

Section-2

Biodiversity

Chapter 5

Cellular Life

## Information

David Baltimore, a noble prize-winning biologist, devised the Baltimore classification system, which places viruses into one of seven groups, based on their mode of replication, and genome type.

## Science, Technology and Society Connections

- Describe the limitations of the vaccine for the common cold/flu virus: Although we can often refer to the causative agent of cold as "the cold virus" there are actually more than 200 viruses that cause cold. Developing a vaccine against the infections is not practical.

## Teacher's Point

Teacher would guide the students to:

- Make a list of names of five plant and animal viruses that have DNA or RNA.
- Draw labeled diagrams of bacteriophage, flu virus and HIV.

## Critical thinking

**Why antibiotics do not work against viruses?**

**Ans: Antibiotics** are useless against viral infections. This is because **viruses** are so simple that they use their host cells to perform their activities for them.

**Or second answer**

Most of the antibiotics act on ribosome and stop the process of protein synthesis in bacteria. Virus lacks ribosomes . therefore , antibiotics do not work against viruses.

### Teacher's Point

Teacher would guide the students to:

- Record the symptoms of flu in any individual.
- Make a list of names of at least five viruses in plants and animals that are specific for specific host.

### Science Titbits

Since the prophage contains genes, it can confer new properties to the bacteria. When a cell becomes lysogenized, occasionally extra genes carried by the phage get expressed in the cell. These genes can change the properties of the bacterial cell. This process is known as lysogenic conversation or phage conversation. Clostridium botulinum, a causative agent of food poisoning, makes several different toxins, 2 of which are actually encoded by prophage genomes.

**Q1. Who convinced the majority of biologists that infectious agents do indeed exist? What do you know about the idea of an infectious agent?**

**Ans:** The idea of an infectious agent that did not use nucleic acids and proteins together was considered impossible, but pioneering work by Noble Prize-winning biologist **Stanley Prusiner** has convinced the majority of biologists that such

agents do indeed exist. Prions and viroids are such agents which are acellular infectious particles like viruses but are even simpler and smaller than viruses.

### **Teacher's Point**

Teacher would guide the students to make list of the sequence involved in the lytic life cycle of a bacteriophage and life cycle of HIV.

### **Skills: Interpreting and Recording**

- Predict from the given data the incidence and prevalence of AIDS over period of next five months. HIV FACT SHEET NOVEMBER 2016

### **Global HIV Statistics**

- 18.2 millions people were accessing antiretroviral therapy (June 2016)
- 36.7 million people globally were living with HIV (end 2015)
- 2,1 million people became newly infected with HIV (end 2015)
- 1.1 million people died from AIDS-related illness (end 2015)
- 78 million people have become infected with HIV since the start of the epidemic (end 2015)
- 35 million people have died from AIDS-related illness since start of the epidemic (end 2015)

### **People living with HIV**

- In 2015, there were 36.7 million people living with HIV.

### **New HIV infections**

- Worldwide ,2.1 million people became newly infected with HIV in 2015.
- New HIV infections among children have decreased by 50% since 2010.
- Every year since 2010, around 1.9 million adults have become newly infected HIV.

## Skills: Interpreting and Recording

- Make a list of factors responsible for the spread of AIDS.
  1. Having unprotected sex
  2. Other sexually transmitted infections.
  3. Transfusion of contaminated blood and blood products.
  4. Contaminated syringes and needles.
  5. Injecting drugs.
  6. Unsafe piercings.
  7. Negligence in medical practice.
  8. Mother-to-child HIV risk.

### HIV/AIDS in Pakistan:

Nearly 100,000 people of Pakistan living with HIV/AIDS, but only 15,370 registered. The number of new HIV infections in Pakistan grew at an average of 17.6 percent per year between 2005 and 2015, making it the highest increase in the world. The highest number of 1,278 patients and HIV carriers were in Sindh, followed by 558 in Punjab, 522 in Islamabad, 468 in NWFP, 215 in Balochistan and 31 in Azad Kashmir.

Courtesy: The Express Tribune, Islamabad 12<sup>th</sup> May 2016 and The Dawn Islamabad 28<sup>th</sup> December 2016.

## Science Titbits

Hepatitis F virus (HFV) is a hypothetical virus linked to hepatitis. Several hepatitis F virus candidates emerged in the 1990s, none of these reports have been substantiated.

Another potential viral cause of hepatitis that is probably spread by blood and sexual contact was initially identified as Hepatitis G virus. There is very little evidence that this virus causes hepatitis, as it does not appear to replicate primarily in the liver. It is now classified as GB virus C.

### **Skills: Interpreting and Communication**

- Collect and compare the number of fatalities caused by hepatitis, herpes and polio combined with the total fatalities caused by AIDS.
- National AIDS Control Programme, Ministry of Health – Government of Pakistan. [www.nacp.gov.pk](http://www.nacp.gov.pk)
- Give reasons in favor of the statement "prevention is better than cure" and present the arguments in class.

### **Science, Technology and Society Connections**

- **Suggest way to rid human civilization of viruses.**  
Viruses are responsible for a number of sicknesses that all humans. Unfortunately, there is no cure for viruses. This means it is up to you to get rid of a viral infection. The best way to do this is to strengthen your immune system since it is the only thing capable of getting rid of viruses. Having a healthy diet of immune-boosting foods, taking vitamin supplements and practicing several other healthy living tips will create an immune system able to quickly rid the body of viruses.

### **Science, Technology and Society Connections**

- **Interpret how viral infections cause global economic loss.**  
Plant virus diseases may damage leaves, stems, roots, fruits, seed or flowers and may cause economic losses by reduction in yield and quality of plant products.

### **Activity**

- i. Correlate the social and cultural values of a country with prevalence of AIDS.
- ii. List the factors responsible for the spread of AIDS.

