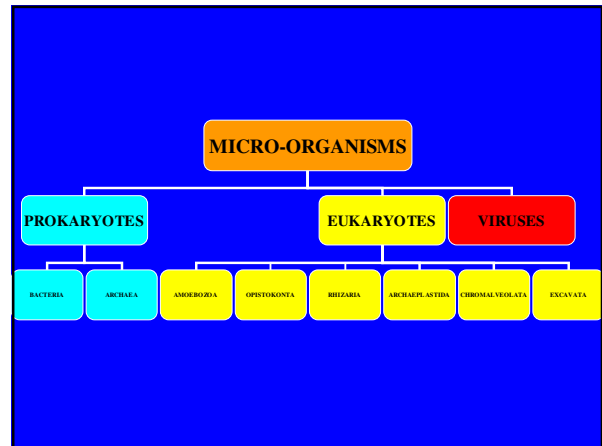


# BIODIVERSITY I

## BIOL 1051

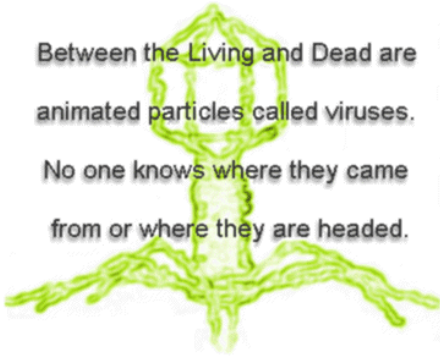
### What are Viruses?

Professor Marc C Lavoie  
 marc.lavoie@cavehill.uwi.edu



### What are Viruses?

Between the Living and Dead are  
 animated particles called viruses.  
 No one knows where they came  
 from or where they are headed.



### What are Viruses?

- 1. Viruses are very very small
- 2. Viruses are NOT cells.
- 3. Size and shape of viruses
- 4. Viral structures
- 5. Virus multiplication
- 6. Virus diversity
- 7. Viroids and Prions

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1. Viruses  
 are very  
 very small

Organism	Effect on body	Actual Size	Model Size	Shape
Poliovirus	Disease of digestive tract, brain, and spinal cord	20 nm (0.0002 mm)	2 cm	
Adenovirus	Disease of respiratory tract and digestive tract	50 nm (0.0005 mm)	9 cm	
Wheatie virus	Common	200 nm (0.0002 mm)	20 cm	
Bacteriophage	Usually, transfers genes from one organism to another through a process called biotechnology	60 nm (0.0006 mm)	6 cm	
Paramecium	Oversees metabolic important in the food chain	200 µm (0.2 mm)	200 m (more than two football fields)	
Cells of Paramecium	Lag like hairs	200 nm wide (0.0002 mm)	30 cm	
Staphylococcus	Causes food poisoning	0.5 µm (0.0005 mm)	0.5 m	
E. coli	Causes diarrhea and helps digestion	2.0 µm (0.002 mm)	2.0 m	
Human hair		0.2 mm wide	100 m	
Human red blood cell	Carries oxygen in our bodies	5.0 µm (0.005 mm)	50 m	

Figure 1.1 Microbe Reference Chart

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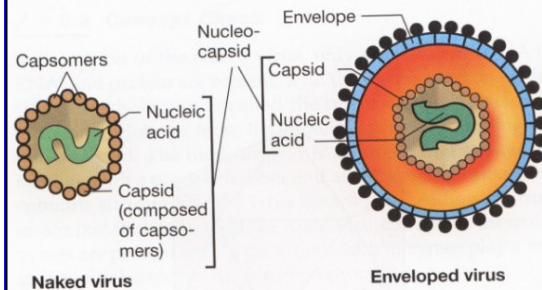
## 2. Viruses are NOT cells.

1. Obligate intracellular parasites
2. Small- filterable through bacteriological filters
3. Contain a **single type of nucleic acid**, either DNA or RNA
4. Contain a protein coat (the **capsid**) consisting of individual protein units (**capsomeres**)
5. May contain a host-derived lipid membrane (the **envelope**) through which may be inserted viral proteins (spikes or peplomers)
6. Multiply inside living cells by using the biosynthetic machinery of the host

## What are Viruses?

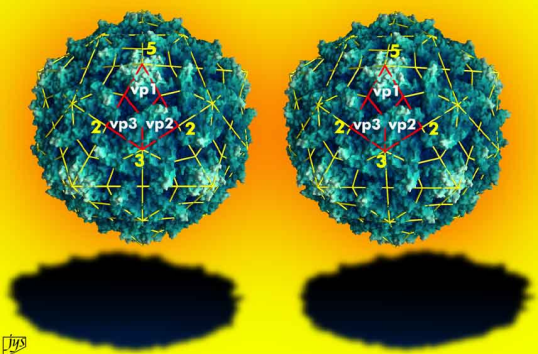
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## 3. Size and shape of viruses



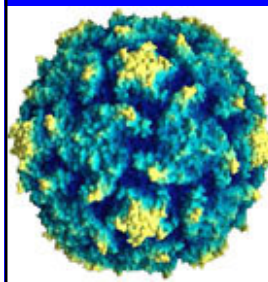
Icosahedral (20 faces) symmetry

## 1.3 Size and shape of viruses

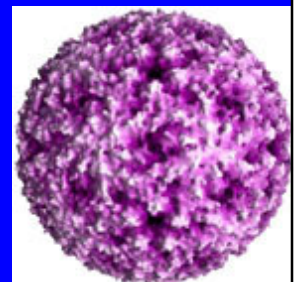


Poliovirus Type 1 (PDB: 2PLV) STEREOVIEW. X-Ray crystallography data by J.M. Hogle, M.Chow, D.J. Filman, Science 228: 159-165. Molecular surface rendering showing surface topography. Lighter blue surface colors depict prominent surface features, darker colors indicate surface crevices and canyons. Red lines outline one icosahedral protomer (vp1, vp2 and vp3) as indicated. vp4 is inside and not visible from the surface. Surrounding yellow numbers mark the icosahedral 5, 2, and 3-fold axes. The large protrusion just above the vp2 sign is the C-terminal arm of vp3. For more virus X-ray coordinates see www.rcsb.org or mmdb.scicpp.edu/viper. For downloadable images see also www.buochina.wisc.edu. Illustration by Dr. Jean-Yves Sironi, Institute for Molecular Virology, LMU-Munich.

## 3. Size and shape of viruses

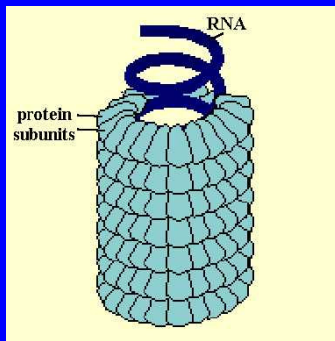


Poliovirus



Foot & Mouth Disease Virus (FMDV)

### 3. Size and shape of viruses

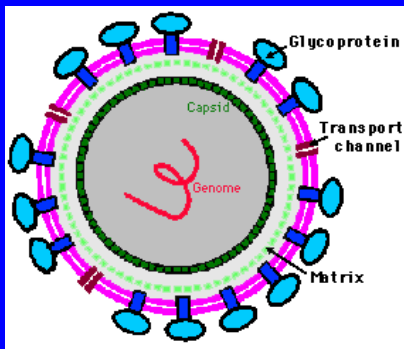


Helical symmetry

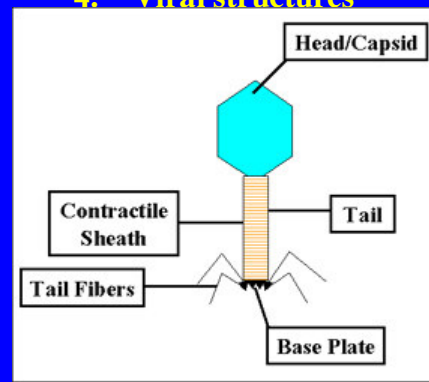
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### 4. Viral structures



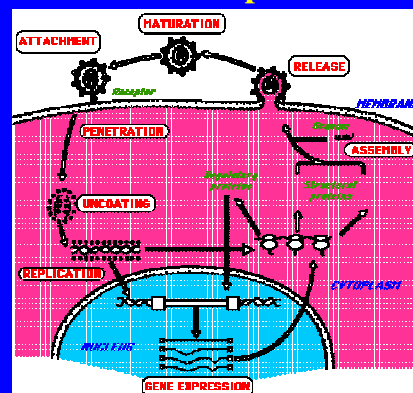
### 4. Viral structures



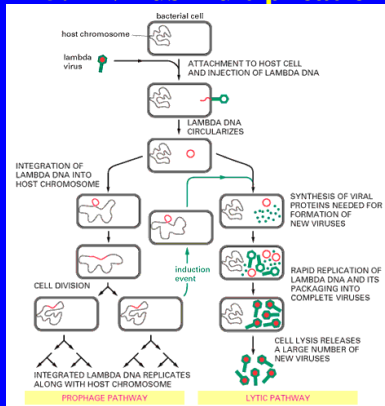
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### 5. Virus multiplication



## 5. Virus multiplication

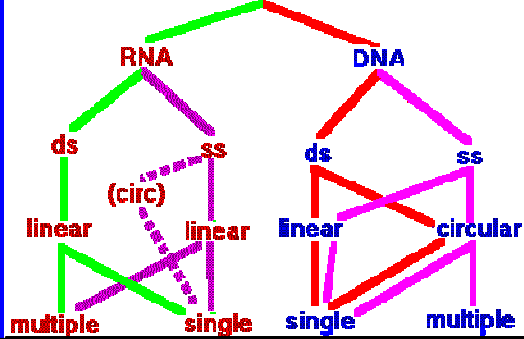


## What are Viruses?

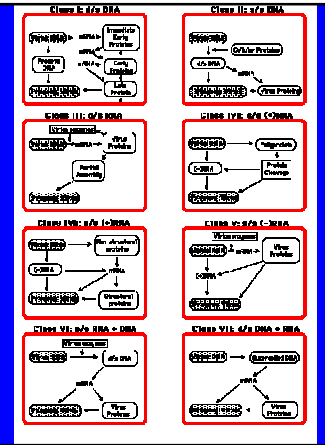
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## 6. Virus diversity

### Virus Genomic Nucleic Acids



## 6. Virus diversity (Baltimore classification)



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## 7. Viroids

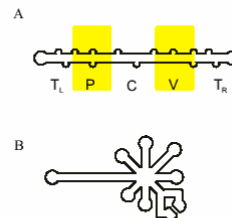


Figure 2: Schematic structure for the two groups of viroids. A) Rod-like structure proposed for the PSTVd-group showing the five domains (T<sub>L</sub>: terminal left, P: pathogenic, C: central, V: variable, T<sub>R</sub>: terminal right). B) Branched structure proposed for peach latent mosaic viroid (PLMVd).



## Lecture 4: What are Viruses?

- WEB sites:
- <https://library.thinkquest.org/13373/intro/intro.htm>
- <http://www.tulane.edu/~dmsander/WWW/224/Classifcation224.html>
- <http://www.bocklabs.wisc.edu/ed/genomes.pdf>
- <http://www.tulane.edu/~dmsander/WWW/224/Classifcation224.html>
- [http://www.uct.ac.za/microbiology/tutorial/other\\_autonomous\\_or\\_semi.htm](http://www.uct.ac.za/microbiology/tutorial/other_autonomous_or_semi.htm)
- [http://www.uct.ac.za/microbiology/tutorial/other\\_autonomous\\_or\\_semi.htm](http://www.uct.ac.za/microbiology/tutorial/other_autonomous_or_semi.htm)
- Russell Knightley Media
- [http://www.mad-cow.org/prion\\_evol.html](http://www.mad-cow.org/prion_evol.html)