

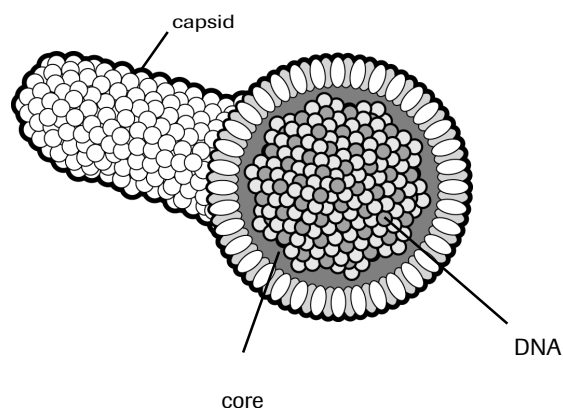
2.3 VIRUSES

SECTION 2.3 QUESTIONS

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Understanding Concepts

1. Most scientists do not consider viruses to be living organisms, and only living organisms are classified in taxonomy systems.
2. Many examples could be provided. DNA viruses cause smallpox, chickenpox, and mononucleosis. RNA viruses cause measles, mumps, the common cold, influenza, HIV/AIDS, and polio. Transmission in the above cases is by direct contact or airborne droplets. Hepatitis (RNA virus) can be spread through fecal contamination. A bite from an infected animal can cause rabies, another RNA virus.
3. Viral replication through the lytic cycle results in the release of many viruses within a period as short as 25–45 min. If the immune system can respond quickly to the viral infection, symptoms may pass quickly. If the virus requires a lysogenic cycle to replicate, symptoms of infection could take many days, months, or even years to appear.
4. Numeric prefixes and units appear in Appendix C1. Micro is 10^{-6} . Nano is 10^{-9} . Student scales should reflect this difference.
5. The hepatitis B virus appears to be tube-shaped with a wide end. The surface of the capsid appears scaly.



Applying Inquiry Skills

6. The Canadian Blood Services impounded all blood supplies collected during summer and fall 2002 because the blood could have been contaminated. Until a reliable test for West Nile virus is developed, the blood is potentially unsafe. West Nile virus replicates in birds. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then transmit West Nile virus to humans while biting to take blood. West Nile is an RNA virus and requires a lysogenic cycle to replicate. Infected individuals would not know they are carrying the virus and would not be screened for this during routine blood donation.
7. The number of AIDS deaths is lower in developed countries than in developing countries. Canada has one-tenth the population of the United States, but has a far lower fraction of AIDS deaths. Canada and the United Kingdom have approximately the same number of AIDS deaths. Education, sexual practices, and accuracy of reporting cause of death could account for the difference in numbers. The real limitation of this data is that it does not express AIDS deaths per 100 000 population.

Making Connections

8. There are direct and indirect costs to any illness. Doctors, nurses, and lab technicians spend a portion of their workday on flu-related cases while other medical problems wait to be diagnosed and treated. Education, awareness of preventative measures, vaccination of high-risk individuals, and good personal hygiene (including thorough hand washing) can reduce the incidence of influenza.
9. If MS is caused by a virus that requires a lysogenic cycle, a period of dormancy would reduce MS symptoms. Environmental factors such as exposure to sunlight or stress might provide a stimulus for the virus to end its period of dormancy, triggering the lytic cycle and resulting in the formation and release of new virus particles.

10. Fact sheet on hepatitis B virus (HBV):

Signs and Symptoms <ul style="list-style-type: none">– jaundice, fatigue, abdominal pain, loss of appetite, nausea, vomiting, joint pain– about 30% have no signs or symptoms– signs and symptoms are less common in children than in adults
Risk and Occurrence <ul style="list-style-type: none">– occurs when blood or fluids from an infected person enter the body of a person who is not immune (e.g., unprotected sex, sharing needles, needlesticks, passed from infected mother to baby during childbirth)– risk groups: persons with multiple sex partners or diagnosis of a sexually transmitted disease; men who have sex with men; sex contacts of infected persons; injection drug users; household contacts of chronically infected persons; infants born to infected mothers; offspring of immigrants from areas with high rates of HBV infection; healthcare and public safety workers; hemodialysis patients
Prevention <ul style="list-style-type: none">– hepatitis B vaccine is best protection– safe sex and safe drug use– blood test for hepatitis B if pregnant– avoid sharing personal care items that might contain blood or body fluids– do not donate blood, organs, or tissue if you have or had hepatitis B– consider the risks of tattooing or body piercing
Treatment <ul style="list-style-type: none">– HBV-infected individuals should be evaluated by their doctor for liver disease– three drugs have been licensed for treating chronic HBV, but cannot be used by pregnant women
Trends and Statistics <ul style="list-style-type: none">– number of new HBV cases has declined from 1980 to 2001; greatest decline among children and adolescents due to routine hepatitis B vaccination– highest incidence in people 20–49 years old
Connection between HBV and HIV <ul style="list-style-type: none">– person at risk for HBV infection might also be a risk for hepatitis C virus or HIV

2.4 BACTERIA

SECTION 2.4 QUESTIONS

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Understanding Concepts

1. Most organisms in kingdom Archaeobacteria thrive under extreme conditions that other organisms could not tolerate. Most live without oxygen. The thermophiles obtain energy by oxidizing sulfur and function in extremely hot environments. The methanogens live in volcanic sea vents and metabolize carbon dioxide to produce methane. The halophiles live in extremely salty environments and use sunlight for energy.
2. Archaeobacteria contribute to human society in the following ways: digestion of sewage and oil spills; alternate fuel source; cancer research; production of bioplastics; production of enzymes for food processing, perfume manufacture; pharmaceuticals; and enzymes used in molecular biology.
3. Classification of eubacteria according to shape, respiration, and nutrition: