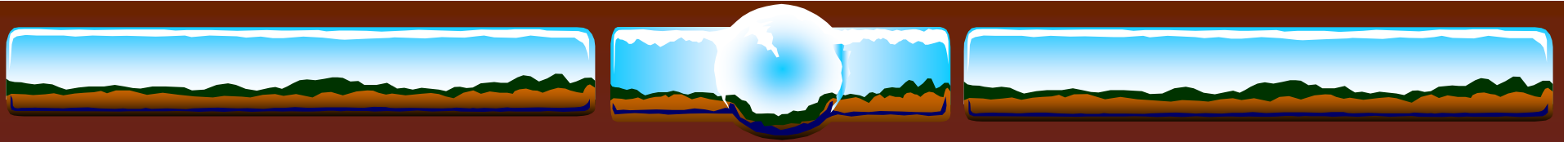


# What Causes Infectious Diseases

Chapter 28 Lesson 1



# Causes of Infectious Diseases

- ❖ Every infectious disease is caused by one of several types of small, microscopic organisms called *pathogens*.
- ❖ Most pathogens are **parasites**- *organisms that live in or on another organism and derive nourishment from it.*
- ❖ Among the forms pathogens can take are bacteria, viruses, rickettsias, protozoans, and fungi.



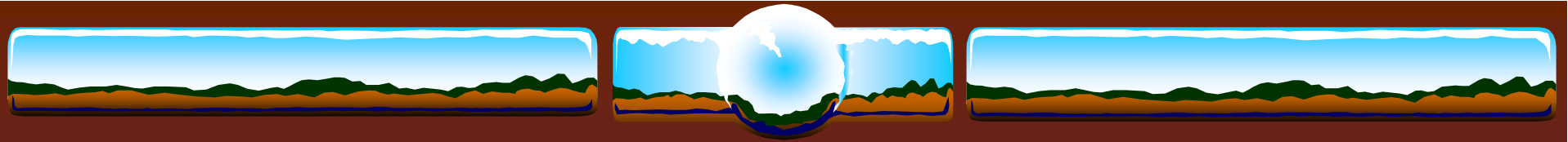
# Bacteria

- ❖ A single celled micro-organism, bacteria can live almost anywhere.
- ❖ Abundant in air, soil, and water.
- ❖ Some bacteria produce poisons that are harmful to human cells. If there are enough bacteria and a person is not immune, death results.
- ❖ When bacteria enter the body they multiply at a rapid rate through cell division.
- ❖ In the right environment, cell division can take place every 20 minutes, meaning after 15 hours, one bacteria can multiply into over 4 billion bacteria.
- ❖ In a healthy person, the body's immune system destroy most bacteria.



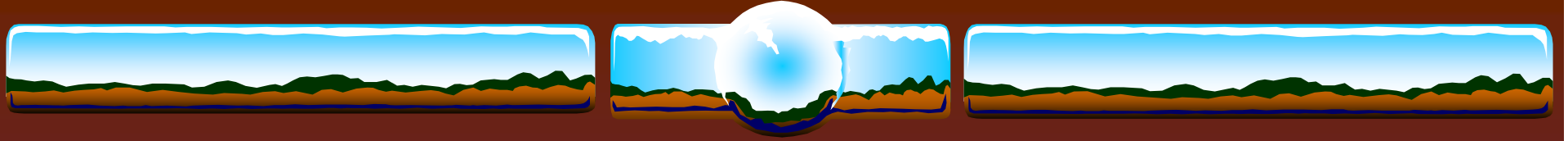
# Viruses

- ❖ **Virus-** *the smallest known type of infectious agent.*
- ❖ Viruses are about one-half to one-hundredth the size of the smallest bacteria.
- ❖ Viruses are not living cells, and must interject their genetic code into normal, healthy cells in order to survive and reproduce.
- ❖ These cells in which the viruses interjects its code are known as host cells.
- ❖ Viruses invade all forms of life including: birds, mammals, reptiles, and insects.
- ❖ Viruses are highly specific and only invade certain cells, which is why humans are immune to some animal viruses.
- ❖ Viruses usually run their course and are eventually killed by the immune system.



# Rickettsias

- ❖ Organisms that resemble small bacteria, but like viruses, are able to multiply only by invading the cells of another life form.
- ❖ Most rickettsias are found in the intestinal tracts of insects-notably fleas-as well as mice, ticks, and mites
- ❖ Rickettsias are passed on to humans through bites, or through feces deposited on the skin.
- ❖ Human diseases caused by rickettsias include typhus, and Rocky mountain spotted fever.



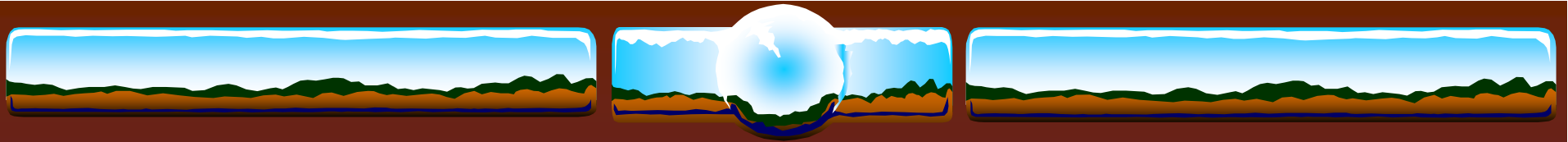
# Protozoans

- ❖ Single celled organisms that are larger than bacteria and have a more complex cell structure. Most are harmless, but about 30 different types cause disease in humans.
- ❖ Disease-producing protozoans are most common in tropical areas with poor sanitation.



# Fungi

- ❖ Simple organisms that cannot make their own food.
- ❖ Many are **saprophytes**- *organisms that feed off dead animals, insects, and leaves.*
- ❖ Fungi prefer dark, damp environments.
- ❖ The most common disease-causing fungi invade mainly deep tissues of the hair, nails, and skin.
- ❖ Ringworm and athlete's foot are the two most common fungal infections.



# How Infectious Diseases are Spread

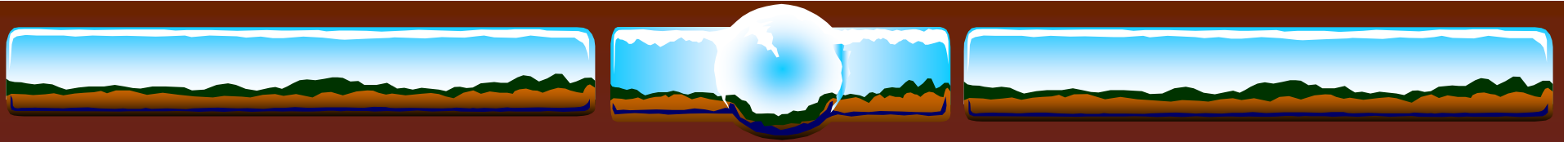
- ❖ **Transmission-** *the spread of infectious pathogens.*
- ❖ **Direct Contact-** pathogens may be spread when an uninfected person comes into physical contact with an infected person. STD's are transmitted that way. The human bite is another. A pregnant woman may also transmit an infection to her unborn child.
- ❖ **Indirect Contact-** Both bacteria and viruses can enter the body through the lungs if droplets-exhaled, coughed, or sneezed out by an infected person-are inhaled. The common cold, influenza, and tuberculosis are spread that way.





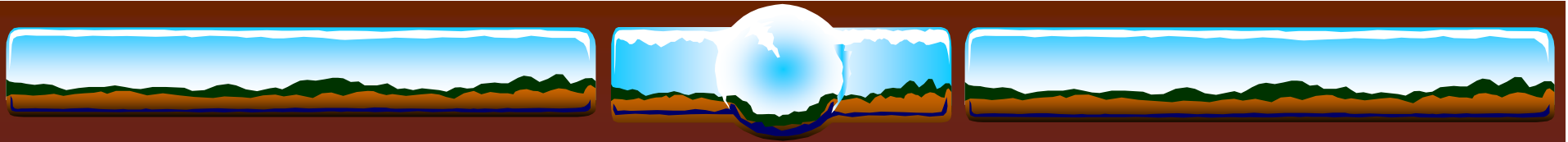
# Animals

- ❖ The bite of an infected animal can spread diseases such as rabies, which can be fatal.
- ❖ When a bloodsucking insect, such as a mosquito, ingests blood from an infected person or animal, the insect may take pathogens into its own body. When the insect then takes blood from an uninfected person, it injects some of the pathogens into that person's body, thus spreading the disease. Malaria is spread this way. These are most common in tropical regions.



# Contaminated Objects

- ❖ Certain pathogens are spread when an uninfected person touches objects that an infected person has used. These objects can include eating utensils, glasses, and toothbrushes. They also include needles used to inject drugs that are shared with another person.



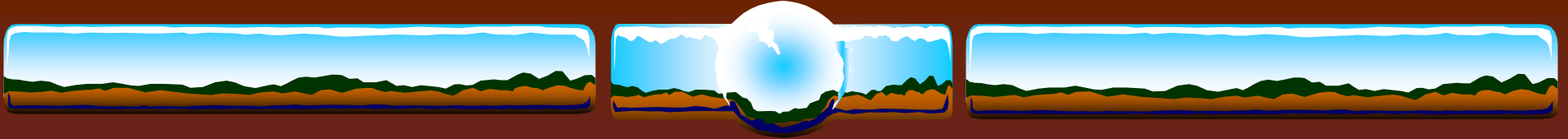
# The Environment

- ❖ Food, water, soil, and even the air we breathe contain potentially harmful pathogens. Some forms of infectious diseases are the direct result of human negligence, such as the careless disposal of infectious wastes from hospitals, which constitutes toxic dumping. This form of pollution can be deadly.
- ❖ Another way in which pathogens in the environment are spread is through careless handling of food, which is a main source of food poisoning.



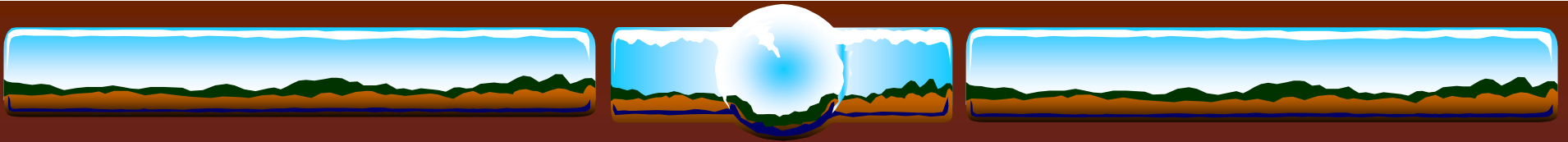
# How Your Body Defends Against Infectious Disease

- ❖ Pathogens are everywhere in numbers beyond comprehension. Because of this we would be constantly sick if not for **immunity**-*the body's natural defense against infection.*
- ❖ **The Immune Response**
- ❖ Because your body is exposed to countless pathogens on a daily basis, it is also constantly fighting them. Most of the time your body manages to stay free of infection because of your immune system. Your immune system includes two main types of defense:
- ❖ **The innate system**- *your inborn defenses-provides nonspecific resistance.*
- ❖ **The adaptive immune system**- *provides specific resistance.*



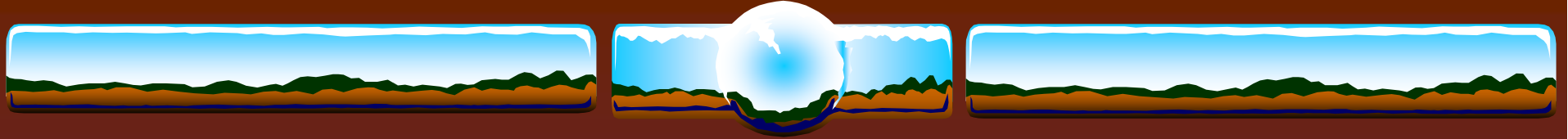
# Nonspecific Resistance

- ❖ **Physical Barriers-** your body's first line of defense against invading pathogens, includes your skin. The tough dead cells that make up the outer layer of skin form an effective barrier. **Mucus membranes-** *the soft, skinlike lining of many parts of the body-* in your mouth, nose, and bronchial tubes produce a sticky substance called mucus that trap pathogens. Some mucus membranes have cilia- tiny hairs that also help to trap pathogens.
- ❖ **Chemical Barriers-** enzymes in tears and saliva are chemical barriers that destroy bacteria. The acidic digestive juices of the stomach are chemical barriers. These juices destroy pathogens that are swallowed with food. Other chemical barriers cause body changes that help cells inside the body fight pathogens.



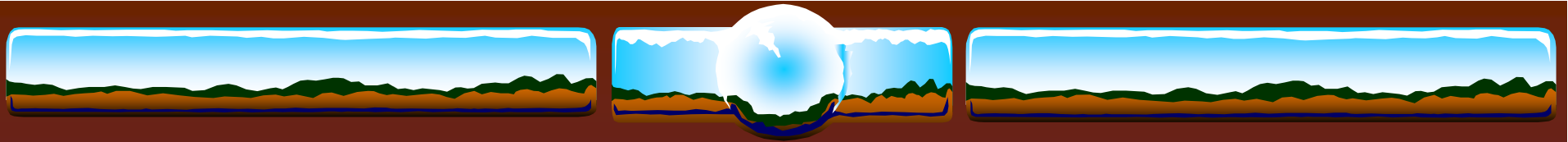
# Nonspecific Resistance

- ❖ **Body cells-** once pathogens break your bloodstream, certain types of white blood cells called **phagocytes**, travel through the blood and group together to destroy them. **Phagocytosis-** *the process by which phagocytes engulf and destroy pathogens.* **Neutrophils-** *the chief type of phagocyte involved in the process of phagocytosis.*
- ❖ **Inflammatory response-** If pathogens break through your body's outermost barriers, your body then goes into an inflammatory response. Chemical mediators are released causing the blood vessels to dilate and allow increased blood flow. This process continues until pathogens are destroyed. Once pathogens are destroyed, tissues can be repaired. Heat, redness, and swelling are a result of an increase in blood flow to the area.



# Specific Resistance

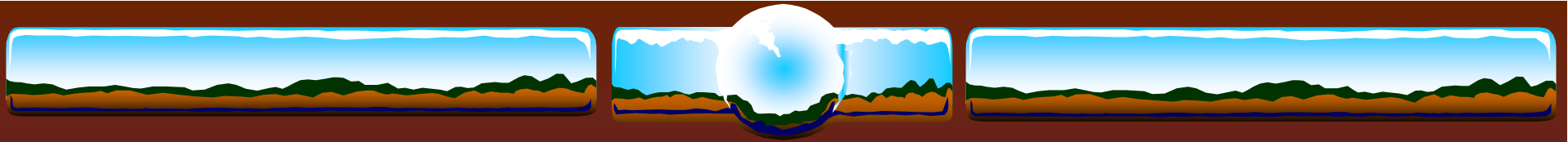
- ❖ The general response of your nonspecific defenses is not always enough to protect your body from disease. The adaptive immune system mounts specific attacks against particular types of pathogens. When this happens, another body defense goes to work in the form of cells called lymphocytes.



# Lymphocytes

- ❖ **B-Cells-** When B-cells encounter pathogens they are stimulated to enlarge and multiply. These B-cells turn into cells called plasma cells, which in turn produce **antibodies-** *proteins that destroy or neutralize invading pathogens*. The antibodies for a particular pathogen remain in your blood to become active if you encounter the specific pathogen again.
- ❖ **T-Cells-** There are two main groups of T-cells-killer cells and helper cells. Killer T cells are stimulated to multiply by the presence of abnormal body cells. They attach to these cells and release toxins that help destroy the abnormal cells. Helper T cells aid the activity of the B cells and killer T cells and control other aspects of the body's immune system.





# Care of the Immune Response

- ❖ The ability of your immune system to fight off invading pathogens varies, depending on a number of preventative factors. Perhaps the most important is good nutrition. When you fail to take in adequate nutrients, you can jeopardize your immune system. This is one reason poorly planned weight loss programs can make a person ill. Over exposure to UV rays also effects you immune response.