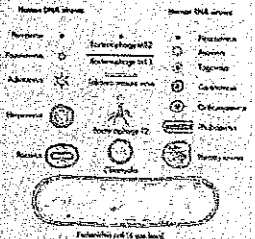


### What is the advantage of having an envelope?

- Similar to host cell membranes and may escape recognition by host cell
- Helps infection by fusing with the host cell's membrane
- Enveloped viruses are easily damaged
- Certain environmental conditions destroy membranes: high temperature, pH of less than 6 or greater than 8, freezing, etc

### Sizes & Shapes:

- All are too small to be seen with a light microscope, mag x2000
- Largest: orthopoxviruses (240 nm x 300 nm)-size of smallest bacteria
- Smallest: Enteroviruses. 30 nm in diameter



**Classification:**

Old system used was by the type of host or host structures

- \*bacterial viruses
- \*plant viruses
- \*animal viruses


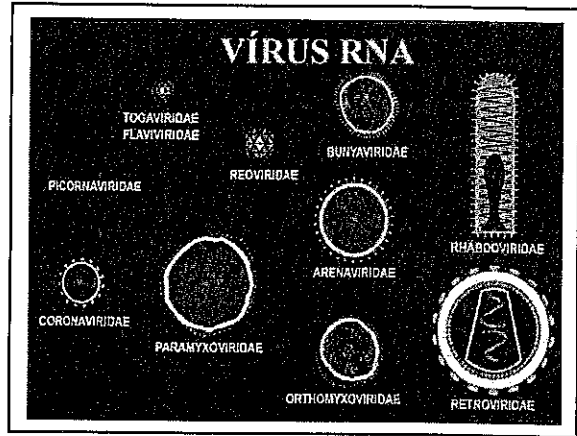
Later classification by:

- \*type of nucleic acid
- \*method of replication
- \*other biochemical and physical factors

1973 virologists established the International Committee on Taxonomy of Viruses

- \*meets every 4 years
- \*establishes rules for classifying viruses
- \*difficult to use normal taxonomy
- \*Uses Family- Genus
- \*ICTV requires the English common name, rather than Latinized binomial term for species

Ex: family: Rhabdoviridae Genus: *Lyssavirus* Species: Rabies virus

**RNA Viruses**

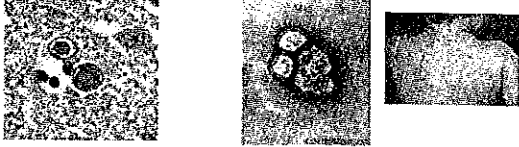
First classified by:

- \*nucleic acid type: RNA or DNA
- Single-stranded (ssRNA) \*also presence of enzymes indicated by + or -
- Double-stranded (dsRNA)
- \*Capsid symmetry (shape)
- \*Envelope
- \*Size

Virus Family	Examples (Common names)	Virus	Capsid	Enveloped	Symmetry	Acid type	Group
1 Herpesviridae	Herpes, Rabies	Herpes	Icosahedral	Yes	Icosahedral	ds	1
2 Picornaviridae	Echovirus, Poliovirus, Rotavirus, Coxsackievirus, Adenovirus, Parvovirus, Parvovirus, Echinovirus, Rotavirus, Rotavirus, Rotavirus	Naked	Icosahedral	No	Icosahedral	ss	2
3 Caliciviridae	Hepatitis A, Norwalk virus	Naked	Icosahedral	No	Icosahedral	ss	3
4 Papovaviridae	Papillomavirus	Enveloped	Icosahedral	Yes	Icosahedral	ds	4
5 Paramyxoviridae	Respiratory syncytial virus	Enveloped	Helical	Yes	Helical	ss	5
6 Flaviviridae	Dengue virus, Japanese Encephalitis virus, Yellow fever virus	Enveloped	Icosahedral	Yes	Icosahedral	ss	6
7 Orthomyxoviridae	Influenza A, Influenza B, Influenza C, Influenza D, Influenza E	Enveloped	Helical	Yes	Helical	ss	7
8 Paramyxoviridae	Measles virus, Mumps virus, Sendai virus, Respiratory syncytial virus	Enveloped	Helical	Yes	Helical	ss	8
9 Herpesviridae	Cytomegalovirus, Herpesvirus	Enveloped	Icosahedral	Yes	Icosahedral	ds	9
10 Adenoviridae	Adenovirus	Naked	Icosahedral	No	Icosahedral	ds	10
11 Rotaviridae	Rotavirus	Enveloped	Helical	Yes	Helical	ss	11
12 Bunyaviridae	Bunyavirus, Hantaan virus	Enveloped	Icosahedral	Yes	Icosahedral	ss	12
13 Rhabdoviridae	Rabies virus	Naked	Helical	No	Helical	ss	13
14 Retroviridae	HIV, AIDS virus	Enveloped	Helical	Yes	Helical	ss	14

Togaviridae- small, enveloped, polyhedral; multiplies in cytoplasm of many mammalian and arthropod host cells.

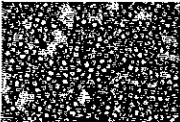
Cause of several kinds of encephalitis and measles




**RNA Groups:**

**Picornaviridae-** very small (30 nm), naked, polyhedral, 150 species cause disease in humans

- \*Enterovirus- (Greek or "intestine"); polioviruses; resistant to chemicals, pass through digestive tract unharmed, invades blood and lymph and spreads into nervous system
- \*Hepatovirus (Greek for "liver"); poor sanitation helps its spread, ingestion of contaminated food or water, the liver is affected
- \*Rhinovirus (Greek for "nose"); one responsible for common cold; no digestive tract trouble-can't survive the acidic conditions.



Polio virus




Rabies →

**Retroviridae-** enveloped, contains enzyme reverse transcriptase Causes tumors and leukemia, invades human T lymphocytes; known as Human T cell Leukemia Virus


**Structure of a retrovirus**

**Flaviviridae-** enveloped, filamentous. Transmitted from person to person by close contact With blood or other body secretions, contaminated needles. Causes Marburg and Ebola.



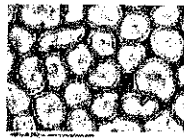
**Reoviridae**- naked, polyhedral capsid, medium-sized dsRNA virus.

Cause of Rotavirus that results in severe diarrhea in children under age 2.



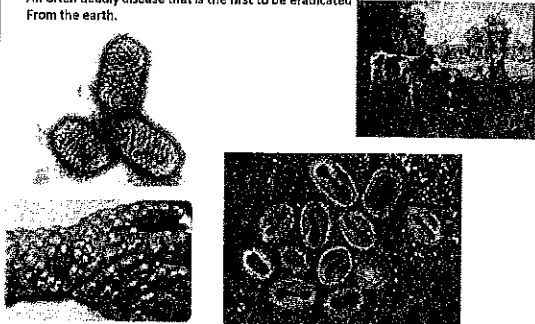
Influenza virus- RNA virus; type A & B responsible for the seasonal epidemic of flu each year. Spread up to 6 ft away from sneezing, coughing or talking. Fever, headache, muscle ache, cough, sore throat, runny nose & fatigue.

Type A-can get from ducks and pigs



**Poxviridae**- enveloped, linear, dsDNA; largest and most complex of all viruses.

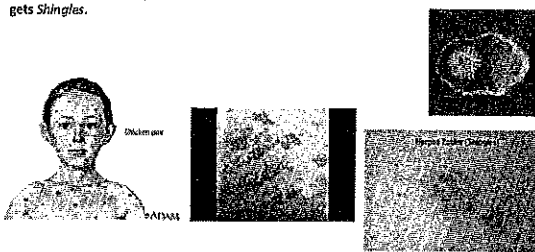
Causes smallpox—skin lesions, virus multiplies in cytoplasm. Also cause cowpox. First vaccine made by Edward Jenner from cowpox and then altered to treat smallpox, an often deadly disease that is the first to be eradicated from the earth.



**DNA Viruses:**

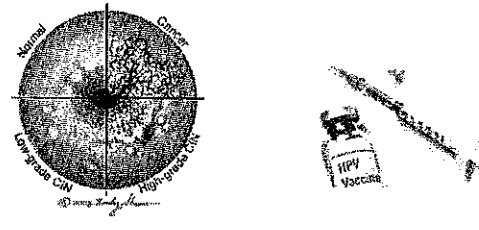
**Herpesviridae**- Greek for "creeping"; large, enveloped with linear dsDNA. Over 100 types, cause of a broad spectrum of disease. Universal property is latency- the ability to remain in host cells, in the neurons, for long periods and to retain the ability to replicate.

Ex. A child gets chickenpox & will still have the virus in latent form. Years later the child gets Shingles.




**Papovaviridae**- named for 3 related viruses: papilloma, polyoma and vacuolating virus. These are small, naked, polyhedral viruses that replicate in their host cells.

**Papillomaviruses** cause benign and malignant warts in humans and some associated with cervical cancer.

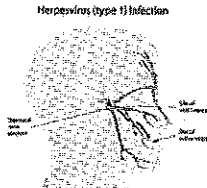


**Simplexvirus:**

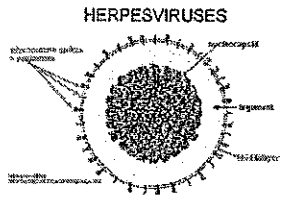
Herpes simplex type I- oral herpes (fever blister)  
Herpes simplex type II-genital herpes (STD)



Herpesvirus (type 1) infection



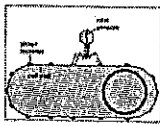
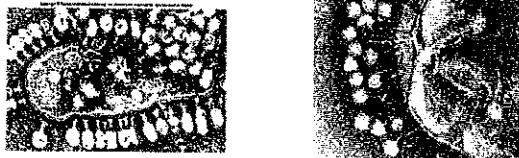
**HERPESVIRUSES**

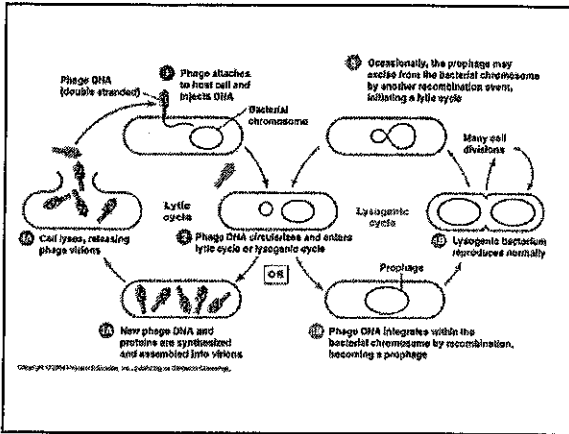


**Viral Replication:**

There are 5 basic steps:

1. Adsorption- attachment of viruses to host cells.
2. Penetration- entry of virions into host cells
3. Biosynthesis- making new nucleic acid molecules, capsid proteins in host.
4. Maturation- assembly of newly synthesized viral components into complete virions.
5. Release- departure of new virions from host cells. Usually kills (lyses) host cell.



**Lysogeny- (Latent Phase):**

- Temperate phages exhibit lysogeny- a stable, long term relationship between the phage and its host. We refer to this being the *dormant period* or lysogenic (*latent*) phase.
- The virus incorporates its nucleic acid into the DNA of the host cell. Now the infected cell has viral genes permanently and can be dormant for months or even years.
- Activation of the virus occurs (for many reasons) and the host goes into the lytic cycle. Outbreaks are often thought to be caused by stress-related factors
- Herpes Simplex I has a latent phase. The virus is transmitted orally and symptoms of this infection are cold sores.

The diagram shows a bacteriophage with labels: Head, DNA (protein sheath), Neck, Whiskers, Tail, Base plate, and Tail fiber. A scale bar indicates 0.5 µm.

**Bacteriophages:**

Bacteriophages (phages) – means “eaters of bacteria”, are viruses that infect bacterial cells.

- First observed in 1915 by Frederic Twort in England and in 1917 by Felix d’Herelle in France.
- Recently they have been used successfully to fight bacterial infections.
- Have either single or double-stranded DNA or RNA.
- Phages: T-even phages, designated as: T2, T4 or T6 (T stands for “type”).
- T4 is most widely studied, parasite of the enteric bacterium: *E. coli*
- Structure- distinctly shaped capsid made of a head, collar and tail. The DNA is packaged in the polyhedral head.

Micrographs show bacteriophages on a surface and in a liquid. A diagram labels the head, collar, tail, baseplate, and tail fibers.

**Prions:**

- In the 1920's several cases of Creutzfeldt-Jakob disease was observed which causes a slow degenerative condition mentally, loss of motor function & death.
  - New Guinea natives got a similar disease, Kuru from cannibalism.
  - Mad cow disease is also a similar disease or scrapies in sheep.
- In 1992 Stanley Prusiner proposed a small infectious particle called a prion as a possible cause of the diseases mentioned.
- Characteristics: resistant to inactivation by heating. Not sensitive to radiation. Not destroyed by enzymes that digest DNA or RNA. Prions are sensitive to protein-denaturing agents such as phenol or urea.
- They resemble paper folded in on itself several times and are made of proteins. Prions are possibly formed from a mutation.

Micrographs show prions as small, irregular particles.

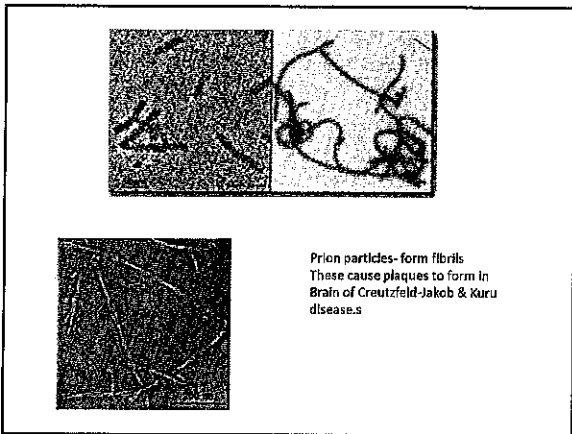
**Replication of a Virulent Phage:**

- Adsorption-** attaches to or adsorb onto the host cell surface. This is a chemical attraction, it requires specific protein recognition factors found in the tail fibers. They bind to the specific receptors on host cell.
- Penetration-** the enzyme *lysozyme* is present in the phage's tail which weakens the bacterial cell wall. The hollow tube (core) in the tail is forced to weaken the host's cell wall. DNA is pushed through into the host cell.
- Biosynthesis-** Phage uses the biosynthetic machinery of the host cell. The DNA takes over the host cell's genes and direct it to make only viral products.
- Maturation-** The host cell cytoplasm makes new capsids and the viral dsDNA molecule is packed into the viral head. Next a tail is attached to the tail and last, the tail fibers.
- Release-** lysozyme breaks down the cell wall allowing viruses to escape. The host cell is lysed. So, phages such as T4 are called virulent (lytic) phages because they lyse and destroy the bacteria they infect.
- Adsorption to burst time is on the average 20-40 minutes, with 50-200 new phages released from 1 bacterium.

**Abnormal- Cruetzfeldt Jakob Disease**      **Normal MRI Brain Scan**

The image shows two MRI brain scans. The left scan, labeled 'Abnormal- Cruetzfeldt Jakob Disease', shows a brain with a highly convoluted, irregular surface. The right scan, labeled 'Normal MRI Brain Scan', shows a brain with a smooth, regular surface.

Fig. 8. Head from MRI showing in the CJD brain sequence hyperintensity in the right caudate nucleus and frontal, temporal and parietal sulci.



CHAPTER 18

**Study Guide**

**Section 2: Viruses and Prions**

In your textbook, read about viruses and viral infection.

Match the definition in Column A with the term in Column B.

- | Column A   | Column B         |
|--|------------------|
| _____ 1. genetic material of a virus                             | A. virus         |
| _____ 2. where a virus attaches to a host cell                   | B. bacteriophage |
| _____ 3. nonliving particle that replicates inside a living cell | C. DNA or RNA    |
| _____ 4. outer layer of virus made of proteins                   | D. capsid        |
| _____ 5. nervous system disease                                  | E. AIDS          |
| _____ 6. a virus that infects bacteria                           | F. rabies        |
| _____ 7. a cell in which a virus replicates                      | G. host          |
| _____ 8. a virus that is spread through sexual contact           | H. receptor site |

Complete the table by checking the correct column(s) for each description.

Description	Lytic Cycle	Lysogenic Cycle
9. Viral genes are expressed immediately after the virus infects the host cell.		
10. Many new viruses are assembled.		
11. This cycle is preceded by a virus entering a host cell.		
12. Viral DNA is integrated into the host cell's chromosome.		
13. Viruses are released from the host cell by lysis or exocytosis.		
14. The viral genes can remain dormant for months or years.		

**Study Guide, Section 1: Bacteria** continued

In your textbook, read about prokaryote structure, identifying prokaryotes, and survival of bacteria.

Match the definition in Column A with the term in Column B.

- | Column A  | Column B         |
|---|------------------|
| _____ 9. part of the composition of the cell walls of eubacteria          | A. nucleoid      |
| _____ 10. dormant bacterial cell  | B. plasmid       |
| _____ 11. area of prokaryotic cell containing a large circular chromosome | C. peptidoglycan |
| _____ 12. small circular DNA in prokaryotic cell                          | D. endospore     |

Complete the table below by drawing each type of prokaryote.

Cocci	Bacilli	Spirochetes
13.	14.	15.

In your textbook, read about the ecology of bacteria.

Use each of the terms below only once to complete the passage.

- |             |                   |              |               |
|-------------|-------------------|--------------|---------------|
| antibiotics | bacteria          | decomposers  | disease       |
| nitrogen    | nitrogen fixation | normal flora | symbiotically |
| vitamin K   | yogurt            |              |               |

Most (16) \_\_\_\_\_ are beneficial. Some bacteria are (17) \_\_\_\_\_ that return vital nutrients to the environment. Certain types of bacteria use (18) \_\_\_\_\_ gas directly and convert this gas into compounds that plants can use. This process is called (19) \_\_\_\_\_. Some bacteria called (20) \_\_\_\_\_ live in and on the human body. *Escherichia coli* live (21) \_\_\_\_\_ in the gut of humans and produce (22) \_\_\_\_\_, which humans need for blood clotting. Many food products, such as cheese and (23) \_\_\_\_\_, are made with the aid of bacteria. Other bacteria make (24) \_\_\_\_\_. A small percentage of bacteria can cause (25) \_\_\_\_\_.

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