Name Date DUE: Class

HW #1 PACKET

Reinforcement and Study Guide

Chapter 2

Principles of Ecology

Section 2.1 Organisms and Their Environment

In your textbook, read about what ecology is and about aspects of ecological study.

Use each of the terms below just once to complete the passage.

ecology	biotic factors	nonliving	environments	atmosphere
humans	organisms	soil	biosphere	abiotic factors

Living organisms in our world are connected to other **(1)** ____________ in a variety of ways. The branch of biology called **(2)** ____________ is the scientific study of interactions between organisms and their **(3)** ____________, including relationships between living and **(4)** ____________ things.

All living things on Earth can be found in the **(5)** ____________, the portion of Earth that supports life. It extends from high in the **(6)** ____________ to the bottom of the oceans. Many different environments can be found in the biosphere. All living organisms found in an environment are called **(7)** ____________. Nonliving parts of an environment are called **(8)** ____________. For example, whales, trees, and **(9)** ____________ are biotic factors. Ocean currents, temperature, and **(10)** ____________ are abiotic factors.

In your textbook, read about levels of organization in ecology.

For each item in Column A, write the letter of the matching item in Column B.

	Column A	Column B
________	**11.** A group of organisms of one species that interbreed and live in the same place at the same time	**a.** community
________	**12.** A collection of interacting populations	**b.** competition
________	**13.** Interacting populations and abiotic factors in a community	**c.** forest
________	**14.** Increases when resources are scarce	**d.** population
________	**15.** A terrestrial ecosystem	**e.** ecosystem

Chapter 2 **Principles of Ecology,** *continued*

Reinforcement and Study Guide

Section 2.1 Organisms and Their Environment

In your textbook, read about organisms in ecosystems.

For each statement below, write true or false.

_____________ **16.** A habitat is the role a species plays in a community.

_____________ **17.** Habitats may change.

_____________ **18.** A niche is the place where an organism lives its life.

_____________ **19.** A habitat can include only one niche.

_____________ **20.** A species' niche includes how the species meets its needs for food and shelter.

_____________ **21.** The centipedes and worms that live under a certain log occupy the same habitat but have different niches.

_____________ **22.** It is an advantage for two species to share the same niche.

_____________ **23.** Competition between two species is reduced when the species have different niches.

Mutualism Commensalism Parasitism Symbiosis

word Band

Complete the table below by writing the kind of relationship described on the left.

Relationships Among Organisms	
Description of Relationship	**Kind of Relationship**
24. Organisms of different species live together in a close, permanent relationship.	
25. One species benefits and the other species is neither benefited nor harmed by the relationship.	
26. One species benefits from the relationship at the expense of the other species.	
27. Both species benefit from the relationship.	

Name Date Class

Chapter **2** **Principles of Ecology**

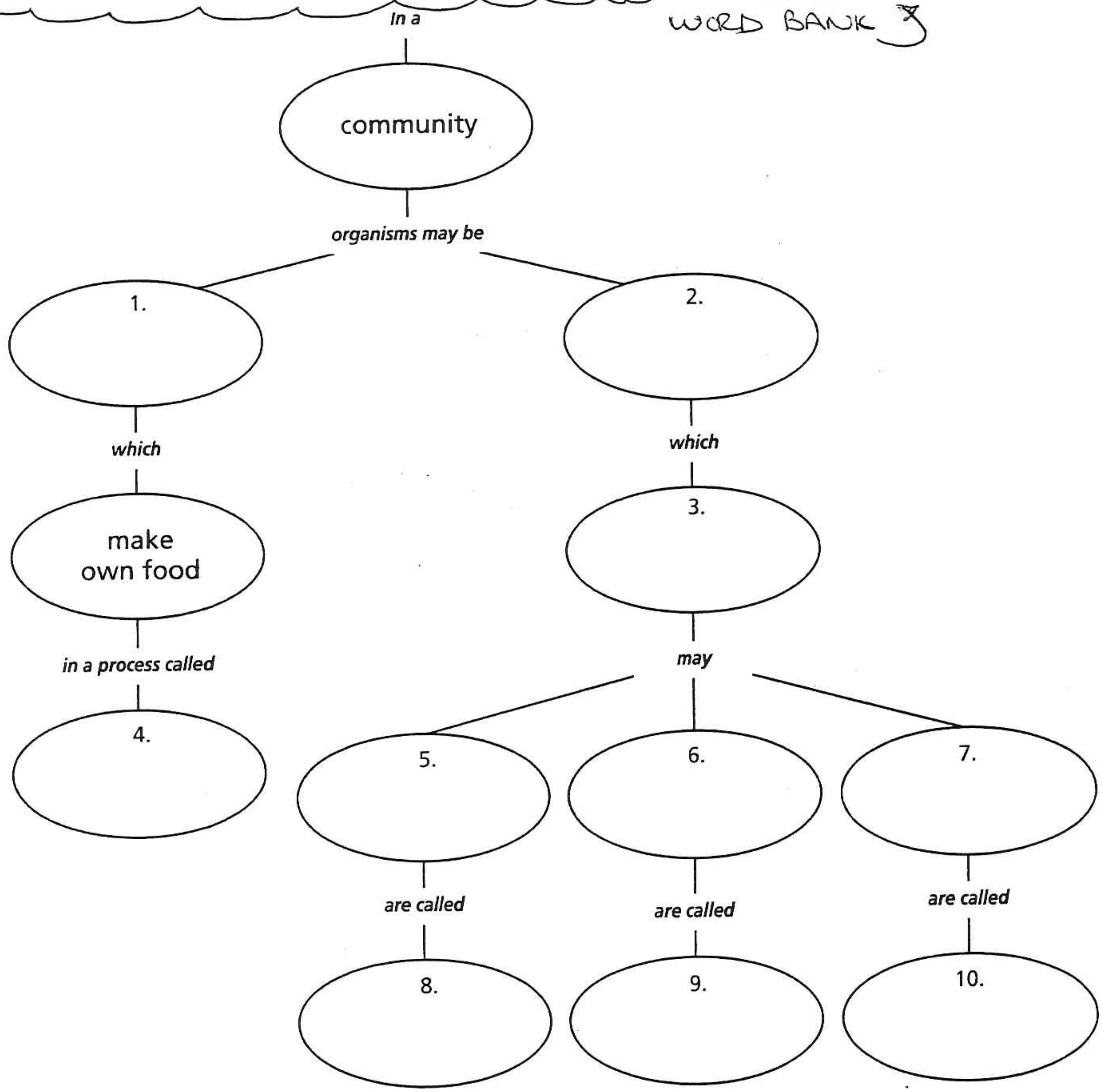
Concept Mapping

Use with Chapter 2, Section 2.2

Food Needs in a Community

Complete the concept map on food needs in a community. Use these words or phrases once: *heterotrophs, decomposers, do not make own food, absorb nutrients from dead organisms, eat autotrophs, eat other heterotrophs, herbivores, photosynthesis, autotrophs, carnivores.*

WORD BANK



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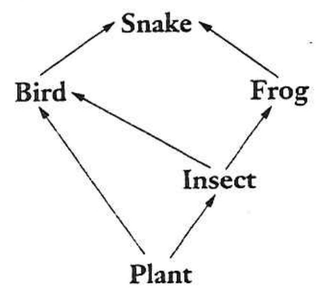
Chapter 2 **Principles of Ecology,** *continued*

Reinforcement and Study Guide

Section 2.2 Nutrition and Energy Flow

In your textbook, read about how organisms obtain energy and about matter and energy flow in ecosystems.

Answer the questions below. Use the diagram of a food web to answer questions 1–7.



1. How many food chains make up the food web?

2. Which organism is an herbivore?

3. Which organism is an autotroph?

4. Which organism is a third-order heterotroph? To what trophic level does that organism belong?

5. Which organism is an omnivore?

6. Which organisms belong to more than one food chain?

7. Which organism belongs to more than one trophic level?

8. What are decomposers? Where would decomposers appear in this food web?

9. What does a pyramid of energy show about the amount of energy available at different trophic levels of a food chain?

10. Why do different trophic levels have different amounts of energy?

Bog Turtles

One of the smallest turtles in the world is found along the east coast of the United States from Massachusetts to Georgia. The bog turtle, measuring only 100 millimeters in length, was unknown in Maryland before 1941.

Studies conducted in recent decades verified that Maryland was included in the range of the bog turtle. It was often misidentified because the colorful orange patterns on its head and neck resembled other turtles. To learn more about the bog turtle, scientists conducted a survey of its habitat sites. The results of the survey led to more thorough investigation of bog turtle sites by the Maryland Department of Natural Resources. As a result, the number of sites increased from one verified site in 1944 to 177 verified sites in 1984.

Known bog turtle sites are less than one acre in size. Bog turtles prefer to live in areas of low lying wet lands, swamps, and meadows that are soft and muddy. These habitats aid in body temperature regulation and egg incubation. Ground water springs provide an area where the turtles can spend winter without the threat of freezing. The vegetation in the bog turtle habitat consists of cattails, sphagnum, moss, and various native grasses. Although the bog turtle population may never have been large, habitats since precolonial times have declined because of development and changing farm practices.

The state of Maryland added the bog turtle to the list of endangered species in 1972. Steps to protect its habitat include land use management, bog preservation, private landowner cooperation, management of invasive plant species, as well as captive breeding programs. By adding federal protection to the existing protection provided at state level, one of the smallest turtles in the world may continue to survive.

1.) Which is one reason that the estimates for bog turtle population may be inaccurate?

A.) Bog turtles are small and can hide well.
B.) There are too many turtles to count accurately.
C.) Bog turtles are mistaken for other types of turtles.
D.) Population data from precolonial times is incomplete.

2.) Which of these processes would <u>most likely</u> cause new color patterns on the head and neck of bog turtles?

A.) mitosis
B.) mutation
C.) succession
D.) replication

3.) Which of these is responsible for the color patterns on the head and neck of the bog turtle?

A.) carbohydrates
B.) diet
C.) habitat
D.) proteins

4.) Some marshes and swamps eventually become homes to communities that include mature trees. What is this process called?

A.) commensalism
B.) homeostasis
C.) mutualism
D.) succesion

Scientific American December 2012
New Life-Forms, No DNA Required
by Ferris Jabr

Artificial organisms based on man-made molecules could thrive and evolve

"Life is inconceivable without a system for genetic information storage and replication, but DNA and RNA are not unique," explains Philipp Holliger of the Medical Research Council's Laboratory of Molecular Biology in Cambridge, England. "Related polymers—at least six more—can do the same function." That the earth's flora and fauna rely only on DNA and RNA, he says, is an "accident from the origin of life."

XNA stands for xeno nucleic acid (*xeno* meaning "foreign"). Like DNA, XNA has a structure that resembles a twisted ladder. In DNA, four different nucleobases, represented by the letters A, C, G and T, form the steps. Phosphate groups and sugars form the ladders' sides, also known as the backbone. For 30 years scientists have been tweaking the sugars to create artificial nucleic acids, which serve as research tools in medicine that can bind to DNA.

To make XNAs, Holliger and his colleagues did not simply alter the sugars in DNA's backbone—they substituted entirely different molecules, such as cyclohexane and threose. Just as important, they created enzymes that work with the XNAs to form a complete genetic system.

The enzymes enable XNAs to do something no other artificial nucleic acids can do: they evolve. Inside living cells, enzymes called polymerases cut, paste and splice DNA to access the genetic information. Without that interaction, DNA would remain as inert as dusty encyclopedias on a shelf. Holliger reprogrammed natural polymerase enzymes to translate DNA into XNA and back again, establishing a novel system for storing and transmitting genetic information, which is the foundation of evolution. One of the XNAs, HNA (anhydrohexitol nucleic acid), reliably preserved changes to its genetic code and evolved to attach to a protein with increasing precision.

Once Holliger improves the functionality of XNA and its enzymes, the set of molecules could replace DNA and RNA in a living cell. Researchers might take a simple bacterium, for instance, suck out its DNA and replace it with XNA.

Alternatively, scientists could enclose XNA within protocells—the origin of a new life-form that could evolve in ways no one can predict. Whereas other synthetic biologists such as J. Craig Venter have made remarkable advances in rewriting the existing genetic code, no one has created truly synthetic life—life that does not depend on what evolution has already provided but on humankind's inventions.

Holliger emphasizes that XNA-based life-forms are a long way off, but he already recognizes a distinct advantage. If such a creature escaped into the wild, it would die without a steady supply of XNA-specific enzymes. And XNA could not weave itself into the genomes of natural organisms, because their native enzymes would not recognize it. XNA-based bacteria designed to devour oil spills or turn wastewater into electricity, for example, could not interfere with native organisms.

The fact that XNA is complementary to DNA, yet structurally unique, makes it immediately useful for medicine, biotechnology and biology research. Holliger imagines XNAs that could be injected into the human body to detect early, subtle signs of disease that current technologies miss.

Steven Benner, a fellow at the Foundation for Applied Molecular Evolution in Gainesville, Fla., has also advanced the effort by expanding the genetic alphabet with two new nucleobases, Z and P. A larger alphabet could form a wider array of genes and, eventually, proteins. "The goal is to create chemically controlled systems that behave like biological systems, without being biological systems," Benner says. "We believe whatever you can draw on a page, you can make." —*Ferris Jabr*

Side Notes

DNA IS PASSÉ. Synthetic biologists have invented an array of new molecules called XNAs that boast all the talents of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA), as well as some special powers. XNAs could allow scientists to safely create life-forms in the laboratory that do not depend on DNA to survive and evolve.

Science Journal Article Questions
Scientific American December 2012
New Life-Forms, No DNA Required
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1.) Define *XNA*.

2.) Explain what is **special** about this molecule XNA.

3.) Describe the **technique** that Philipp Holliger used to create XNA.

4.) Define *protocells*.

5.) Describe a **possible medical benefit** regarding XNA and humans.