Agents of Disease

Mission 1-5 Mission Log

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VOCABULARY

- agar (A-gar) – a jelly-like substance made from seaweed that is used to grow bacteria and fungi.
- Anthelmintic (an-thel-MIN-tik) – A remedy that is destructive to worms and used for removing internal parasitic worms in animals and humans.
- antibiotic – a drug that inhibits the growth or kills an infectious agent. Antibiotics are effective against bacteria. Some of these antibacterial drugs can be used to fight certain protozoa and fungi as well.
- antibodies – molecules produced by a B cell in response to an specific pathogen. Antibodies bind to the pathogen and mark them for destruction.
- antifungal medication – a drug that kills or slows the growth of fungus.
- antiviral medication – Drugs that interfere with the ability of a virus to reproduce and cause disease.
- B cell – a white blood cell derived from the bone marrow. B cells are responsible for the production of antibodies.

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- bacterium (singular) bacteria (plural) – Very small, unicellular microorganisms that multiply by cell division. Cell is typically contained within a cell wall. Found as spherical, rod, and spiral shapes. Bacteria can spread through direct contact, indirect contact, food, water, air, and animals.
- bodily fluids – liquids associated with the body, such as blood, urine, saliva, and mucus from the nose.
- control – A standard of comparison for checking or verifying the results of an experiment. It is the part of the experiment in which no change is made.
- fungus (singular) fungi (plural) – an organism that has a cell wall and a cell membrane. They include molds (filamentous multicellular type) and yeast (unicellular spherical type). Fungi can spread through direct contact, indirect contact, water, air, and animals.

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- helminth – Multicellular worms that can be parasites in the intestine, blood, or body tissue. Helminths can spread though direct or indirect contact, food, water, and air.
- immune system – a complex network of specialized cells, tissues, and organs that defends the body against attacks by disease-causing microbes.
- immunity – resistance to a specific pathogen.
- infectious agents - Organisms or particles that cause an infectious disease. Bacteria,
- viruses, fungi, protozoa, helminthes, and prions are infectious agents.
- inoculate – a. introduce a substance into a person or animal to produce immunity; b. to pass on a disease from one organism to another by passing on the pathogen.

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- Lymphoid (lim-FOID) organs – organs concerned with the growth, development and deployment of white blood cells (lymphocytes). Examples include the spleen, thymus, lymph nodes, and appendix.
- Koch's Postulates - A set of rules for proving that a microorganism causes a specific disease.
- nonspecific defense – immune system response where a white blood cell constantly patrols the body, gobbling up many different types of pathogens.
- Pathogen (PATH-o-gen) – disease-producing agents.
- Penicillium italicum – Penicillium italicum is a type of fungus called a mold. Molds can cause
- plant diseases and food spoilage. Some molds can be used to make antibiotics.
- phagocytes (FAG-uh-sites)– cells that surround and gobble up invading microbes. These cells are used in the nonspecific defense by the immune system.

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- prion (PRAHY-on or PREE-on) – Extremely small particles that consist only of protein. Prions are resistant to heat and disinfectants and can only be spread through food.
- protozoan (singular) protozoa (plural) – Simple, single-cell organisms such as the amoeba and paramecium. Some have flagella or cilia and are capable of rapid movement.
- Protozoas can spread though food, water, and animals.
- specific defense – immune system response where white blood cells mount a directed attack against a specific pathogen.

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- virus – Extremely small particles that can only reproduce and survive by taking over a living cell. They consist of nucleic acid enclosed in protein. Viruses can spread though direct contact, indirect contact, food, water, air, and animals.
- white blood cells – also known as lymphocytes. Cells of the immune system involved in defending the body against pathogens.

MISSION ONE LOG

Directions: Record your observations by finding the clue that correctly matches each description. Write down the clues as you proceed through the mission.

Question	Answer
A. In the **Enemy Agents** challenge, you meet up with six different infectious agents. Name them. B Which type of infectious agent are a tapeworm, a roundworm, and a hookworm?	A. B.
A. In the **Koch's Concepts** challenge, why is it necessary to wash the orange before infecting it with the fungus? **B.** Who worked out the four-step procedure scientists use to determine if a specific germ causes a particular disease?	A. B.
A. In the **Germ Blaster** challenge, which types of infectious agents can be killed by antibiotics? **B.** Which pathogen has no treatment?	A. B.
A. n the **Infect-O-Rama** challenge, what are the ways in which viruses can be spread? **B.** Which two modes of transmission are common to five of the infectious agents?	A. B.
A. In the **Body Defender** challenge, what two body parts make up the first line of defense against pathogens? **B.** What is the name of the proteins made by B cells that can bind (connect) to a specific pathogen?	A. B.

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MISSION TWO LOG

Directions: Record your observations by finding the clue that correctly matches each description. Write down the clues as you proceed through the mission.

Questions
1. In the Arora II spacecraft, you learn of an outbreak of disease in Prokaryon. What type of disease is it?
2. In the CyNN news article, a news crawler appears at the bottom of the story. It tells of a fringe group who are demanding the closure of the refugee camp. What is the name of this fringe group?
3. Before arriving in Prokaryon, Eureka helps you review the Germ Theory first proposed by Louis Pasteur. What is this theory?
4. Eureka also shows you information on Joseph Lister, a surgeon who believed in the Germ Theory and therefore insisted that doctors do what?
5. In reviewing the infectious agents, you learn there are six types. Name four of these.
6. In the animation of bacteria, you learn that they are categorized according to shape--rod, sphere, or spiral. What are the three different shapes called?
7. Upon arriving in Prokaryon, Sirius shows you a graph of diarrhea cases. How does the graph indicate an epidemic is occurring?
8. In the lab, Beta shows you what the wiggling menace looks like. What is the name of the wiggling menace?
9. After looking at the fecal slides, Beta shows you an animation on cholera. Describe the type of stool found in cases of cholera. In what body part does V. cholera colonize or grow? What is the treatment for cholera?
10. After determining that the two possible sources of contamination are tomatoes and water, Eureka is reminded of a mysterious cholera epidemic in which maps were used to pinpoint a water pump as the source of contamination. Who was the physician who solved this mystery?
11. In order to verify the source of the contamination, a case control study is performed. In this study, a comparison is made between those who got sick with cholera and what other group of people?
12. What ends up being the source of contamination? The tomatoes or the lake water?
13. At the end, Beta and Sirius say that the epidemic can be stopped if the refugees do what two things?

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MISSION THREE LOG

Directions: Record your observations by finding the clue that correctly matches each description. Write down the clues as you proceed through the mission.

Question
1. When Dr. Xu is talking to Beta and Delta, she tells them that she thinks that a patient has smallpox. You then learn that smallpox is contagious. What does this mean?
2. When searching the apartment with Delta, you find out that smallpox was eradicated in the 20th century, but that smallpox could be used a weapon for _____.
3. When searching the apartment with Delta, you find a Traveler's Alert that tells you, that to avoid getting monkeypox, you should limit your contact with what animals?
4. In the lab you see an interactive model of a virus. What is the part of the virus called that contains instructions to make other virus?
5. In the lab, you see an interactive movie on viral reproduction. The process by which the virus obtains a new coating from the host cell's membrane is called: replication, docking, or release?
6. In the lab, you look at the viruses in Jeremy's blisters with Beta. His blister look similar to those a person would get from _____.
7. When Alpha is in the lab he says that Dr. Xu has prevented anyone from entering or leaving the hospital. What is this called?
8. After the dissection of the robospider, information is released which tells you who created the first vaccine. Who was it?
9. In the information that is released from the robospider, you learn that a pathogen from mild disease can protect some one against smallpox. What is the name of this disease?
10. After making the smallpox vaccine, you dip a special needle into the vaccine to vaccinate someone. What is the name of this needle?

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MISSION FOUR LOG

Directions: Record your observations by finding the clue that correctly matches each description. Write down the clues as you proceed through the mission.

Question
1. In the game Vectorama, record two of the matches you make and list the disease the vector transmits.
2. How many people die each year from malaria?
3. Match the achievement to the scientists: a. Discovered that a mosquito carried a parasite that caused disease b. Discovered that red blood cells had a one-celled organism living in them c. His experiments proved that Anopheles mosquitoes can carry the malaria parasite
4. What is unique about mosquitoes that bite?
5. In Plasmodia Invaders, the malaria parasite invades the liver and then destroys red blood cells. If too many red blood cells are destroyed, the patient can get _____.
6. In Immune System Defenders, B-cells make special chemicals called _____ that recognize a _____ _____.
7. “Phagocyte” means _____ _____ .
8. The immune system causes the body to respond to the flood of toxins released by_____.
9. What do anti-malarial drugs do to fight the disease?
10. How did Eureka escape?

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MISSION FIVE LOG

Directions: Record your observations by finding the clue that correctly matches each description. Write down the clues as you proceed through the mission.

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Question
NCDC HEADQUARTERS
1. _____ are diseases that can be passed from animals to humans.
2. Match each disease to the pathogen that causes it. 1. rabies 2. ringworm 3. mad cow 4. anthrax
3. List two of the causes for the increasing number of zoonotic diseases.
BIODEFENCE RESEARCH FACILITY
4. List three of the four “Category A” pathogens that are zoonotic.
5. Match each type of anthrax with the organ(s) it affects. a. Cutaneous Anthrax b. Gastrointestinal Anthrax c. Pulmonary Anthrax
NEUROPOLIS UNIVERSITY
6. After handling any animal, including your pets, you should always _____.
7. True or False: You can catch a zoonotic disease from unwashed vegetables.
BIOSAFETY LEVEL 4 LAB
8. Why do researchers tape their gloves and socks to their BSL4 coveralls?
FARM
9. What did the Japanese use to spread plague infected fleas over China before World War II?
10. From where did the terrorist get the anthrax bacteria?

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