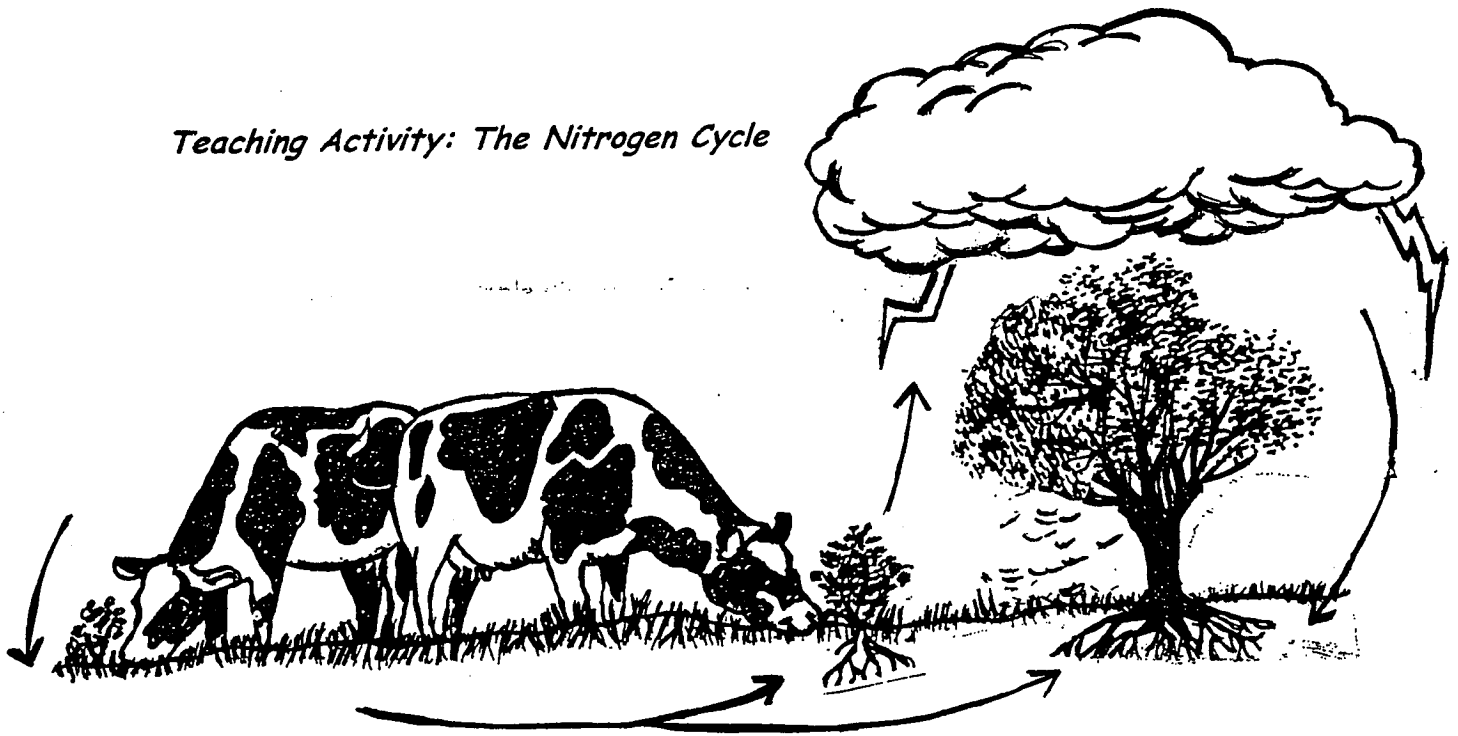


Teaching Activity: The Nitrogen Cycle



Introduction: About 78% of the Earth's atmosphere is made up of "free" nitrogen (N_2), produced by biological and chemical processes within the biosphere and not combined with other elements. All living things need nitrogen to build proteins and other important body chemicals. However, most organisms, including plants, animals and fungi, cannot get the nitrogen they need from the atmospheric supply. They can use only the nitrogen that is already in compound form.

Certain types of bacteria are able to use the free nitrogen in the air to make nitrogen compounds through a process called *nitrogen fixation*. Most of the nitrogen fixation on Earth occurs as a result of bacterial activity. Some of these bacteria live in the soil, others live in water. Still others grow inside structures on the roots of certain plants called *legumes*, which include beans, clover, alfalfa, peas and peanuts.

One family of nitrogen compounds produced by *nitrogen - fixing bacteria* are called *nitrates*. Nitrates are taken directly from the soil by plants and used by the plant to make other compounds, such as proteins. The compounds made from the plants are then used by other organisms that cannot use nitrates directly.

Nitrogen is returned to the atmosphere by the activity of organisms known as *decomposers*. Some bacteria are decomposers and break down the complex nitrogen compounds in dead organisms and animal wastes. This returns simple nitrogen compounds to the soil where they can be used by plants to produce more nitrates.

Nitrogen is continually moving back and forth between the soil, plants and animals. Eventually, however, the complex compounds are broken down to produce free nitrogen, which is then returned to the atmosphere. This continual transfer of nitrogen from the nonliving part of the environment to the living part and back again is called the *nitrogen cycle*.

Objective:

- To describe the steps in the Earth's nitrogen cycle;
- To create a simple diagram of the nitrogen cycle;

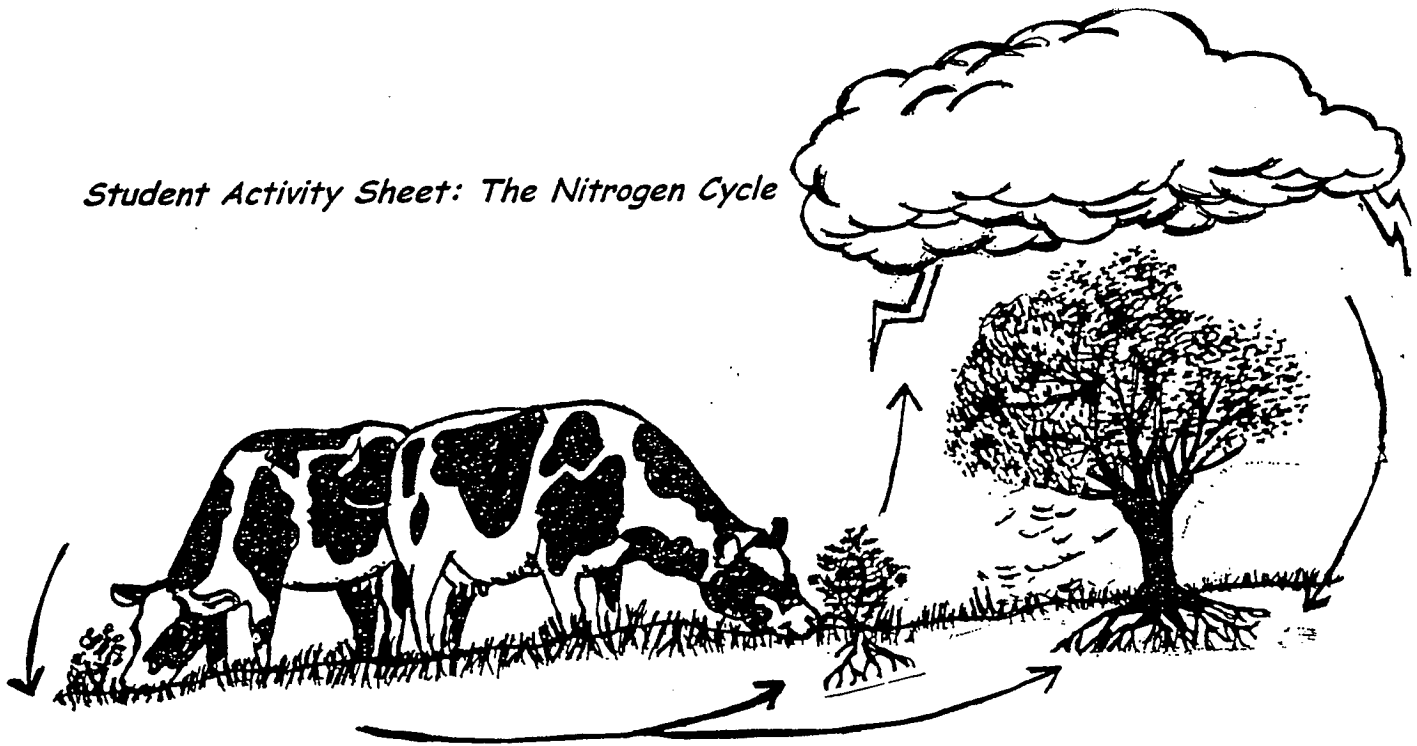
Important Terms: Nitrogen, cycle, elements, compounds, nitrogen fixation, bacteria, nitrates, decomposers;

Materials: Copy of Nitrogen Cycle Student Activity Sheet, paper/pencil, scissors and glue;

Procedure:

1. Read over and discuss the **Introduction**.
 - Diagram the steps in the nitrogen cycle on the board if necessary.
 - Go over each of the **Important Terms**.
 - Mention some other natural cycle on Earth.
2. Instruct students to complete the diagram of the N_2 cycle by cutting out and gluing the missing information in the correct space on the diagram.
 - Suggest that initially students place the terms on the diagram and when they are sure, glue/tape them in place.
3. When students have completed the diagram, they should answer the questions in the **Analysis and Comprehension** section.

Student Activity Sheet: The Nitrogen Cycle



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Student Activity Sheet: The Nitrogen Cycle

Objective:

- To describe the steps in the Earth's nitrogen cycle;
- To create a simple diagram of the nitrogen cycle;

Procedure:

1. Read over and discuss the **Introduction** with your teacher.
Make sure that you understand the new terms in the reading selection.
2. Complete the diagram of the nitrogen cycle.
 - Cut out and place the statements where they belong.
 - Glue them into place.
 - Color in the diagram if you wish to.
3. Answer the questions in the **Analysis and Comprehension** section.

Diagram Statements

Free atmospheric nitrogen

Nitrogen enters the soil

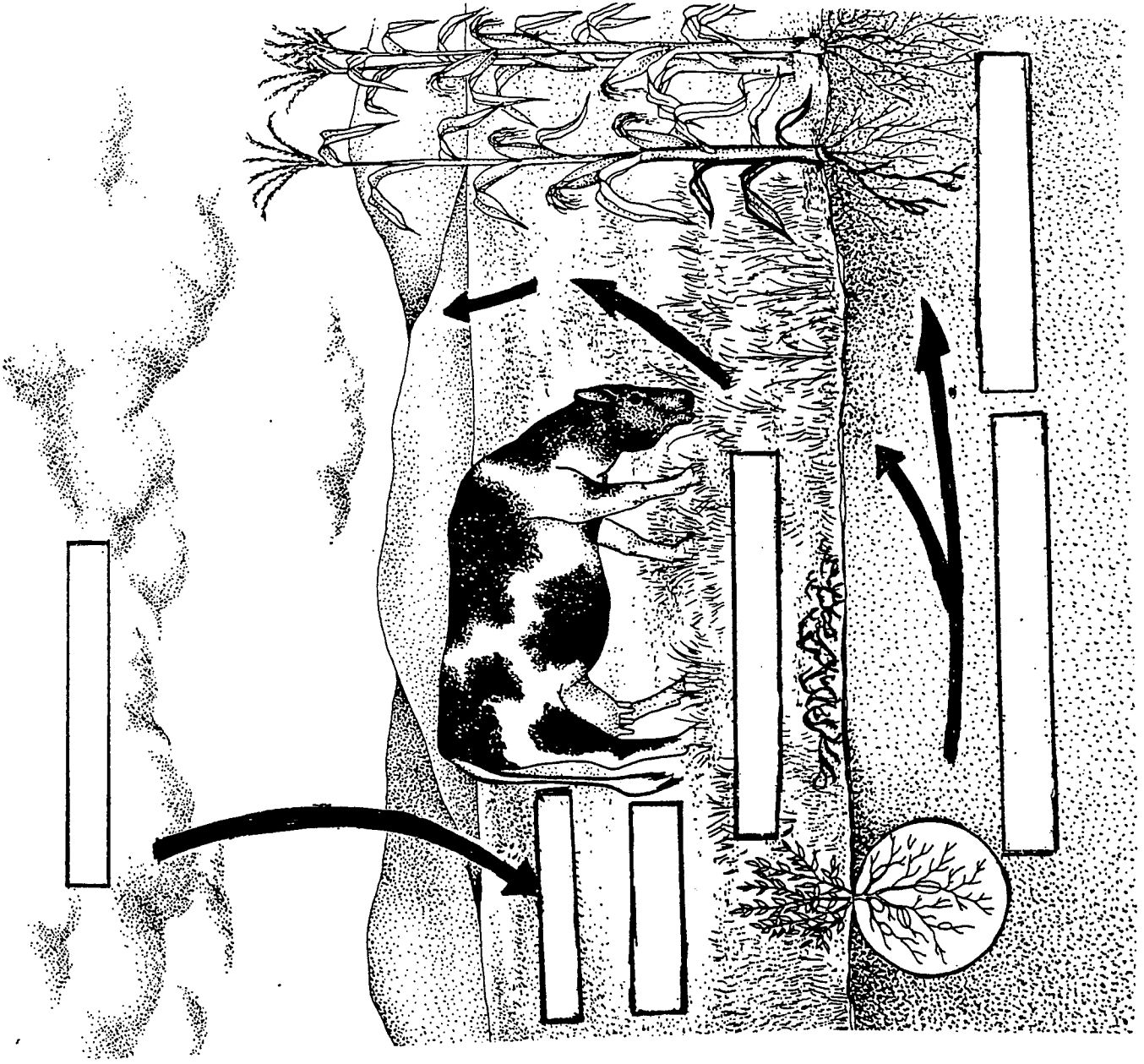
Plants use nitrates to make proteins

Bacteria change N into nitrates

Animals eat plants

Decomposers release N into the air

THE NITROGEN CYCLE



Student Activity Sheet #2

Analysis and Comprehension:

1. How much of the atmosphere of the Earth is "free" nitrogen? _____
2. Why is nitrogen so important to living things? _____

3. Why is free oxygen a problem for many organisms? _____

4. What form must the nitrogen be in? _____
5. What organisms are responsible for producing nitrogen compounds?

6. What is this process called? _____
7. Where can nitrogen fixing bacteria be found? _____
8. Name three plants that are "nitrogen fixers"? _____

9. What are decomposers? _____
10. What part do they play in the nitrogen cycle? _____

11. Where does the free nitrogen produced by bacteria eventually go?

12. Give a brief description of how the nitrogen cycle works.

