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BIOLOGY /TERM II HOLIDAY PACKAGE

INSTRUCTIONS:

1. Read the passage/notes below and answer the related questions
2. Use the space reserved for answers

Unit 14 behavior and responses in mammals

1. Defining behaviour

Behaviour is the way an organism responds to internal or external stimuli in its environment.

A stimulus is any change in the environment that causes a response.

Examples of stimuli in mammals:

- Heat
- Cold
- Pain
- Light
- Sound
- Hunger
- Fear
- Hormonal changes

A response is the reaction of an organism to a stimulus.

Example:

The stimuli or action associated with a stimulus	A response
Touching a hot object	withdrawal of hand
Bright light	closing eyes
Hunger	searching for food/Eating when hungry
Fear	Running from danger
Heat/Cold	Sweating when hot/Shivering when cold respectively

2. Components required for behavioural responses in mammals

For behaviour to occur, mammals need:

1. Receptors

Receptors are specialized cells or organs that detect stimuli.

Examples:

- Eye (light receptor)
- Ear (sound receptor)
- Skin (touch receptor)
- Nose (chemical receptor)
- Tongue (taste receptor)

Types of receptors:

Type	Function	Example
Photoreceptors	Detect light	Eye
Thermoreceptors	Detect temperature	Skin
Chemoreceptors	Detect chemicals	Nose
Mechanoreceptors	Detect pressure	Skin
Nociceptors	Detect pain	Skin

2. Coordinator: The part that processes information and determines the response.

In mammals this includes:

- Brain
- Spinal cord

This forms the **central nervous system (CNS)**.

Functions:

- Receives information
- Interprets stimulus
- Sends response signals

3. Effectors: Effectors are organs that carry out responses.

They include:

- Muscles
- Glands

Examples:

Effector	Response
Muscles	Movement
Sweat glands	Sweating
Salivary glands	Secretion of saliva

2. Types of Behaviour

Behaviour is mainly classified into **two major types**:

1. Innate behaviour

2. Learned behaviour

3.1 Innate Behaviour

► Definition

Innate behaviour is behaviour that an organism is born with. It is genetically determined and does not require learning.

This behaviour is also called:

- Inborn behaviour
- Instinctive behaviour

► Characteristics of Innate Behaviour

In general, innate behaviors will always be:

1. **Heritable**: encoded in DNA and passed from generation to generation
2. **Intrinsic**: present in animals raised in isolation from others
3. **Stereotypic**: performed in the same way each time by each individual
4. **Inflexible**: not modified by development or experience
5. **Consummate**: fully developed or expressed at first performance

► Sub-types of Innate Behaviour

1. Reflex actions

Definition:

Reflex action is a rapid automatic response to a stimulus without conscious thinking.

Examples:

- Blinking of eyes
- Knee jerk
- Withdrawal from heat
- Sneezing

Characteristics of Reflex Actions:

- Very fast
- Automatic
- Involuntary
- Protective
- Controlled by spinal cord

2. Instinctive behaviour

► Definition:

1. **Instinct** is a complex pattern of behaviour that an organism is born with.

Examples:

- Birds building nests
- Babies sucking milk
- Spiders spinning webs
- Migration of birds

Characteristics:

- Complex
- Inherited

- Species specific
- Done correctly first time

3. Kinesis

► Definition:

2. Kinesis is a random movement response to stimulus where the speed of movement depends on stimulus intensity.

Types of Kinesis:

► a) Orthokinesis

Movement speed changes.

Example:

Woodlice move faster in dry areas.

► b) Klinokinesis

Turning rate changes.

Example:

Maggots turn more in unfavourable conditions.

4. Taxes (Taxis)

Definition:

Taxes is a directional movement toward or away from a stimulus.

Types of Taxes:

Type	Meaning	Example
Phototaxis	Response to light	Euglena moving to light
Chemotaxis	Response to chemicals	Bacteria moving to nutrients
Geotaxis	Response to gravity	Roots growing downward
Hydrotaxis	Response to water	Roots growing toward water
Thermotaxis	Response to temperature	Organisms moving to warm areas

Types based on direction:

Positive taxis: Movement toward stimulus.

Negative taxis: Movement away from stimulus.

2.2 Learned Behaviour

► Definition

Learned behaviour is behaviour acquired through experience and practice.

Characteristics of Learned Behaviour:

In general, learned behaviours will always be:

1. **Non-heritable:** acquired only through observation or experience
2. **Extrinsic:** absent in animals raised in isolation from others
3. **Permutable:** pattern or sequence may change over time
4. **Adaptable:** capable of modification to suit the changing conditions
5. **Progressive:** subject to improvement or refinement through practice

► Sub-types of Learned Behaviour

1. Habituation

Habituation is learning to ignore repeated harmless stimuli.

Example:

- Not reacting to repeated noise
- Birds ignoring scarecrow after time

2. Conditioning: This is a learning through association.

Types:

a) Classical conditioning

Learning by association between two stimuli.

Example:

Pavlov's dog experiment:

- Bell + food → salivation
- Bell alone → salivation

b) Operant conditioning

Learning through reward and punishment.

Example:

- Dog rewarded for obeying command
- Student studies to get good marks

3. Trial and Error Learning

Definition:

Learning by trying different methods until success is achieved.

Example:

- Rat finding way through maze
- Child learning to walk

Characteristics:

- Takes time
- Improves with practice
- Involves memory

4. Insight learning

Definition:

Learning through thinking and reasoning.

Example:

Chimpanzee using stick to get food.

Characteristics:

- Requires intelligence
- Sudden solution
- No trial needed sometimes

5. Imprinting

Definition:

Learning occurring at a particular early stage of life.

Example:

Ducklings following first moving object.

Characteristics:

- Occurs early in life
- Permanent
- Fast learning

Differences between innate and learned behaviour

Feature	Innate behaviour	Learned behaviour
Origin	Inborn	Acquired
Experience	Not required	Required
Flexibility	Fixed	Flexible
Speed	Fast	May be slow
Modification	Difficult	Easy
Example	Reflex action	Riding bicycle

3. Importance of behaviour

Behaviour helps organisms to:

- Survive
- Find food
- Avoid predators
- Reproduce
- Adapt to environment
- Maintain homeostasis
- Communicate

Summary

Behaviour is a response to stimuli

It is either innate or learned

It is controlled by nervous and endocrine systems

It is important for survival

Main types:

1. Innate behaviour

- Reflex
- Instinct
- Taxes
- Kinesis

2. Learned behaviour

- Habituation
- Conditioning

- Habituation
- Conditioning
- Trial and error
- Insight
- Imprinting

I. State whether the following statements are True or False	Answers
1. Behaviour is precisely an external response directed internally.	1.
2. Riding a bicycle is an innate behavioural activity.	2.
3. In classical condition, animal learns to respond to the stimulus even in the absence of a reward or punishment.	4.
4. Innate behavior is also known as inherited behavior.	5.
5. Kinesis is no change in the speed of movement in presence of a stimulus.	6.
6. Animals hibernate for food and breeding.	7.
7. Touching something hot and pulling your hand back is a learned behavior.	8.
8. To mark their territories, animals use pheromones.	9.
9. Latent learning is a form of learning which is immediately expressed.	
II. Multiple choice questions	
1. A trainer is teaching actions to dogs. It is a. learning c. imprinting b. kinesis d. courtship	1.
2. What happens in a situation of fear? a. heart rate decreases b. blood pressure decreases c. secretion of non-adrenaline b. heart rate increases	2.
3. Which behaviour activity is done before mating? a. learning c. habituation b. courtship d. imprinting	4.
4. Territorial behaviour of animal provides: (a) shelter (b) food (c) breeding (d) all of the above	5.
5. Periodic movement of animals from one place to	6.
	7.
	8.
	9.

another is called

- (a) migration (b) imprinting
- (c) conditioning (d) taxis

6. Which is an example of imprinting behaviour?

- (a) secretion of saliva (b) riding bicycle
- (c) newborn baby and mother (d) sacrificing life for others

7. In which behaviour are scent markings and visual signalling observed?

- (a) courtship (b) territorial
- (c) migration (d) habituation

8. Which of the following belongs to altruism?

- (a) Hamilton's rule (b) Pavlov's experiment
- (c) reflex arc (d) biological clock

9. Habituation behaviour is

- a. A period before mating
- b. A periodic movement from one place to other
- c. A structure in which a linear or nearly linear ranking exists
- d. A behavior by which organism decreases or ceases to respond to a stimulus after repeated presentations