

# Microorganisms and fungi

[Literature](#), [Russian Literature](#)



Microorganisms and Fungi Bacteria and Viruses Viruses Vocabulary virus: A nonliving, infectious particle composed of a nucleic acid and a protein coat; it can invade and destroy a cell. pathogen: A virus, microorganism, or other substance that causes disease; an infectious agent. capsid: A protein sheath that surrounds the nucleic acid core in a virus. envelope: A membrane-like layer that covers the capsids of some viruses. glycoprotein: A protein to which carbohydrate molecules are attached. bacteriophage: A virus that infects bacteria. lytic: The cycle of a viral infection, replication, and cell destruction. provirus: Viral DNA that has attached to a host cell's chromosome and that is replicated with the chromosome's DNA. lysogenic: Viral replication cycle in which the viral genome replicates without destroying the host cell. prion: An infectious particle that consists only of a protein and that does not contain DNA or RNA. Direct Instruction - Running Time: 16 min 43 sec Viruses -Composed of nucleic acids enclosed in a protein coat -Smaller than the smallest bacterium -Non'living -Only characteristic of life is reproduction in a host cell -Pathogens -Agents that cause disease Discovery of viruses -Tobacco mosaic virus (TMV) -First virus identified -Mayer, Beijerinck, Ivanovski, and Wendell Stanley -Chemical rather than an organism Viral structures -Capsid -Protein coat -Envelope -Envelope surrounding membranes -Glycoproteins -Proteins with attached carbohydrates -Bacteriophage -Viruses that infect bacteria Viral reproduction -Two main ways -The lytic cycle -The lysogenic cycle -In both cases the virus must infect a host cell Lytic cycle -Cycle of viral infection, reproduction, and cell destruction Lysogenic cycle -Virus replicates without destroying the host cells Host cell specificity -Viruses originated when fragments of host genes

escaped or were expelled from cells -As many viruses as there are organisms  
Structure of HIV -An enveloped virus -Composed of two molecules of single-stranded RNA  
How HIV infects cells -Attachment -Glycoproteins on the surface of the virus fit human cell surface receptors (CD4) -Lymphocytes - Macrophages -Certain cells in the brain -Replication -HIV capsid comes apart and release its viral RNA and reverse transcriptase to make DNA template which integrate into the host's DNA  
AIDS -After the initial infection, HIV continues to replicate and mutate -HIV glycoproteins recognize a new co-receptor -Found on subset of lymphocytes, called T-cells -reproduces in T-cells and destroys them -Increases number of virus particles in the blood - Infects other T cells that block bodies immune system -Immune system is unable to defend against infection  
Viral diseases -Emerging viruses -Newly recognized that have reappeared or spread to new areas -Prions -Composed of proteins but have no nucleic acid; pathogens; mad cow disease -Viroids - Single strand of RNA (no capsid) -Disease agents in plants -Cucumbers, potatoes, avocados, and oranges  
Important viral diseases -AIDS -Immune system failure -Sexual contact, contaminated blood, or contaminated needles -Common cold -Sinus congestion, muscle aches, and coughs - Inhalation direct contact -Ebola -High fever, uncontrollable bleeding -Body fluids -Hepatitis A -Flulike symptoms, swollen liver, yellow skin - Contaminated blood, food, or water -Hepatitis B -Flulike symptoms, swollen liver, painful joints, can cause liver cancer -Sexual contact, contaminated blood, contaminated needles  
Journal Activity

----- Evaluate the argument that emerging viruses are new viruses. Emerging viruses are new viruses because they are

infecting something different than the original virus and they may even do something different. Plus if the virus is reappearing then that means the virus is new because it was supposed that the virus had disappeared.

Lab Lecture - Running Time: 3 min 23 sec Lab Assessment Answers

- How many cells have been killed by the virus in the image below? a. 7
- What component of a virus is injected into the infected cell? b. the nucleic acid
- Suppose that one virus infects one cell, and 300 minutes later 100 cells are dead (experienced lysis) due to viruses. Which of the following is most likely to describe when lysis occurred for those 100 cells? b. Lysis occurred for 30 cells in the first 150 minutes and for 70 cells in the last 150 minutes.

Practice / Homework Answers

- Viruses are not considered to be living organisms, but they are still studied as part of biology. Explain. Viruses are active inside living cells, making viruses an important part of the study of biology. Although viruses contain genetic material and can evolve as this material changes over time, they are not considered living because they are not cellular, cannot make their own protein, and cannot use energy in metabolic processes.
- A new disease has suddenly appeared, and scientists are trying to determine whether the disease agent is a virus or a bacterium. They collect the following information:
  - The disease can be transmitted through the air.
  - The disease agent is too small to be seen under a compound microscope.
  - There are no known antibiotics that are effective against the disease.
  - The genetic material of the disease agent is DNA.
  - The disease agent cannot be cultured using any known culture medium.Is the disease agent most likely a bacterium or a virus? Explain your answer. The disease agent is most likely a virus. Like bacteria, many viruses can be transmitted

through the air. Almost all viruses are too small to be seen under a compound microscope, although many bacteria are also too small to be seen under a compound microscope. Antibiotics are ineffective against viruses, while there are antibiotics that are effective against most bacteria. The genetic material of viruses may be DNA or RNA, and the genetic material of bacteria is always DNA. Viruses cannot be cultured on artificial media, while most bacteria can be cultured. Facts 2, 3, and 5 provide the most significant information indicating that the disease agent is a virus.

3. How does HIV infect immune cells? HIV first attaches to macrophages and lymphocytes at their CD4 receptors. The virus enters macrophages by also binding to CCR5 receptors. Later, when AIDS develops, the random mutations that the virus undergoes eventually allows it to recognize different receptors on the surface of lymphocytes. This allows the virus to enter and replicate inside of lymphocytes as well as macrophages.

4. Identify the different types of viral replication in the diagram. The lysogenic cycle is represented in portion A. The lytic cycle is represented in portion B.

5. Explain why viruses are not considered to be living. Viruses are segments of nucleic acids contained in a protein coat. Because viruses do not grow, do not maintain homeostasis, and do not metabolize, biologists do not consider viruses to be living.

6. Describe the events in steps D-F in the diagram above. In phase D, the viral DNA enters the lytic cycle and begins to replicate. In step E, new viruses are made before being released when the cell breaks open in step F.

7. Describe what is happening in steps A-C of the diagram above. In step A and B, a viral phage finds and attaches to a host cell. In step C, the phage injects its genetic material into the host cell.

8. How was the tobacco mosaic virus

discovered? The tobacco mosaic virus was discovered when scientists searching for the cause of the disease filtered all of the bacteria from the sap of infected plants. The scientists discovered that the filtered sap out still infect other plants, so they knew that the infectious agent was smaller than bacteria. At this time, scientists thought that the newly discovered viruses were tiny cells. However, in 1935, Dr. Stanley crystallized purified virus and discovered that they were more like chemicals than cells.

9. What does the above figure represent? This is a diagram of the lytic cycle.

10. Compare and contrast the lytic and lysogenic cycles. Both the lytic and lysogenic cycles are methods of viral replication. Both begin with attachment of the virus to a host cell and injection of genetic material into the cell. From here the cycles diverge. In the lytic cycle, the viral genetic material takes over the reproductive material of the cell. The viral genetic material is copied rapidly and new viruses are produced. The host cell then breaks open and releases the new viruses. In the lysogenic cycle, the viral genetic information is integrated into the host's DNA. The host cell then divides normally. This can occur for several rounds of cell division.

Quiz Answers Bacteria Vocabulary

pilus: A short, thick appendage that allows a bacterium to attach to another bacterium.

bacillus: A rod-shaped bacterium.

coccus: A sphere-shaped bacterium.

spirillum: A spiral-shaped bacterium.

capsule: In mosses, the part that contains spores; in bacteria, a protective layer of polysaccharides around the cell wall.

antibiotic: A substance that can inhibit the growth of or kill a microorganism.

endospore: A thick-walled protective spore that forms inside a bacterial cell and resists harsh conditions.

conjugation: Form of sexual reproduction in which paramecia and some prokaryotes exchange

genetic information. anaerobic: Chemical reactions that do not require the presence of oxygen. aerobic: Chemical reaction that requires the presence of oxygen. Direct Instruction - Running Time: 12 min 45 sec Bacterial structure

1. Internal compartmentalization -Prokaryotes without a cell nucleus -No internal compartments
2. Cell size -Mostly 1  $\mu$  and 5  $\mu$  in size - $\mu$  means micrometer
3. Multicellularity -All bacteria are single-celled -Mat form strands
4. Chromosomes -Consists of a single cellular piece of DNA
5. Reproduction - Binary fission -One cell pinches into two cells
6. Flagella and pili -Composed of a single fiber protein that spins like a corkscrew to move the cell -Allows the bacteria to attach to surfaces or to other cells
7. Metabolic diversity -Can perform both anaerobic and aerobic processes

Bacterial Structure -Bacterial cell shapes -Bacillus -Rod-shaped -Coccus -Round-shaped -Form clusters - Spirillum -Spiral-shaped -Capsule -Outside the cell wall and membrane -Gel-like layer -Cell walls -Antibiotics -Chemicals that interfere with the life processes in bacteria -Endospores -Thick-walled -Surround their chromosomes and cytoplasm when exposed to harsh conditions -Pili -Enable bacteria to adhere to surface of sources or nutrition (skin) -Conjugation - Process in which two organisms exchange genetic material

Obtaining energy -Photosynthesizers -Significant fraction of world's photosynthesis is carried on by bacteria -Anaerobic -Without oxygen -Chemoautotrophs -Obtain energy by removing electrons from inorganic molecules like ammonia - Heterotrophs -Most bacteria -Together with fungi-principal decomposers - Aerobic -Live in the presence of oxygen Pathogenic bacteria -Bacteria can metabolize their host -Secrete enzymes that break down complex organic structures to obtain their nutrients -Bacterial toxins -Secrete poisonous

compounds into their environment -Biowarfare -Deliberately exposing people to biological toxins or pathogens such as bacteria or viruses Important bacterial diseases -Anthrax (respiratory) -Fever, severe difficulty breathing - Bacillus anthracis -Inhalation of spores -Bubonic plague -Fever, bleeding, lymph nodes that form swellings called buboes, fatal -Yersinia pestis -Bite of an infected flea -Cholera -Severe diarrhea and vomiting; often fatal if not treated -Vibrio cholerae -Drinking contaminated water -Lyme disease -Rash, pain, swelling in joints -Borrelia burgdorferi -Bite of an infected tick Antibiotics -Antibiotic-resistant bacteria -Antibiotic misuse -Use prescription full term -Multiple-antibiotic resistance Importance of bacteria -Food and chemical production -Mining and environmental uses of bacteria Journal Activity ----- How does the growth of

antibiotic resistance in bacteria support the theory of evolution by natural selection? It supports the theory of evolution by natural selection because the bacteria that does survive will reproduce and after some generations the bacteria would develop a trait that helps it to withstand the antibiotic.

Practice / Homework Answers 1. Describe the process by which a bacteria cell moves itself. Bacteria cells use a flagella, a single fiber protein which looks like a tail. This appendage spins like a corkscrew to move the cell. 2. What are the three different ways that bacteria can obtain energy?

Photosynthesizers get their energy from the sun. Chemoautotrophs get their energy by removing electrons from chemicals. And heterotrophs must get their energy from other organisms. 3. How is cholera spread? How is botulism spread? Cholera is spread through contaminated drinking water. Botulism is spread through contaminated food. 4. What ecological role do



many heterotrophic bacteria fill? Heterotrophic bacteria are some of the principle decomposers of organic matter. 5. What are the major differences between bacteria and eukaryotic cells. The major difference between bacterial and eukaryotic cells is that bacteria are prokaryotes and lack a nucleus. Bacterial DNA is in the form of a single circular chromosome. Bacteria range in size from 1- 5 $\mu$ m. Bacteria are all single-celled and reproduce through binary fission. They can perform both aerobic and anaerobic respiration and have flagella and pili. 6. Some bacteria are harmful to humans. Describe two different ways that bacteria can negatively affect people. Some bacteria actually begin to metabolize their hosts. Digestive enzymes begins to break down host cells and tissues. Other bacteria produce toxins that can poison their host. 7. What are some ways in which bacteria can benefit people? Bacteria are important in the formation of certain foods. They are also used in mining and bioremediation (using bacteria to clean up the environment). In addition, bacteria that colonize different places in your body out compete other bacteria that may be harmful. 8. How do bacteria become resistant to antibiotics? Individual bacteria do not become resistant to antibiotics. Populations of bacteria become resistant when individuals with a mutation that confers antibiotic resistance are strongly favored by selection when a population is treated with an antibiotic. Usually this occurs when an antibiotic treatment ended prematurely, so that not all of the bacteria are killed. 9. Antibiotics are generally effective against bacterial infections but cannot be used to treat viral infections. Why is this the case? Antibiotics work by interfering with cell wall formation or cellular processes such as protein synthesis. Some antibiotics can cause disruption of the cell

membrane. All of these actions can negatively affect the survival of bacteria. However, since viruses do not undergo cellular processes, they are not influenced by the actions of antibiotics. Thus, antibiotic treatment is

ineffective against viral infections. 10. What are endospores and when might they form? In harsh conditions such as drought, food storage, or extreme temperature, some bacteria can form endospores: thick walls around their chromosomes and a small amount of cytoplasm. This will allow the bacteria to survive until conditions improve. Quiz Answers Topic Test Topic Test

Review Answers Topic Test Answers Protists The Kingdom Protista

Vocabulary protist: Diverse group of multicellular or unicellular eukaryotes that lack complex organ systems and live in moist environments; they cannot be classified as an animal, plant, or fungus. Direct Instruction -

Running Time: 2 min 38 sec Protist -Kingdom Protista -Eukaryotes that are not a member of the kingdoms Plantae, Animalia, or Fungi -Diverse group of many single celled organisms; some have many cells yet still resemble unicellular organisms. Evolution of protists -Protista -" Very first" -First eukaryotic organisms on Earth - ~1. 5 bya -Early forms of mitochondria and chloroplasts Classification of protists -Classify according to the way they obtain nutrition -Heterotrophs -Animal-like -Producers -Plant-like -

Decomposers -Fungus-like Journal Activity Describe the evolution of protists.

Protists were the very first eukaryotic organisms on Earth which was about 1. 5 billion years ago. They were also the early forms of mitochondria and chloroplasts. So they were first early eukaryotes then they developed into more complex structures. Practice / Homework Answers Quiz Answers

Animal-like Protists: Protozoans Vocabulary pseudopod: Temporary projection

of cytoplasm, or a "false foot," used by some protists for feeding or movement. amoeboid movement: Type of locomotion by amoebas. food vacuole: Small cavity in the cytoplasm of protists that temporarily stores food. cilium: Short, hairlike projection similar to a flagellum; produces movement in many cells. trichocyst: Small, bottle-shaped structure used for defense by paramecia. macronucleus: The larger of a ciliate's two nuclei; contains multiple copies of most of the genes that the cell needs in its day-to-day existence. micronucleus: The smaller of a ciliate's two nuclei; contains a "reserve copy" of all the cell's genes. gullet: Indentation in one side of a ciliate that allows food to enter the cell. anal pore: Region of the cell membrane of a ciliate where waste-containing food vacuoles fuse and are then emptied into the environment. contractile vacuole: Cavity in the cytoplasm of some protists that collects water and discharges it from the cell. Direct Instruction - Running Time: 5 min 52 sec Zooflagellates -Swim using flagella -Phylum Zoomastigina -Absorb food through their cell membranes -Lakes and streams -Absorbs nutrients from decaying organic material -Some live in other organisms -Reproduce asexually -Mitosis and cytokinesis -Reproduce sexually -Meiosis and cytokinesis Sarcodines - Animal-like protists -Use pseudopods for feeding and movement -Pseudopods -Move via temporary cytoplasmic projections -Amoeboid movement -When the cytoplasm of the cell streams into the pseudopod -Food vacuole -Small cavity in the cytoplasm that temporarily stores food Ciliates -Cilia -Short hairlike projections similar to flagella -Used for feeding and movement - Internal anatomy -Trichocysts -Small bottle-shaped structures used for defense -Macronucleus -"Working library" of genetic materials -Micronucleus

-Reserve copy of cell's genes -Gullet -Reservoir for food -Food forced into food vacuoles -Pinches off; lysosomes; digestion -Anal pore -Waste materials -Contractile vacuoles -Cavities in the cytoplasm that are specialized to collect water; maintains homeostasis -Conjugation -Under stress -Allows them to exchange genetic material with other organisms Sporozoans -Do not move on their own -Parasitic -Live within host cell -Worms, fish, birds, and humans -Reproduce by sporozoites Animal-like protists and disease -Malaria -The sporozoan Plasmodium is carried by the female Anopheles mosquito - Other protistan diseases -Trypanosoma Zooflagellates -African sleeping sickness -Entamoeba -Amebic dysentery -Giardia -Produces tough microscopic cysts; diarrhea Ecology of animal-like protists -Some living symbiotically within organisms -Recycle nutrients by breaking down dead organic matter -Live in seas and lakes Journal Activity

----- Compare animal-like protists that have flagella to those that have cilia. Protists with flagella will move by spinning the flagella and the protists with the cilia use the cilia to move and eat because the cilia is hair-like so the protist can use it to do more things. This means that the flagella cannot do as much as the cilia can because of the structure of them. Practice / Homework Answers 1. Structure A opens to the outside of the organism shown in the figure above. How is the structure of A related to its function in the organism? Structure A traps food particles in the organism's environment, allowing them to enter the organism's body. 2. If the structure labeled D in the figure above were to malfunction, what effect would this likely have on the organism? The organism likely could not move normally through its environment. 3. According to the figure above, what has

occurred up to and including Step B? A mosquito has picked up the protist and, in turn, injected it (in the form of sporozoites) into a human host. The sporozoites have started to grow in the human liver. 4. If the structure labeled B in the figure above were to malfunction, what effect would this likely have on the organism? Excess water likely would build up inside the organism. 5. What is the serious human disease whose pathway of infection is illustrated in the figure above? The disease is malaria. 6. According to the figure above, what is occurring in Steps C, D, and E? The protists infect red blood cells and ultimately cause them to burst. 7. Identify and briefly explain the process by which paramecia exchange genetic material between individuals. Paramecia exchange genetic material during the process of conjugation. During conjugation, two paramecia attach themselves to each other. Meiosis of their diploid micronuclei leaves four haploid nuclei. Three of these disintegrate, and the remaining one divides. One of the pair of micronuclei is exchanged with that of another individual, making each organism in the conjugating pair genetically identical. 8. Considering the nature of the animal that carries the protist shown in the figure above, in what kinds of environments would this disease be most common? Malaria would be most common in environments where the mosquito that carries the protist is common. Some students may know that malaria is common in tropical environments. 9. How does the structure labeled C in the figure above help the organism in its day-to-day existence? Structure C is a “working library” of genetic information, which contains multiple copies of most of the genes that the organism uses for its day-to-day existence. 10. How do sporozoans differ from other protists in terms of movement?

Members of the phylum Sporozoa do not move on their own. Quiz Answers

Plantlike Protists: Unicellular Algae Vocabulary accessory pigment: A compound other than chlorophyll that absorbs light at wavelengths other than these of chlorophyll. eyespot: Group of cells that can detect changes in the amount of light in the environment. pellicle: Cell membrane in euglenas. phytoplankton: Population of algae and other small photosynthetic organisms found near the surface of the ocean that form part of plankton.

Direct Instruction - Running Time: 9 min 7 sec Chlorophyll and accessory pigments -Chlorophyll and accessory pigments allow algae to harvest and use the energy from the sunlight Accessory pigments -The leaves of most green plants also contain one or more other pigment types, known as accessory points -The accessory pigments include chlorophyll b, which is dark to olive green in color, the carotenes, which are orange, and the xanthophylls, which are yellow Euglenophytes -Contain two flagella -No cell wall -Ponds and lakes - ~50 um in length -Eyespot -assists in finding sunlight to power photosynthesis -Pellicle -Intricate cell membrane -Reproduce asexually by binary fission Chrysophytes -Diverse group that have gold colored chloroplasts -Stored food in the form of oil rather than starch - Reproduce both asexually and sexually -Most solitary -Some form colonies

Diatoms -Most abundant and beautiful organisms in the world -Produce thin, delicate cell walls rich in silicon (Si) -Main components in glass

Dinoflagellates - ~Half are photosynthetic -The other half are heterotrophs - Two flagella -Reproduce asexually by binary fission -" Fire plants" - Luminescent property -Dinoflagellates form a major part of primary planktonic production in oceans -Most dinoflagellates have a somewhat

complex life cycle involving several steps, both sexually and asexually motile and non-motile -Even though they are important producers and a key component to the food chain, dinoflagellates are also known for producing deadly toxins, especially when they are present in large numbers -They can not only kill a large range of marine species, but can also impart fatal toxins into several species, especially shellfish Ecology of unicellular algae - Phytoplankton -Photosynthetic organisms found near the surface of the ocean - ~1/2 the photosynthesis found on the Earth -Sources of nourishment for shrimp to whales -Indirectly eaten by humans algal blooms -

Dinoflagellates that grow rapidly in blooms -Red tides -Toxin and deadly

Journal Activity ----- Explain what chlorophyll

and accessory pigments do in algae. Chlorophyll and accessory pigments

allow the algae to have a green color and to absorb nutrients from the sunlight. So the pigments and the chlorophyll allow the algae to do things

that are necessary for life. Practice / Homework Answers 1. Suppose you

have just eaten a large meal of shellfish. You know you are not allergic to them, but you become very ill after dinner. What is a likely cause of your

illness? Dinoflagellates can produce deadly toxins. These toxins can be

infused into shellfish and make whatever eats the shellfish ill. 2. Explain the

role of unicellular algae in the aquatic food chain, and predict the effects of

the sudden death of a significant portion of existing populations of unicellular algae. Unicellular algae compose a considerable part of the phytoplankton

and, therefore, they are at the base of the food chain. A sudden loss of a

significant portion of existing populations would likely disrupt aquatic

ecosystems, causing first a reduction in the populations of animals that use

them as a direct source of nourishment, followed by a reduction in the populations of animals that feed on algae eaters. This would be followed by a reduction in aquatic carnivores such as seals and could even affect terrestrial carnivores such as polar bears or humans.

3. How do accessory pigments differ in function from chlorophyll, and how do they affect the appearance of algae and the depths at which algae can grow? Accessory pigments absorb light at different wavelengths than does chlorophyll. This process tends to increase the range of depths at which algae can grow. For example, the reddish accessory pigments called phycobilins are especially good at absorbing the blue light found at great depths in the sea, allowing the algae that contain them to live in deep water. Because accessory pigments reflect different wavelengths of light than does chlorophyll, they give algae a wide range of colors.

4. Why are euglenas well adapted to conditions of varying light intensities? Euglenas carry out photosynthesis if sunlight is available, but can also live as heterotrophs, absorbing the nutrients available in decayed organic matter, if sunlight is not available.

5. How do euglenophytes use their eyespots? The eyespots of euglenophytes are used to locate sunlight for photosynthesis.

6. What are the characteristics of diatoms? Diatoms are beautiful plantlike protists. There are many species, all of which produce thin, delicate walls rich in Silicon.

7 . Describe the appearance of a typical euglena and explain how it moves through water. A typical euglena is about 50 micrometers in length. Two flagella emerge from a gullet at one end of the organism, and the longer of these spins in a pattern that pulls the organism rapidly through the water. Near the gullet end of the organism is a cluster of reddish pigment known as



the eyespot. The euglena is covered by an intricate cell membrane called a pellicle, which is folded into a series of ribbon-like ridges supported by microtubules.

8 . What is the function of chlorophyll and accessory pigments in algae? Chlorophyll and accessory pigments allow algae to harvest and use the energy from sunlight.

9. What is the advantage to algae of having forms of chlorophyll other than chlorophylla? Different forms of chlorophyll in algae absorb different wavelengths of light, allowing algae to use more of the energy of sunlight than just the red and violet wavelengths captured by chlorophyll a.

10. What is phytoplankton? Phytoplankton is the population of small, photosynthetic organisms found near the surface of the ocean.

Quiz Answers Plantlike Protists: Red, Brown, and Green Algae Vocabulary

phycobilin: Accessory pigment found in red algae that is especially good at absorbing blue light.

filament: In algae, long threadlike colony formed by many green algae; in plants, along thin structure that supports an anther.

alternation of generations: Process in which many algae switch back and forth between haploid and diploid stages of their life cycles.

gametophyte: Haploid, or gamete-producing, phase of an organism.

spore: Haploid reproductive cell.

sporophyte: Diploid, or spore-producing, phase of an organism.

Direct Instruction - Running Time: 5 min 17 sec

Red Algae - Phycobilins -Allows red algae to grow in deeper depths of the oceans -Absorb blue light -Polar regions to the tropics -Grows on ocean's surface to great depths -Formation of coral reefs -Maintain equilibrium in coral reefs; feed coral animals -Produces calcium carbonate

Brown algae -Contain chlorophyll a and c -Brown accessory pigments fucoxanthin -Largest and most complex of algae -Found in cool, shallow coastal waters of temperate or arctic areas -

Kelp; Sargassum; rockweed Green algae -Cell wall and photosynthetic - Chlorophyll a and b -Store food in the form of starch -Fresh and salt water - Unicellular green algae -Chlamydomonas -Ponds, ditches, and wet soil - Colonial green algae -Filaments -Long thread-like colonies -Multicellular green algae -" Sea lettuce" -Rocky seacoasts Reproduction green algae - Alternation of generations -Diploid and haploid generations -Reproduction of chlamydomonas -Reproduction in ulva -Gametophytes -Gamete producing plants -Spores -Haploid reproductive cells; meiosis -Sporophyte -Spore-producing organism Human uses of algae -Produces 1/2 of the oxygen on the Earth -Rich in Vitamin C -Treat stomach cancer; high blood pressure; arthritis, etc. -Ice cream; salad dressing; candy -Chemicals from algae used to make plastics, waxes, transistors, deodorants, paints, lubricants, and artificial wood Journal Activity ----- Describe

the main features of the major phyla of multicellular algae. Multicellular algae have a rocky shape because of the shape of their surroundings and they are able to absorb large amounts of sunlight. Practice / Homework

Answers 1. \_\_\_\_\_ (Red/Brown) algae contain brown accessory pigments as well as chlorophyll a and c. Brown 2. What are the characteristics of red algae? Red algae is found in oceans from the tropics to the poles. It is also found at the surface of water down to great depths. Red algae is important in the formation of coral reefs because it is able to produce calcium carbonate. 3. What are some of the characteristics that green algae shares with plants? Like plants green algae get their energy though photosynthesis, have cell walls chlorophyll a and b, and store food in the form of starch. 4. Other than color, how might you distinguish a species

of brown algae? Brown algae is the largest and most complicated algae. It contains both chlorophyll a and c and is usually found in cool temperate or arctic coastal waters. 5. What is meant by the term alternation of generations? Alternation of generations means that during a organism's lifetime it alternates between diploid and haploid states. 6. Compare the structure and function of the diploid sporophyte to the haploid gametophyte in the multicellular alga, *Ulva*. Both are large multicellular organisms that are so similar they are difficult to tell apart. The sporophyte produces haploid spores, whereas the gametophyte produces haploid gametes. 7. Describe two ways in which reproduction can occur in protists? Sexual reproduction can occur in two ways in multicellular protists. The first way is when two haploid gametes fuse. The second is through conjugation, which is the exchange of genetic material between two individuals. 8. How is algae important to the medical field? Green algae is rich in vitamin C. It is used to treat cancer, high blood pressure, and arthritis. 9. What are two human uses of algae? Algae can be used to foods like candy, salad dressing, and ice cream. Another use is to make things like waxes, plastics, transistors, deodorants, paint, lubricants, and artificial wood. 10. How do green algae store food? Green algae store food in the form of starch.

Quiz Answers

Funguslike Protists Vocabulary

cellular slime mold: Slime mold whose individual cells remain separated during every phase of the mold's life cycle.

acellular slime mold: Slime mold that undergoes a stage in which its cell fuse and form larger cells with many nuclei.

fruiting body: Slender reproductive structure that produces spores and is found in some fungus-like protists;

reproductive structure of fungus that develops from a mycelium.

plasmodium: Structure with many nuclei formed by acellular slime molds.  
hypha: Tiny filament that makes up a multicellular fungus or a water mold.  
zoosporangium: Spore case. antheridium: Male reproductive structure in some algae and plants. oogonium: Specialized structure formed by hyphae that produces female nuclei. Direct Instruction - Running Time: 4 min 26 sec  
Slime molds -Recycle organic material -Cellular slime molds -Individual; separated by cell membranes -Fruiting body -Reproductive structure - Produces spores -Acellular slime molds -Cells fuse to form large cells - Plasmodia -After aggregate-form large cells with many nuclei Ecology of fungus-like protists -Slime molds and water molds are important recyclers of organic material; help things rot -Decomposers -Dark, rich topsoil provide plants with nutrients -Cause plant diseases Water molds and the potato famine -Phytophthora infestans -Oomycete that attacks potatoes -Great Potatoe Famine -Ireland -1846 Journal Activity

----- How is the sluglike mass of cellular slime molds similar to the plasmodium of acellular slime molds? How do they differ? Cellular slime molds are individual and are separated by cell membranes and can produce spores. Acellular slime molds fuse to form larger cells. They are the same however because they both are able to produce structures for asexual reproduction. Practice / Homework Answers 1. Refer to the figure above to formulate a question about the genotypes of the different sporangia produced by a single aggregated mass of cells that began as separate organisms. With the way that the protists broke up dose that mean that the DNA of each will only have a small amount of the same DNA? 2. Why is it difficult to classify cellular slime molds as unicellular or

multicellular? During much of their life cycle, cellular slime molds are unicellular and both their appearance and behavior are similar to that of animal-like protists. When they aggregate, however, cellular slime molds act like multicellular organisms—they migrate together and produce a single fruiting body as if they were a single organism.

3. What are slime molds? What are water molds? Slime molds are fungus-like protists that play key roles in recycling organic material. Water molds are fungus-like protists that thrive on dead or decaying organic matter in water and are plant parasites on land.

4. Does the organism shown in the figure above undergo sexual or asexual reproduction? How do you know? The organism undergoes sexual reproduction—the life cycle depicts the pairing of gametes (D) to produce a zygote (E).

5. Given the information that meiosis occurs in structure A, classify each of the other labeled structures or stages of the life cycle shown in the figure above as either haploid or diploid. Structures (or stages) B and C are haploid, while D, E, F, and G are diploid.

6. What is the primary difference between cellular slime molds and acellular slime molds? Cells of cellular slime molds are separated by cell membranes during every phase of the mold's life cycle. Cells of acellular slime molds fuse to form large cells with many nuclei.

7. What might be the end result in terrestrial and aquatic ecosystems if all decomposers—including slime molds and water molds—no longer existed? Ecosystems would be littered with the bodies of dead animals and plants. Materials would remain tied up in dead bodies and would not reenter the ecosystem to be used by other living things, eventually, raw materials for new living things might be depleted to the extent that no more new living things could be produced, and life on Earth would end.

8. What

type of organism caused the destruction of much of the potato crops of 1845 and 1846 in Ireland? A land-dwelling water mold, called *Phytophthora infestans*, destroyed the potato crops. 9. Water molds and slime molds are important decomposers in ecosystems. However, not all fungus-like protists are beneficial. How can fungus-like protists negatively affect humans?

Fungus-like protists cause many different plant diseases. These diseases can devastate crops and lead to food shortage. 10. Compare and contrast fungi and fungus-like protists. Fungi and fungus-like protists are heterotrophs that get their energy by breaking down dead and decaying organic material. They have spores and hyphae. Unlike fungi, fungus-like protists have centrioles and do not have cell walls. Quiz Answers Topic Test Topic Test Review

Answers Topic Test Answers Fungi Characteristics of Fungi Vocabulary Direct Instruction - Running Time: 3 min 51 sec Journal Activity Practice / Homework Answers Quiz Answers Fungal Diversity Vocabulary Direct Instruction - Running Time: 4 min 18 sec Journal Activity Practice / Homework Answers Quiz Answers Fungal Partnerships Vocabulary Direct Instruction - Running Time: 2 min 15 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Plants What Is a Plant? Adapting to Life on Land Vocabulary Direct Instruction - Running Time: 6 min 18 sec Journal Activity Practice / Homework Answers Quiz Answers Survey of the Plant Kingdom Vocabulary Direct Instruction - Running Time: 4 min 58 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Plant Diversity Nonvascular Plants Vocabulary Direct Instruction - Running Time: 3 min 27 sec Journal Activity Practice / Homework Answers Quiz Answers Non-

Seed Vascular Plants Vocabulary Direct Instruction - Running Time: 4 min 20 sec Journal Activity Practice / Homework Answers Quiz Answers Seed Plants Vocabulary Direct Instruction - Running Time: 7 min 17 sec Journal Activity Lab Lecture - Running Time: 4 min 34 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Plant Structure and Function Plant Cells and Tissues Vocabulary Direct Instruction - Running Time: 7 min 34 sec Journal Activity Practice / Homework Answers Quiz Answers Roots, Stems, and Leaves Vocabulary Direct Instruction - Running Time: 24 min 47 sec Journal Activity Practice / Homework Answers Quiz Answers Plant Responses Vocabulary Direct Instruction - Running Time: 4 min 22 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Plant Reproduction Life Cycles of Mosses, Ferns, and Conifers Vocabulary Direct Instruction - Running Time: 3 min 31 sec Journal Activity Practice / Homework Answers Quiz Answers Flowers and Flowering Vocabulary Direct Instruction - Running Time: 4 min 6 sec Journal Activity Practice / Homework Answers Quiz Answers The Life Cycle of a Flowering Plant Vocabulary Direct Instruction - Running Time: 7 min 7 sec Journal Activity Lab Lecture - Running Time: 4 min 51 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Invertebrates Introduction to Animals Characteristics of Animals Vocabulary Direct Instruction - Running Time: 5 min 50 sec Journal Activity Practice /

Homework Answers Quiz Answers Animal Body Systems Vocabulary Direct Instruction - Running Time: 5 min 40 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Simple Invertebrates Sponges Vocabulary Direct Instruction - Running Time: 3 min 58 sec Journal Activity Practice / Homework Answers Quiz Answers Cnidarians Vocabulary Direct Instruction - Running Time: 5 min 3 sec Journal Activity Practice / Homework Answers Quiz Answers Flatworms and Roundworms Vocabulary Direct Instruction - Running Time: 3 min 13 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Mollusks and Annelids Mollusks Vocabulary Direct Instruction - Running Time: 5 min 37 sec Journal Activity Practice / Homework Answers Quiz Answers Annelids Vocabulary Direct Instruction - Running Time: 4 min 43 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Arthropods Features of Arthropods Vocabulary Direct Instruction - Running Time: 3 min 2 sec Journal Activity Practice / Homework Answers Quiz Answers Spiders and Other Arachnids Vocabulary Direct Instruction - Running Time: 2 min 2 sec Journal Activity Practice / Homework Answers Quiz Answers Insects and Their Relatives Vocabulary Direct Instruction - Running Time: 18 min 28 sec Journal Activity Practice / Homework Answers Quiz Answers Crustaceans Vocabulary Direct Instruction - Running Time: 3 min 15 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Echinoderms and Invertebrate Chordates Echinoderms Vocabulary Direct Instruction - Running Time: 3 min 32 sec Journal Activity Practice / Homework Answers Quiz



Answers Invertebrate Chordates Vocabulary Direct Instruction - Running Time: 1 min 51 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Vertebrates Fish and Amphibians Fish Vocabulary Direct Instruction - Running Time: 5 min 3 sec Journal Activity Practice / Homework Answers Quiz Answers Amphibians Vocabulary Direct Instruction - Running Time: 4 min 13 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Reptiles and Birds Reptiles Vocabulary Direct Instruction - Running Time: 6 min 46 sec Journal Activity Practice / Homework Answers Quiz Answers Birds Vocabulary Direct Instruction - Running Time: 3 min 54 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Mammals Mammal Characteristics Vocabulary Direct Instruction - Running Time: 3 min 17 sec Journal Activity Practice / Homework Answers Quiz Answers Diversity of Mammals Vocabulary Direct Instruction - Running Time: 3 min 5 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Animal Behavior Innate Behavior Vocabulary Direct Instruction - Running Time: 6 min 26 sec Journal Activity Practice / Homework Answers Quiz Answers Learned Behavior Vocabulary Direct Instruction - Running Time: 3 min 47 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers The Human Body The Nervous System Human Body Systems Vocabulary Direct Instruction - Running Time: 5 min 59 sec Journal Activity Lab Lecture - Running Time: 4 min 26 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be

sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers The Nervous System Vocabulary Direct Instruction - Running Time: 10 min 25 sec Journal Activity Lab Lecture - Running Time: 6 min 26 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers Divisions of the Nervous System Vocabulary Direct Instruction - Running Time: 6 min 3 sec Journal Activity Practice / Homework Answers Quiz Answers The Senses Vocabulary Direct Instruction - Running Time: 7 min 20 sec Journal Activity Lab Lecture - Running Time: 4 min 0 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers Drugs and the Nervous System Vocabulary Direct Instruction - Running Time: 6 min 27 sec Journal Activity Lab Lecture - Running Time: 8 min 21 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Skeletal, Muscular, and Integumentary Systems The Skeletal System Vocabulary Direct Instruction - Running Time: 5 min 44 sec Journal Activity Practice / Homework Answers Quiz Answers The Muscular System Vocabulary Direct Instruction - Running Time: 4 min 19 sec Journal Activity Practice / Homework Answers Quiz Answers The Integumentary System Vocabulary Direct Instruction - Running Time: 3 min 50 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Circulatory and Respiratory Systems The Circulatory System

Vocabulary Direct Instruction - Running Time: 7 min 56 sec Journal Activity Practice / Homework Answers Quiz Answers Blood and the Lymphatic System Vocabulary Direct Instruction - Running Time: 4 min 50 sec Journal Activity Practice / Homework Answers Quiz Answers The Respiratory System Vocabulary Direct Instruction - Running Time: 6 min 43 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Digestive and Excretory Systems Food and Nutrition Vocabulary Direct Instruction - Running Time: 6 min 10 sec Journal Activity Lab Lecture - Running Time: 5 min 10 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers The Process of Digestion Vocabulary Direct Instruction - Running Time: 7 min 12 sec Journal Activity Practice / Homework Answers Quiz Answers The Excretory System Vocabulary Direct Instruction - Running Time: 15 min 51 sec Journal Activity Lab Lecture - Running Time: 4 min 43 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Endocrine and Reproductive Systems The Endocrine System Vocabulary Direct Instruction - Running Time: 6 min 59 sec Journal Activity Practice / Homework Answers Quiz Answers Human Endocrine Glands Vocabulary Direct Instruction - Running Time: 7 min 4 sec Journal Activity Practice / Homework Answers Quiz Answers The Reproductive System Vocabulary Direct Instruction - Running Time: 13 min 28 sec Journal Activity Practice / Homework Answers Quiz Answers Fertilization and Development Vocabulary

Direct Instruction - Running Time: 10 min 32 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers The Immune System and Diseases Infectious Disease Vocabulary Direct Instruction - Running Time: 7 min 57 sec Journal Activity Lab Lecture - Running Time: 4 min 42 sec Lab Assessment Answers View Lab Your Lab Assessment consists of 2 tasks. Be sure to complete both tasks before submitting. Practice / Homework Answers Quiz Answers The Immune System Vocabulary Direct Instruction - Running Time: 5 min 26 sec Journal Activity Practice / Homework Answers Quiz Answers Immune System Disorders Vocabulary Direct Instruction - Running Time: 3 min 58 sec Journal Activity Practice / Homework Answers Quiz Answers The Environment and Your Health Vocabulary Direct Instruction - Running Time: 5 min 45 sec Journal Activity Practice / Homework Answers Quiz Answers Topic Test Topic Test Review Answers Topic Test Answers Cumulative Exam Cumulative Test Review Answers Cumulative Exam Answers