Suggested time allotment: 4 hours

MODULE 1 FROM CELL TO ORGANISM

Overview

There are different materials in the environment. There are also diverse kinds of living things. This module will discuss different kinds of living things and what they are made up of.

Organ systems work together to help organisms meet their basic needs and to survive. The digestive system helps organisms get energy from the food they eat. The circulatory system moves the nutrients that come from digested food, along with blood, to the different parts of the body. How do you think do the other organ systems work together? Do plants have organ systems, too?

Organ systems are made up of organs that have related functions and are grouped together. For example, the mouth, esophagus, stomach, and intestines are organs of the digestive system. The heart, arteries and veins are some parts that make up the circulatory system. Are there organisms that do not have organs?

This module introduces you to the different structures that make up an organism. These structures are formed from the grouping together of parts whose functions are related. You will also discover in this module that organs themselves are made up of even smaller parts. Anything that happens to these small parts will affect the functioning of the organs, organ systems, and the whole organism.

What are organisms? What makes them up?

Activity 1

What makes up an organism?

Objectives

In this activity, you should be able to:

1. identify the parts that make up an organism,
2. describe the function of each part, and
3. describe how these parts work together in an organism.

Materials Needed

- Writing materials
- Posters and pictures of organisms, organ systems, organs, tissues, and cells

Procedure

Read the selection below and answer the questions that follow.

You are an organism just like the plants and animals.

Photos: Courtesy of Michael Anthony B. Mantala

Figure 1. Pictures of a human being, plant, and an animal

Have you ever asked yourself what makes you up and the other organisms around you? Figure 2 shows a model of a human torso.

Q1. What parts of the human body do you see?

Q2. To which organ systems do these parts belong?

Figure 3 shows some organ systems that you may be familiar with.

Q3. Can you identify these organ systems?

Q4. How do these organ systems work together?

Photo: Courtesy of Michael Anthony B. Mantala
Biology Laboratory, UP NISMED

Figure 2. A model of a human torso

Photo: http://fc.amdsb.ca/~melanie_mccowan/S04B36342.2/human-_body.jpg

Figure 3. Some Organ Systems

The circulatory system is one of the organ systems that make up an organism. It is made up of the heart, blood vessels, and blood.

Figure 4 shows a model of a human heart. Your heart is about the size of your fist. It pumps and circulates blood to the different parts of the body through the blood vessels.

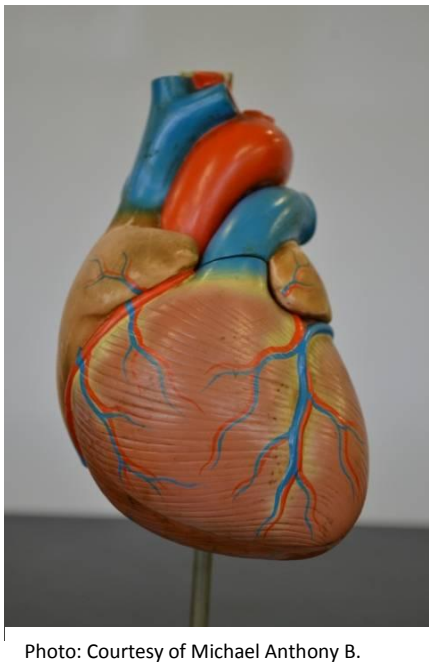


Photo: Courtesy of Michael Anthony B. Mantala

Figure 4. A model of a human heart

Certain diseases affect the heart and cause it to function improperly. To learn more about these diseases and what they do to the heart, interview relatives or neighbors who have heart problems or who know of people who have the disease. You can also use the internet and the library to read articles about how certain diseases affect the heart, its parts, and the whole organism.

Q5. Refer to Figure 4. What parts of the human heart do you see?

Q6. What do you think will happen to the heart if any of these parts were injured or diseased?

Q7. If these parts of the heart were injured or diseased, what do you think will happen to the organism?

The excretory system is another organ system that makes up an organism. It is made up of different organs that help the body eliminate metabolic wastes and maintain internal balance. These organs include a pair of kidneys. Figure 5 shows a model of a human kidney. What shape does it look like?

The kidneys are made up of even smaller parts. Some parts eliminate wastes that are no longer needed by the body; other parts function in the reabsorption of water and nutrients.

Like the heart, certain diseases also affect the kidneys and their function. To learn more about these diseases and what they do to the kidneys, interview relatives or neighbors who have kidney problems or who know of people who have the disease. You can also use the internet and library resources to read articles or news clips about how certain diseases affect the kidneys – and the other organs of the body – and the whole organism.

Photo: Courtesy of Michael Anthony B. Mantala
Biology Laboratory, UP NISMED

Figure 5. A model of a human kidney

Q8. Refer to Figure 5. What parts of the human kidney do you see?

Q9. What do you think will happen to the kidneys if any of these parts were injured or diseased?

Q10. If these parts of the kidneys were injured or diseased, what do you think will happen to the organism?

Q11. What procedure can a medical doctor do to correct an injury to these organs?

Organs are made up of tissues. The heart, kidneys, and the parts that make them up are made up of tissues. Figure 6 shows a picture of a muscle tissue. This tissue is made up of cells - the basic units of structure and function in organisms.

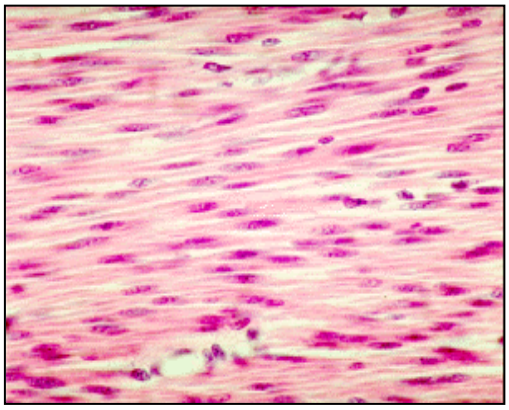


Photo: http://www.uoguelph.ca/zoology/devobio/miller/013638fig6-17.gif

Figure 6. Muscle tissues

Q12. What do you think will happen to the organs if these tissues were injured or diseased?

Q13. If these tissues were injured or diseased, what do you think will happen to the organ systems?

Q14. If these tissues were injured or diseased, what do you think will happen to the organism?

Plants are also made up of organ systems: the root and shoot systems. The root system absorbs water and nutrients; the shoot system moves them to the different parts of the plant.

Photo: Courtesy of Michael Anthony B. Mantala

Figure 7. An orchid showing shoot and root systems

Q15. In what ways are the functions of the organ systems of plants similar to those of animals?

Q16. In what ways are they different?

Figure 8 shows a picture of a flower. Flowers are the reproductive organs of plants. Together with the leaves and the stems, they make up the shoot system.

Photo: Courtesy of Michael Anthony B. Mantala

Figure 8. A Gumamela (Hibiscus) flower

Q17. In what ways are flowers similar to the reproductive organs of animals?

Q18. In what ways are they different?

Q19. How do the flowers, leaves, and stems help plants meet their basic needs?

Q20. What do think will happen to the plant if any of the parts that make up the shoot system were injured or diseased?

Figure 9 shows a picture of the roots of a tree. What parts do you think make up these roots?

Q21. Aside from absorbing water and nutrients, what other functions do the roots serve?

Photo: Courtesy of Michael Anthony B. Mantala

Figure 9. Roots of a tree

Figure 10 shows a model of a section of a root tip. When you get a small section of a root tip and view it under a microscope, you will see that it is made up of many layers of tissues. You will also see that these tissues are composed of similar cells that are arranged and grouped together to perform specific functions.

Q22. What do you think will happen to the roots if the tissues that make them up were injured or diseased?

Q23. If the roots were injured or diseased, what do you think will happen to the plant?

Photo: Courtesy of Michael Anthony B. Mantala
Biology Laboratory, UP NISMED

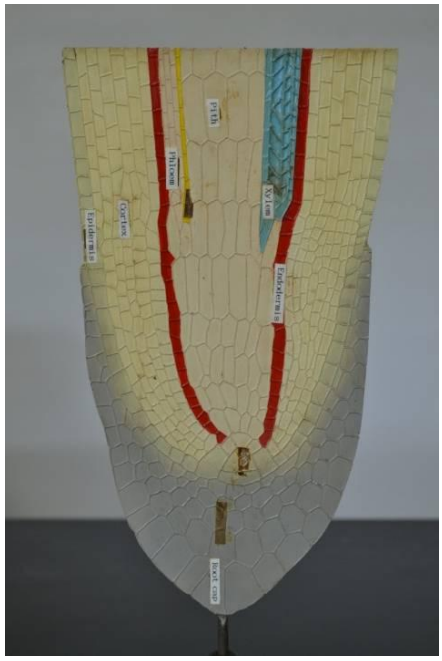


Figure 10. A model of a section of a root tip showing different plant tissues

Take a closer look at the models of animal and plant cells in Figure 11. Cells are the basic units of structure and function of all organisms. These cells are grouped together to form more complex structures: tissues, organs, and organs systems.

Animals and plants are very different organisms and yet, they are both made up of parts that are organized similarly.

Photo: Courtesy of Michael Anthony B. Mantala, Biology Laboratory, UP NISMED

Figure 11. Models of animal and plant cells

Q24. What do you think will happen to the tissues, organs, and organ systems if these cells were injured or diseased?

Q25. If the tissues, organs, and organ systems were injured or diseased, what do you think will happen to the organism?

Activity 2

Levels of organization in an organism

Objectives

In this activity, you should be able to:

1. identify the different levels of organization in an organism,
2. describe the parts that make up each level of organization and their functions, and
3. describe how the parts that make up a level of organization affect the higher levels of organization and the entire organism.

Materials Needed

- Writing materials
- Posters and pictures of organisms, organ systems, organs, tissues, and cells

Procedure

1. From the interviews you have made in Activity 1 and the articles you have read about certain diseases that affect the heart, kidneys, and the other parts of the body, complete the table on page 8. You may use Manila paper if the spaces provided in the table are not enough.

2. On the topmost row write a disease, which you have read about or learned from your interview, that affects parts of the human body.

3. In each of the boxes that correspond to the levels of organization, describe how the disease affects the parts that make up each level.

4. Opposite each level of organization, cut and paste pictures (you may use the pictures that come with the articles) that show how the disease affects the parts that make up the different levels. Another option is to show it through drawing.

Table. Diseases and their effects on the levels of organization in an organism

Disease:	
How does the disease affect each of the following levels of organization?	**Pictures/Drawings**
Organism	
Organ System	
Organ	
Tissue	
Cell	

After learning the different levels of organization in organisms, can you think of levels of organization that are bigger than the organism?

Putting them all up together…

Plants are organisms...

Photo: Courtesy of Michael Anthony B. Mantala

Humans and animals are organisms...

Photo: Courtesy of Michael Anthony B. Mantala

Plants are made up of organ systems...

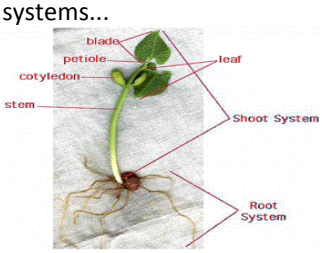


Photo: http://www.emc.maricopa.edu/faculty/farabee/biobk/bean_whole_morphology.gif

Humans and animals are made up of organ systems...

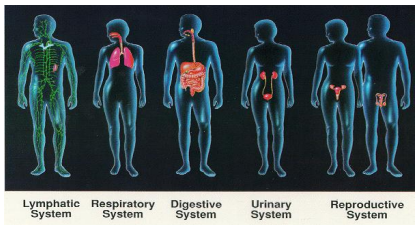
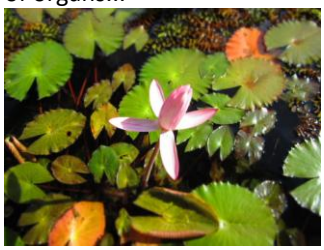


Photo: http://aarcaro.files.wordpress.com/2011/01/dwa5-organ-systems2.gif

Organ systems are made up of organs...



Organ systems are made up of organs...

Photo: http://aarcaro.files.wordpress.com/2011/01/dwa5-organ-systems2.gif

Organs are made up of tissues...

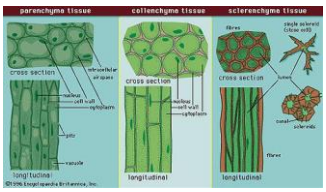


Photo: http://www.tantebazar.com/imgx/simple_plant_tissues.jpg

Organs are made up of tissues...

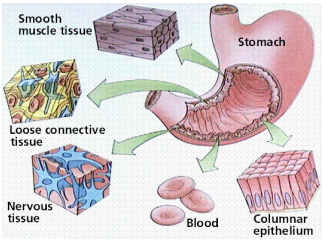


Photo: http://www.emc.maricopa.edu/faculty/farabee/biobk/stomTS.gif

Tissues are made up of cells... All organisms are made up of cells.

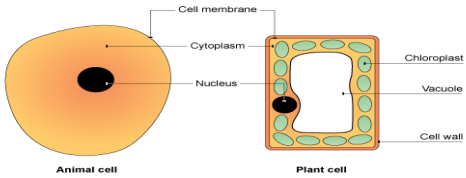


Photo: http://www.bbc.co.uk/ks3bitesize/science/images/

Reading Materials/Links/Websites

Bright Hub Education. (2009). Science Lesson Plan: Biological Organization. Middle School Science Lessons. Retrieved January 16 2012 from http://www.brighthubeducation.com/

Education. (2003). The Pyramid of Life (Levels of Biological Organization). Biology Demystified: A Self-Teaching Guide. Retrieved January 16, 2012 from http://www.education.com/

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