Honors Biology
Carmel High/Dooner
Ch 19 Viruses

VIRUSES

- Viruses were not even discovered/studied until 1897 when the term started to be used; it means "poison" in Latin; although they could not be seen, in 1935 Stanley got some extract containing viruses to crystallize, and because living organisms do not crystallize, he concluded that viruses are **NOT ALIVE**
- We can only see them with Electron Microscopes; they differ widely in terms of size and structure; a typical virus **IS COMPOSED OF A CORE OF DNA OR RNA SURROUNDED BY A PROTEIN COAT**

- **THEY ENTER LIVING CELLS AND ONCE INSIDE USE THE "MACHINERY" OF THE INFECTED CELL TO PRODUCE MORE VIRUSES**

- **A VIRUS' PROTEIN COAT IS CALLED ITS CAPSID;** the capsid includes proteins that enable a virus to enter a host cell; capsid proteins of a typical virus bind to receptors on the surface of a cell and "trick" the cell into allowing it inside

- **Because viruses must bind PRECISELY to proteins on the cell surface and then use a host's genetic system, MOST VIRUSES ARE HIGHLY SPECIFIC TO THE CELLS THEY INFECT**

- **There are: 1) PLANT VIRUSES; 2) ANIMAL VIRUSES: 3) BACTERIOPHAGES**

- **Viruses that infect bacteria are called bacteriophages; although bacteriophages typically INJECT their DNA into the host cell, not all viruses invade a host cell in this manner; many animal viruses enter the host through ENDOCYTOSIS- the binding of the virus to the cell membrane, inducing the cell to take in the virus**

- **Once inside the host cell, the virus sheds its protein coat and either undergoes replication or becomes part of the host's DNA**

- **There are two methods of VIRAL REPLICATION inside the host cell:**

1) LYTIC INFECTION
2) LYSOGENIC INFECTION

- **<u>LYTIC INFECTION</u>: VIRUS enters the cell, makes copies of itself, and causes the cell to BURST("<u>LYSE</u>")**

- **<u>LYSOGENIC INFECTION</u>: the Virus integrates its DNA into the DNA of the host cell, and the viral genetic information replicates each time the host cell's DNA replicates; lysogenic viruses do not lyse the host cell right away- instead they remain inactive for a period of time and are called <u>PROPHAGES</u>**

- The host cell can replicate for many generations with the PROPHAGE embedded in its DNA, giving rise to many new cells that contain a prophage; **<u>WHEN CONDITIONS CHANGE</u>**, the virus can SWITCH from the LYSOGENIC CYCLE to the LYTIC CYCLE

- It is usually some kind of environmental change that causes the switch, such as a CHEMICAL CHANGE or RADIATION

- The lysogenic virus that causes chicken pox in a child can reactivate as "shingles" 60 years later when the child is a senior citizen!

<u>RETROVIRUSES:</u>

- Viruses which contain RNA instead of DNA as their gentic material; "retro" meaning they are copying there genetic info backwards; some types of viruses which can cause cancer in humans are retroviruses and HIV is a retrovirus

QUESTIONS: What role do viruses play in the biosphere? Are they evolving or devolving? What is their origin? What is their relationship to prokaryotic and eukaryotic cells?