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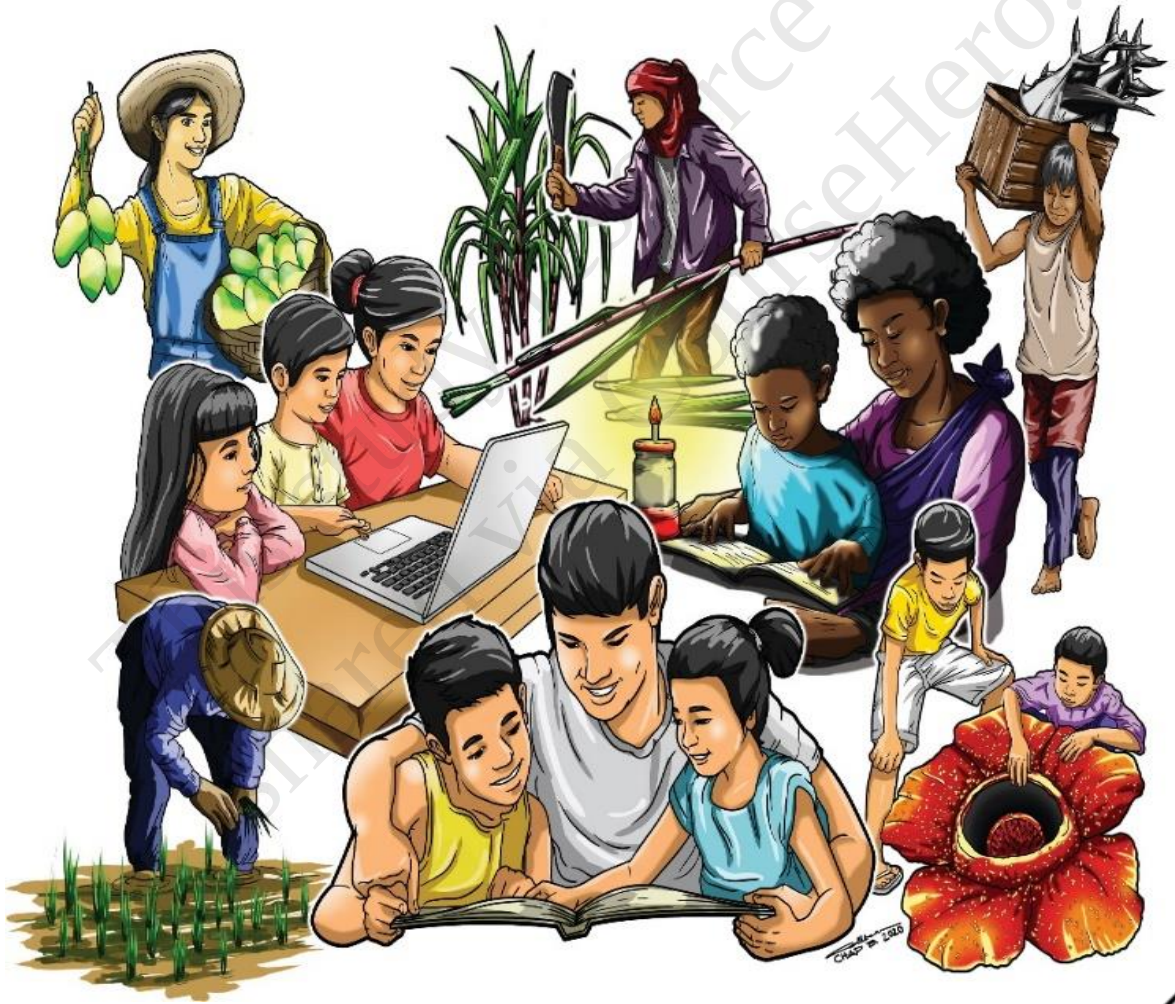
DEPARTMENT OF EDUCATION

General Biology 1 Activity Sheet

Quarter 2 – MELC 2

Week 1

Importance of Chlorophyll and other Pigments



REGION VI – WESTERN VISAYAS

General Biology 1
Activity Sheet No. 2- Importance of Chlorophyll and other Pigments
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This **Learning Activity Sheet** is developed by DepEd Region 6 – Western Visayas.

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Introductory Message

Welcome to General Biology 1!

The Learning Activity Sheet is a product of the collaborative efforts of the Schools Division of Aklan and DepEd Regional Office VI - Western Visayas through the Curriculum and Learning Management Division (CLMD). This is developed to guide the learning facilitators (teachers, parents and responsible adults) in helping the learners meet the standards set by the K to 12 Basic Education Curriculum.

The Learning Activity Sheet is self-directed instructional materials aimed to guide the learners in accomplishing activities at their own pace and time using the contextualized resources in the community. This will also assist the learners in acquiring the lifelong learning skills, knowledge and attitudes for productivity and employment.

For learning facilitator:

The General Biology 1 Activity Sheet will help you facilitate the leaching-learning activities specified in each Most Essential Learning Competency (MELC) with minimal or no face-to-face encounter between you and learner. This will be made available to the learners with the references/links to ease the independent learning.

For the learner:

The General Biology 1 Activity Sheet is developed to help you continue learning even if you are not in school. This learning material provides you with meaningful and engaging activities for independent learning. Being an active learner, carefully read and understand the instructions then perform the activities and answer the assessments. This will be returned to your facilitator on the agreed schedule.

Name of Learner:_____
Grade Level/ Section: _____**Date:** _____

General Biology 1 Activity Sheet No. 2

THE IMPORTANCE OF CHLOROPHYLL AND OTHER PIGMENTS

I. Learning Competency with Code

Explain the importance of chlorophyll and other pigments (STEM_BIO11/12-IIa-j-3)

II. Background Information for Learners

Photosynthesis is a major process necessary for plants to produce their own food.

In this process, the sun's energy is converted to chemical energy by photosynthetic organisms. However, the various wavelengths in sunlight are not all used equally. Instead, photosynthetic organisms contain light-absorbing molecules called *pigments*. The importance of pigment in photosynthesis is that it helps absorb the energy from light. The free electrons at the molecular level in the chemical structure of these photosynthetic pigments revolve at certain energy levels.

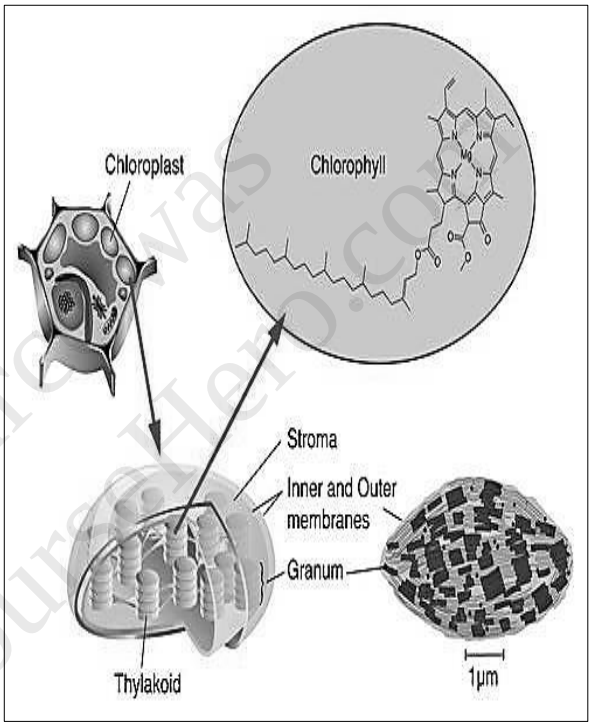

Figure 1. The location and structure of chlorophyll.
Photo source: *https://www.ck12.org/book/ck-12-biology-advanced-concepts/section/5.4/*

Since sunlight provides energy for photosynthesis to take place, organisms are eventually solar – powered. During light reactions, light – energy absorbed by chlorophyll- a green photosynthetic pigment found in plants, algae and cyanobacteria. It is used to make two energy – rich compounds: ATP and nicotinamide adenine dinucleotide phosphate (NADPH).

In general, chlorophyll is the *primary pigment* and the main *light – absorbing molecule* used in the process of photosynthesis. *Chlorophyll* reflects green light and absorbs red and blue light most strongly. In plants, photosynthesis takes place in chloroplasts, which contain the chlorophyll (refer to Figure 1).

Chlorophyll absorbs photons from the red and blue portions of the visible spectrum but either transmits or reflects photons from the green portion. In other words, the green color is what is visible after chlorophyll has absorbed the light used in the light reactions of photosynthesis.

There are two main types of chlorophyll in plants and green algae, *chlorophyll a* and *chlorophyll b*.

In plants, chlorophyll a is the *only pigment* directly involved in the light reactions in photosynthesis. It primarily absorbs light from the blue – violet and red ranges of the spectrum and appears dark green because it mainly reflects green light. All plants, algae, and cyanobacteria which photosynthesize contain chlorophyll a.

Chlorophyll b also known as *"accessory pigment"* does not take part directly in the light reactions but instead transmits absorbed energy to those chlorophyll a molecule that are directly involved.

Some other accessory pigments, known as carotenoids, primarily absorb blue – green light and reflect yellow or yellow – orange light. In plants, these accessory pigments are typically not visible until chlorophyll breaks down as when leaves of the deciduous plants change color. It is the carotenoids that cause autumn coloration after short days and cold temperatures have slowed photosynthesis and chlorophyll has broken down.

III. Activity Proper

Activity 1
A. WORD SEARCH

Directions: Encircle the words below that are related to the lesson. The words inside the separate box will help you determine the words to be searched.

M	Q	F	H	R	V	N	U	P	A	S	G	V	N	L
F	C	Q	D	G	J	L	B	V	C	A	R	F	P	A
V	P	H	O	T	O	S	Y	N	T	H	E	S	I	S
N	D	D	L	V	W	G	B	X	S	D	E	B	G	P
D	V	A	K	O	D	F	H	M	C	B	N	S	M	E
H	S	V	J	Y	R	A	D	F	X	V	B	H	E	C
C	D	H	M	R	S	O	R	U	C	B	N	G	N	T
R	G	A	B	S	O	R	P	T	I	O	N	U	T	R
Z	E	B	Z	U	V	E	B	H	U	P	R	Q	R	U
D	V	F	Q	N	B	T	N	J	Y	J	V	S	T	M
A	B	N	L	K	S	R	M	T	I	L	N	Z	G	U
U	Z	O	S	E	D	F	W	R	K	B	L	U	E	H
O	C	P	D	O	C	J	L	B	V	C	A	R	F	P
P	Q	C	A	R	O	T	E	N	O	I	D	S	H	N
L	I	G	H	T	J	L	B	V	C	A	R	F	P	A

CHLOROPHYLL	*PIGMENT*	*SPECTRUM*	*LIGHT*
CAROTENOID	*GREEN*	*ABSORPTION*	
PHOTOSYNTHESIS	*REFLECT*	*BLUE*	

B. TRUE OR FALSE.
Directions: Write TRUE if the statement is correct and FALSE if it is wrong and explain your answer.

_____**1. <u>Chlorophyll A</u> is the primary pigment and the main light – absorbing molecule used in the process of photosynthesis.**
_____**2. The two main types of chlorophyll in plants are chlorophyll a and <u>carotenoid.</u>**
_____**3. Carotenoids primarily <u>absorb blue – green light</u> and reflect yellow or yellow – orange light.**
_____**4. <u>Chlorophyll a</u> is the only pigment directly involved in the light reactions in photosynthesis.**
_____**5. Chlorophyll reflects <u>blue and red light</u> which makes the leaf green.**

C. INCORPORATING ART INTO SCIENCE
Directions: Below is a simple science activity which you can work at home by using the resources near you or at your backyard.

MY CHLOROPHYLL ART

Materials

- ✓ *8 to10 green leaves (make sure the leaves are rich in chlorophyll)*
- ✓ *a white sheet of paper (any size)*
- ✓ *a metal spoon*

Procedure

1. *Secure all the materials needed for the activity*
2. *Wear protective clothing (lab apron/lab gown if available, mask and gloves)*
3. *Fold a sheet of white paper or the activity sheet in half.*
4. *Place several leaves between the folded paper.*
5. *Press firmly on the leaves between the pages and rub with a metal spoon. Avoid plastic spoons as they break when pressed as firmly as necessary.*
6. *Make your work as beautiful and creative as possible. Enjoy the activity! ☺*

Guide Questions

1. Why is it important for plants to have pigment like *chlorophyll*?

_____

_____

2. What is the reason why the color of leaves changes during autumn?

_____

_____

IV. Reflection
Complete the statements below.

I understand

_____

_____

I don't understand

_____

_____

I need more information about

_____

_____

V. Reference for learners

Nabors, M. W. (2005) BOTANY: An Introductory Approach. Pearson Education South Asia Pte. Ltd.

https://aroundthekampfire.com/2019/02/chlorophyll-paintings-plant-science-leaf-rubbing-art-activities.html

VI. Answer Key

Guide Questions.

1. Why is it important for leaves to have pigment like *chlorophyll*?

Chlorophyll is the primary pigment that is responsible for light – absorbing molecule which is used in the process of photosynthesis.

2. What is the reason why the color of leaves changes during autumn?

Accessory pigments are the reason why leaves changes colors during Autumn. As trees prepare to lose their leaves, the chlorophyll molecule breaks down, revealing the colors of other pigments like red, yellow, and orange.

EXERCISE C

MY CHLOROPHYLL ART

ANSWERS MAY VARY

EXERCISE B

1. CHLOROPHYLL is the primary pigment that is responsible for light – absorbing molecule which is used in the process of photosynthesis.
2. CHLOROPHYLL B is known as accessory pigment and does not take part directly in light reactions. Instead, it transmits absorbed energy to those CHLOROPHYLL A molecules.
3. TRUE
4. TRUE
5. Chlorophyll only reflects GREEN light that is responsible in green color of most leaves.

EXERCISE A

W

M	Q	F	H	R	V	N	U	P	A	S	G	V	N	L
F	C	Q	D	G	J	L	B	V	C	A	R	F	P	A
V	P	H	O	T	O	S	Y	N	T	H	E	S	I	S
N	D	D	L	V	W	G	B	X	S	D	E	B	G	P
D	V	A	K	O	D	F	H	M	C	B	N	S	M	E
H	S	V	J	Y	R	A	D	F	X	V	B	H	E	C
C	D	H	M	R	S	O	R	U	C	B	N	G	N	T
R	G	A	B	S	O	R	P	T	I	O	N	U	T	R
Z	E	B	Z	U	V	E	B	H	U	P	R	Q	R	U
D	V	F	Q	N	B	T	N	J	Y	J	V	S	T	M
A	B	N	L	K	S	R	M	T	I	L	N	Z	G	U
U	Z	O	S	E	D	F	W	R	K	B	L	U	E	H
O	C	P	D	O	C	J	L	B	V	C	A	R	F	P
P	Q	C	A	R	O	T	E	N	O	I	D	S	H	N
L	I	G	H	T	J	L	B	V	C	A	R	F	P	A