

**PENANG SANGAM HIGH SCHOOL**  
**P.O.BOX 44, RAKIRAKI**

**LESSON NOTES**

**WEEK 18**

**Year/Level:** 13A/B

**Subject:** BIOLOGY

|                                 |                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------|
| <b>Strand</b>                   | 2 Living Together                                                                |
| <b>Sub Strand</b>               | 2.1 Organisms And The Environment                                                |
| <b>Content Learning Outcome</b> | Identify and describe different movements in organisms as a response to stimulus |

**Biological clocks are used for:**

- Control of daily rhythms of the body
- Reproduction timing
- Preparing for migration by eating plenty of food
- Preparing for winter by storing food, increasing thickness of coat and hibernating
- Navigating by the sun or stars

**Activity:**

**Summary of Biological Rhythms**

| <b>Period/<br/>Length</b> | <b>Name</b> | <b>Chronological<br/>Name</b> | <b>Example</b>                         |
|---------------------------|-------------|-------------------------------|----------------------------------------|
| 12.4 h                    | Tidal       | CIRCA TIDAL                   | Crab activity on shoreline             |
| 29 days                   | Monthly     | CIRCA LUNAR                   | Menstrual cycle, marine reproduction.  |
| 365 days                  | Yearly      | CIRCANNUAL                    | Hibernation, many reproductive cycles. |
| 24 h                      | Daily       | CIRCADIAN                     | sleep-wake cycle and many others       |

### Examples of Circadian Rhythms in Humans

1. Sleep – awake rhythms: these vary in individuals with age. For example, children sleep for long hours compared to adults.
2. Heart rate: keeps in step with the temperature.
3. Pain: sensitivity to pain varies during the day. For instance, we are more sensitive to the pain of cold at night than to the pain of a needle at noon.
4. Kidney excretions: follows rhythm of excretion of chemicals such as calcium and potassium.
5. Birth and death: birth or death rate is high during early mornings.

## **BIOLOGICAL ORIENTATION**

**Orientation** is the act of turning or moving in relation to an abiotic factor in the environment.

### **A) Biological Orientation in Plants**

**a. Tropisms:** refers to the growth response of plants towards or away from environmental stimulus coming from one direction. For example:

- Growth of plant shoot towards light is positively phototropic.
- Growth of plant roots towards gravity or downwards into the soil is positively geotropic.
- Growth of roots away from some copper pipes is negatively chemotropic.

**b. Taxes:** refers to the movement of the whole organism towards or away from the stimulus coming from one direction. This is usually associated with the animals which are free to move. Single-celled or simple algae which swim with flagella or cilia show taxic movements. *For example:*

- *Euglena (a green flagellate) swims towards light, so we say it is **positively phototaxic**.*
- *Flatworms moving towards raw meat show **positive chemotaxis**.*

**c. Nastic Responses:** these are responses of plant to stimuli that do not come from any particular direction. The direction of the response is not dependent on the direction of the stimuli. *For example,*

- *collapsing of Mimosa pudica leaves when disturbed.*
- *Response of insectivorous plants eg Venus fly trap*

**d. Kinesis:** is a movement or activity of a cell or an organism in response to a stimulus. Unlike taxis, the response to the stimulus is non-directional, for example humidity. *For cockroaches, a stimulus would be*

*light. When a light is flashed on a group of cockroaches, they do not go toward or away from the light, they just scatter around elude energy. The stimuli causes the movement to be at random.*

## **B)Biological Orientation in Animals**

### **i) Migration**

Is an active, regularly, repeated movement in a particular direction by animals.

Features of migratory animals include:

- They are usually active.
- They usually migrate over long distances.
- They often makes two way trip.
- They usually migrate on either regular seasonal basis.
- They often occur at a definite stage in the life cycle.

### **Example of Migration**

**Salmon:** are anadromous, spending most of their adult life in the sea and migrating up river to spawn. Salmon return to the same river in which they hatched as a fry. They identify their natal stream by its unique chemical properties.

**Green Turtle:** these reptiles have a worldwide distribution and spend most of their live at sea however, they still have to come ashore to breed. Some green turtles migrates from the water off the Coast of South America all the way to Ascension Islands in mid-Atlantic to their traditional breeding sites.

**Zooplankton:** these species make twice-daily vertical migration, coming to the surface layer sat night to feed, and sink approximately 1000 meters during the day.

### **Activity:**

1. Describe how the following environmental clues are used by animals for migration:

solar navigation -

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magnetic fields –

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star navigation

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chemical navigation -

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2. The innate mechanism which controls fat deposits in polar bears before hibernation is a result of the exogenous clock.

(i) Name an exogenous cue that results in this physiological change.

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(ii) Describe how endogenous clocks differ from the exogenous clocks.

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