



*Dr. Bbosa Science*

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## **Behaviors**

Are responses to the stimuli animals receive. Those animals that respond appropriately to changes in their environment are more likely to survive and reproduce.

A stimulus is anything that causes an action or reaction from something else.

### **The development of behaviors.**

To almost all behaviors there are two components one is instinctive and one learned. eg fish instinctively swim when they first take to water. Instincts are genetically inherited from parents and handed down in evolution. In most cases instinctive behaviors are common to all members of a species. Like structural features such as limb, instincts are subject to natural selection. However, with practice fish learn to swim more effectively.

### **Instinct**

Instinctive behavior is an innate (inborn), stereotyped response to one or more environment stimuli, characteristics of organism of a given species

Characteristic of instincts include:

- Are inherited and not acquired. That is, they develop independent of the environment
- Are usually of immediate adaptive value to the organism.
- Are produced unconsciously in response to sudden change in the environment.
- Are similar in all members of a species and develop even in isolation.

They include

#### **1. Reflex.**

A reflex is a simple act of behavior in which a stimulus produces a specific short-lived response.

For example of reflex

1. Escape response of the earthworm i.e. when they hit an obstacle they quickly disappear into their burrows.
2. Quick removal of hands from a hot object.

Ecological importance reflex behavior

- (i) Rapid response to a stimulus, helps minimize any damage to the body from potentially harmful conditions, such as touching something hot.
- (ii) Knee jerk helps us in balance
- (iii) Reduce energy that would be required to plan and actively execute every tiny movement we make.
- (iv) reduces chances of the earthworm being eaten by foxes or other predators.

## 2. Kinesis

Alternative definitions

- (i) is a behavior pattern in which an animal responds to an alternation in stimulus intensity by changing its activity level.
- (ii) is the movement of an organism in response to a stimulus, but it does not result in movement directly towards or away from the stimulus.
- (iii) Kinesis is a random (non-directional) movement in response to a stimulus

Difference between kinesis and taxis

Kinesis is a random (non-directional) movement in response to a stimulus while taxis is a directional movement away or towards a stimulus

**For example of kinesis**

- (i) Woodlice like damp conditions. If the environment is too dry, they will move more often (although in random directions), until they find a damp environment. They will then move less often to try and stay in that environment. Note that the movement is non-directional but the organism simply moves more, or less in response to a stimulus.

It's important to emphasize that woodlice do not move up the gradient of humidity. They simply move more in a non-humid environment. Eventually sheer chance they are likely to reach a more humid environment. The result of this behavior is that woodlice spend most of their time in moist habitats.

- (ii) When a light is turned on, the cockroach will quickly start running - not necessarily away from or towards the light. This is kinesis, as it is just movement as a response to the stimulus of the light being turned on and not associated with a direction.
- (iii) Kinesis is movement triggered by increased activity such as an animal who is cold, hot, hungry or angry.

**Ecological importance of kinesis**

It increases the chances of finding resources and favorable conditions by sheer luck.

3. **Taxis** is a movement that oriented in relation to the direction of stimulus

#### **Examples of taxis**

- (i) Euglena swims towards light. Euglena is said to be positively phototactic. Earth worms move away from light and are therefore negatively phototactic.
- (ii) The mosquito moves towards the carbon dioxide source in order to find food.
- (iii) Moving toward a source of scent to find ripe fruit/food.

#### **Ecological importance of taxis**

- (i) Helps an organism to find food
- (ii) Enables an organism to avoid unfavorable environment.
- (iii) Enable organism to find mates

### **Sign of stimuli.**

Is a stimulus that produces a selectively stereotyped response. Such selective behavior is adaptive because it allows an animal to respond immediately in an appropriate way to relevant aspect of its environment and to ignore others.

Example;

- the two eyes constitute the sight stimulus which cause the baby smile.
- The red spot of herring gull's yellow beak is a sign stimulus that direct its chicks to pick at its beak to receive food.
- The swollen abdomen of stickleback is the sign stimulus to attract male stickleback.

### **Learning**

It refers to a more or less permanent change in behavior which occurs as a result of experience. Animals vary in how much they are capable of learning.

In general, the larger an animal's brain, the more it can learn though much of the brain has nothing to do with learning.

The tremendous capacity human for learning is due to enlarged cerebral hemispheres with extensive cortical folding and organization.

### **Types of learning.**

#### **1. Habituation**

Is reduced response of an animal to a repeated stimulus which is associated with neither benefit nor harm.

#### **Examples of habituation**

- (i) Birds soon ignore the scarecrow which prevented them from landing when it was first placed in a field.
- (ii) Lack of continued response to strong odors is a common example of sensory habituation.

- (iii) Reduced response to tingling sensation of coarse sweater.
- (iv) Reduced distraction from noise

### **Importance of habituation**

- (i) Enables a young animal to understand neutral elements in the environment such as movements due to wind.
- (ii) It enables an animal to save energy by not responding to non-harmful stimuli over and over again.
- (iii) Habituation helps to eliminate unnecessary responses.
- (iv) Helps an animal filter large amount of information received from the surrounding environment.

## **2. Associative learning or conditioning**

This is any learning process in which a new response becomes associated with a particular stimulus. Or is learning attributed to temporary relationship between events.

It is classified as **classical conditioning** and **operant condition**

### **(a) Classical conditioning/**

Classical conditioning is the process by which a naturally occurring stimulus is paired with a stimulus in the environment, and as a result, the environmental stimulus eventually elicits the same response as the natural stimulus.

### **Examples of classical conditioning**

- (i) Saliva secretion elicited by the sight, smell of food or ringing a bell for lunch.
  - The naturally occurring stimulus such as food to the dog is referred to as the **unconditioned stimulus** because the dog's response (salivation) to the food occurs naturally.
  - The smell or bell is the **conditioned stimulus** because the dog must learn to associate it with the desired response.
  - Salivation in response to the food is called the **unconditioned response** because it's an innate reflex.
  - Salivation to the smell or bell is the **conditioned response** because the dog learns to associate that response with the conditioned stimulus.
  
- (ii) A feeling of hunger in **response to the** smell

### **(b) Operant conditioning, Instrumental or trial and error learning**

This is a type of learning where behavior is controlled by consequences i.e. reward or punishment.

## Examples of operant conditioning

- (a) Suppose a hungry dog is allowed to roam around a room. As soon as it jumps onto a particular chair it is given some food. The dog soon learns to associate jumping onto that chair with a reward. If hungry it will go straight to the chair as soon as it enters the room. As with classical conditioning, this is a form of associative behavior. However the dog has learned to associate a reward not with a particular stimuli but its own behavior.
- (b) children learn to avoid hot red hot objects.
- (c) A student tends to complete his/her homework daily; because he/she knows that he/she will be rewarded with a candy (action) or praise (behavior).
- (d) Workers are often offered with the incentives and bonus in return of completing their targets in time or for regular attendance. It makes the workers to perform better, so that, they can continuously get those incentives and bonus.
- (e) Students or children will follow rules strictly to avoid being nagged by the teachers or parents. So, to avoid nagging, the child might end up following the rules strictly. Similarly, army personnel also have to follow the strict routine to avoid disciplinary actions against them; it shapes them into a disciplined individual.

### 3. Latent learning

Animal learn about something unintentionally but the knowledge become useful at the time when it's necessary.

Latent learning is important because in most cases the information we have learned is not always recognizable until the moment that we need to display it

#### **For examples of latent learning/observational learning**

- (i) A signpost of a medical facility may be may be remembered when you are sick.
- (ii) A student is taught how to perform a special type of addition, but does not demonstrate the knowledge until an important test is administered.
- (iii) An infant learns to make and understand facial expressions. A child learns to chew.
- (iv) After witnessing an older sibling being punished for taking a cookie without asking, **the** younger child does not take cookies without permission.

#### **Importance of learning**

- Important for socialization process, as children learn how to behave and respond to others by observing how their parents and other caregivers interact with each other and with other people

### 4. Insight learning

It occurs when an animal solves unfamiliar problem apparently by looking at it, assessing the situation and the arriving at a solution.

The first experiment which demonstrated this type of learning in non-human were done on chimpanzees. Presented with a bunch of banana too high to reach and a few boxes, some chimpanzees piled up boxes to make a stand for themselves.

**Intelligence:** Intelligence is the ability of an animal to solve unfamiliar problems.

## 5. Imprinting

It is another form of learning where chicks, duckling and goslings will follow the first moving object they see after hatching. This object is ordinary their mother but they seemingly can be imprinted on any object such as a human or a red ball, if it's the first moving object they see during a sensitive period of two to three days after hatching.

The term sensitive period means that the behavior only develops during this time.

### Importance of imprinting behavior

- (i) It enables the young animal to recognize its own mother from among the other adults of its species.
- (ii) In early childhood, human become imprinted on their brother and sister and subconsciously learn not to mate with them subsequently to prevent inbreeding.
- (iii) Enable animals to visually identify with other members of their species so they may choose appropriate mates later in life.
- (iv) Enable young one to get food from their parents.

## 6. Displacement activity

Displacement behavior are inappropriate behavior (out of context) which are sometimes displayed by animals when is in state of internal conflict such as fear and aggression.

When an animal is confronted with several alternative courses of action, it may perform what appear to be an irrelevant behavior,

Examples of displacement activity

- (i) When a bird sitting on its egg is suddenly confronted by a predator, instead of fleeing or attacking the predator may not do either but preens its feather.
- (ii) Displacement behavior in human include scratching an ear and unnecessary running a hand through one's hair under conflict.

### Importance of displacement activity

It may be away of releasing stress

### Reproductive behavior

For an organism that reproduce sexually reproductive success depends on finding a mate. During the course of evolution an amazing diversity of pattern of courting and mating have arisen.

### **Choosing a mate**

It must be emphasized that the phrase choosing a mate does not imply that an organism consciously tries to decide with whom to mate. For the vast majority of species, 'decision' is made almost certainly subconsciously.

### **Species-specific signals**

At the most basic level, a mate must be an individual of the same species but the opposite sex. In many species, what ensures that the right individuals mate with each other is courtship.

Courtship is a complex behavior pattern designed to stimulate an organism to sexual activity, and is associated with pair formation in those species where both sexes are involved in rearing offspring, such as baboons. Courtship behavior is controlled primarily by motivational and releasing stimuli and leads to mating. A variety of signals used in courtship to attract members of the opposite sex include sight, sound, smell, etc.

### **Functions of courtship.**

- a. Allows the male to mate with a female when gonads are functional
- b. It enables the mates to select opposite sex with the best quality, enabling the community to evolve into the adapted individuals.
- c. It tightens the bond between the mating pair.
- d. Enables the male and female to look after the offspring together.
- e. Synchronization of gonadal development so that the gametes mature at the same time.

### **Communication.**

The ability of an animal to communicate with one another is fundamental to animal behavior.

Communication between two individuals involves the following:

(v) Signal; The message conveyed from one individual to another.

(vi) A sender; The individual who transmits the signal.

(vii) A context; The setting in which communication occurs.

(viii) A channel; The medium in which the signal is transmitted [e.g. chemical, auditory or tactile]

(ix) A receiver; Individual who detects the signal

(x) A code; The rules which enable the receiver to decipher/translate the signal.

Communication may be either intraspecific or interspecific.

The importance of communication to animals can be illustrated by the phenomenon of territorial defense.

## **Territorial behavior**

A territory is more or less exclusive area defended by an individual or group.

### **Function of a territory**

- (i) It limits mating to fit individuals produce vibrant offspring
- (ii) Exclusive access to food; some animals hunt in groups
- (iii) Allow one sex, usually the male to defend an area to which female are attracted for mating
- (iv) Protection; organism defend themselves as a group from intruders or predators.
- (v) Provide breeding space.
- (vi) Allow sharing of resources with those organisms that cannot guard their family.

### **Disadvantage of territory**

- (i) Weak animals are denied sex
- (ii) Limit population density and other good qualities are lost
- (iii) Promote spreading of diseases
- (iv) May lead to extinction in case of disaster.

## **Social behavior**

This is where animals live in groups.

### **Advantage of social behavior**

- (a) Species in large groups suffer less predators even when the predator is successful; The chance that one is picked is very low.
- (b) Predators are more successful at catching large prey when hunting in groups than when hunting on their own.
- (c) Wood lice huddle together and survive desiccation better.
- (d) Honey bees build hives with an internal air- conditioning system created by thousands of workers fanning with their wings
- (e) Males able to hold on to resources show their evolutionary fitness and are attractive to females.
- (f) Exclusive access to food, particularly at times of shortage.
- (g) Exclusive area for breeding and raising young.
- (h) Space for sexual display and courtship.
- (i) Spacing of animals avoids competition.
- (j) Reduces aggression / conflicts.
- (k) Improves local knowledge of predators and resources.

### **Disadvantages of group**

- (a) Competition for food
- (b) Competition for male and some monopolize female.
- (c) Intraspecific competition may be a means of regulating population size
- (d) Reduces individual's chances of being eaten
- (e) Cost of defending territory including risk of physical contact, and displays of strength.
- (f) Difficult for smaller animals to hold territory; i.e. more likely to be attacked than larger animals



- (g) Difficult to move if resources exhausted.
- (h) Importance of territory size. If too large, then hard to maintain control. If too small, not enough resources for effort of defending.
- (i) Higher risk of predation if territory within predator's territory.
- (j) Easy for predators to find.

### **Altruism and kin selection**

**Altruism** is a disadvantageous behavior for an individual performing the behavior, but helpful to other individual e.g. worker honey bees are altruism in that they help their mother to produce off spring rather than lay eggs themselves.

**Kin selection:** is said to occur when a decrease in an individual's fitness, or the number of off springs it produces, is more than compensated by an increase in the fitness of its relative, e.g. communal suckling.

**Reciprocal altruism**, when altruist subsequently receive aid in return.

**Socialization** is the process by which human learn to become members of the society.

**MIGRATION:** Inborn, seasonal, long-distance travel of animals to specific locations, usually with a return. **Orientation:** organism is capable of detecting compass direction (N, S, E, W) using cues from the environment **Navigation:** organism is capable of detecting its position as well as orientation, (N, S, E, W of something – river, ocean, mountain range, etc) **Examples of migration:**

- (i) Some species of Gallinaceous and raptorial birds migrate from valley to mountain peaks.
- (ii) Salmon return to native streams to breed after several years at sea.
- (iii) Deer and Caribou, African ungulates - mammals engaged in overland migrations.
- (iv) Some sharks, whales (northern oceans for calving, southern areas for breeding) and other marine mammals - engaged in long distance oceanic migrations Migration is triggered by seasonal changes in weather, air temperature or day length, or changing food supply. Examples: wildebeest move towards rain in the dry season, some animals move from one food source to another, while others migrate to particular breeding areas.

### **Cues that animals use to navigate**

- (i) Endogenous - hormonal
- (ii) Exogenous - external cues from the environment

Examples:

1. Sun compass - movement of sun; angle of sun; polarized light (pattern of light based on sun's position and reflection on water)
2. Geomagnetic compass - sensitivity to magnetic North and the earth's magnetic field
3. Star compass or position of moon
4. Other visual cues - patterns of waves; cloud patterns; landmarks
5. Smell
6. Sound

7. Electric
8. Young animals may learn when and where to migrate by following their parents

### **Advantages of migration**

1. Return to specialist site for breeding that does not need all year round food supply, and often no (or few) predators.
2. Move to where food/prey available when not breeding, particularly with young (i.e. maximize feeding opportunity).
3. Stationary can mean increased predator risk.
4. Constant temperature conditions: escape bad weather and lower temperatures (and greater risk of death), especially to give birth.
5. Able to have specialist breeding site (e.g. no predators) and another site for feeding.
6. Flexible strategy - some members of the species can migrate and others not depending on where live.
7. Stationary animals risk exhausting food supply using it all year round, particularly if competition from other species.
8. Opportunity for different members of the species to meet, and greater breeding variety
9. Ideal when specialist food required because the earth's resources are not evenly distributed.
10. Birds migrating at night usually safe from predators as few day-time birds of prey adapt to night-time hunting.

### **Disadvantages of migration**

1. Large amount of energy required to travel long distances.
2. Problems and risks of navigation.
3. Risk of forgetting sites or not being able to find again.
4. Leave home territory empty allowing for invaders, and then fights on returning.
5. Risk at temporary stopovers from lack of local knowledge about predators.
6. Vulnerable to weather changes or poor conditions in one year.
7. Many decisions required including optimal fuel load and optimal time of departure.
8. Other risks like the change from salt to freshwater or vice versa for some fish.
9. Evolutionary maladaptive behaviour in some cases; e.g. green turtles feed on eastern coast of South America but breed on Ascension Island (south Atlantic).
10. Risks of night-time migration if animals normally active in day-time (e.g. bat predation of birds).

## Exercise

1. Imprinting can be described as
  - A. A behavior that involves recognizing a print mark
  - B. An innate behavior that requires practice
  - C. Learning that occurs at a critical period in early development
  - D. Learning that requires a sign stimulus.
2. Which one of the following patterns of behavior in rat would be a result of latent learning?
  - A. Avoiding to eat poisoned food
  - B. Associate smell with presence of food
  - C. Young rat following their mother
  - D. Being aware of escape route
3. Which of the following is **not** correct about instinctive behavior?
  - A. Is permanent adaptive trait
  - B. Can be developed in animals reared in isolation
  - C. Allow synchronization of sexual behavior
  - D. Develop independently of the environment
4. When same response is given to the same stimulus on different occasion, the behavior is said to be
  - A. Instinctive
  - B. Conditioned
  - C. Imprinted
  - D. stereotyped
5. Hormones influence behavior in the following ways except
  - A. affecting the growth of nerve connections in the brain
  - B. directly affecting nerve cell and synapses within the central nervous system
  - C. altering the sensitivity of peripheral receptors
  - D. inducing RNA changes to quicken the learning process
6. Which one of the following is an advantage of social behavior among animals?
  - A. No incidence of cannibalism
  - B. Decreased susceptibility to diseases
  - C. Increased reproductive efficiency
  - D. Decreased competition
7. Migration of birds during winter from temperate regions to the tropics is an example of
  - A. Habituation
  - B. Insight learning
  - C. Imprinting
  - D. Exploratory learning
8. Which one of the following is not a purpose for courtship behavior among animals?
  - A. Establishing a territory
  - B. Ensuring that both partners are sexually mature
  - C. Establishing a pair bond
  - D. Ensuring that both partners are ready for mating

9. Birds learn to ignore a scare crow that is left in the same spot for a long time. This type of behavior is called
- A. Associative learning
  - B. Habituation
  - C. Imprinting
  - D. Conditioning
10. The type of learning that involves the immediate understanding and responding is
- A. imprinting
  - B. associative learning
  - C. insight learning
  - D. habituation
11. Which one of the following, types of behavior is **least** learnt?
- A. Associative
  - B. Instinct
  - C. Imprinting
  - D. Insight
12. Which one of the following does not result from territorial behaviors?
- A. Reduced competition within a herd
  - B. Increased variation among off springs
  - C. Reduced frequency of genes from weak individuals
  - D. Increased inbreeding
13. Which is instinctive behavior?
- A. Courtship and display ceremonies in birds and insect
  - B. Avoiding the capture of a distasteful insect by bird
  - C. Migration of birds
  - D. Chicks taking cover when a kite is passing
14. When an earthworm encounters an unfavorable stimulus it quickly withdraws. This is an example of
- A. A conditioned reflex
  - B. An escape response
  - C. Chemotaxis
  - D. A terminating stimulus
15. Which one of the following best describes association learning?
- A. Preying bird avoiding to eat a bright colored caterpillar
  - B. Rat eventually learning to transverse a maze if rewarded
  - C. Chick following the first moving object it sees after hatching
  - D. Chimpanzee using a stick to reach an object
16. Which one of the following would not be caused by seasonal changes in migratory birds?
- A. Hormonal changes
  - B. Feeding behaviors
  - C. Reproductive behaviors
  - D. Plumage coloration

17. Which one of the following patterns of behavior in rats would be a result of latent learning?

- A. Being aware of escape routes.
- B. Avoiding to eat poisoned food.
- C. Associating smell with presence of food.
- D. Young rats following their mother.

18. What type of learning is exhibited by a predator when it avoids eating a brightly colored prey?

- A. exploratory
- b. habituation
- C. associative
- D. Trial and error

Structured question

19. (a) Give the meaning of each of the following forms of behavior.

- (i) Habituation (1mark)
- (ii) Imprinting (1mark)
  
- (iii) Instinctive behavior (1mark)

(b) State the benefits of each of the above forms of behavior to an animal.

- (i) Habituation (2mark)
- (ii) Imprinting (2mark)
  
- (iii) Instinctive behavior (3mark)

20. (a) What is instinctive behavior? (1mark)

(a) State two factors that influence instinctive behavior (2marks)

(b) Territorial behavior is common among many animal species. Give

(i) Four advantages of this behavior. (4marks)

(ii) Three disadvantages of this behaviors (3marks)

21. (a) What is displacement activity? (2marks)

(b) State the ecological importance of each of the following forms of behavior.

(i) Territorial behavior (3marks)

(ii) Courtship behavior (3marks)

(c) Give two ways in which animals avoid predation (2marks)

22. (a) Explain the biological signification of the following forms of behavior

- (i) Territorial behavior
- (ii) courtship

(b) Distinguish between learned and instinctive behavior.

23 a. Using examples, explain the meaning of displacement activity 6 marks

b. What's the importance of each of the following forms of behaviors to the survival of organisms in the community?

- (i) territorial behavior (07marks)
- (ii) courtship behavior (07marks)

Answers to objective type questions

1	C	6	C	11	B	16	B	
2	D	7	D	12	B	17	A	
3	C	8	A	13	D	18	C	
4	D	9	B	14	B			
5	D	10	C	15	A			

19. (a) Give the meaning of each of the following forms of behavior

- (i) Habituating
- (ii) Imprinting
- (iii) Instinctive behaviours

(b) State the benefit of each of the form of behaviour to an animal

- (i) Habituation
- (ii) imprinting
- (iii) instinctive behaviour

**Solution**

(a) (i) Habituation is a form of learning in which an animal gradually ceases to respond to a continuously repeated stimulus not associated with reward or punishment.

(ii) Imprinting is a form of behavior in which a young animal learns to recognize and follow its parent right from the time it is born.

(iii) Instinctive behavior is an innate (inborn), stereotyped response to one or more environment stimuli, characteristics of organism of a given species

(b) (i) Importance of habituation

- Enables a young animal to understand neutral elements in the environment such as movements due to wind.
- It enables an animal to save energy by not responding to non-harmful stimuli over and over again.

(ii) Importance of imprinting

- enable a young animal to acquire rapidly skill possessed by the parents
- It also enables a young animal to closely follow its parents which gives it protection
- It enables the offspring to associate and identify with the species

(iii) Importance of instinctive

- Animals solve quickly new problem without mistakes.
- It enables an animal to use its past experience in one situation to easily solve a similar problem.

## 20. Solution

(a) Instinctive behavior refers to species – specific, protective or procreation activities of an individual in the environment influence.

(b) Species type

Genetic constitution

Exposure to behavior provoking stimuli.

(c) (i) Advantages of territorial behavior\

- The mating pair of organisms of the same species and their offspring are well spaced to receive the available resource e.g. food, space. Shelter.
- The available resources are protected and shared evenly amongst the population.
- Provides defense of an area in which organism live against organisms of the same or different species.
- It minimizes spread of diseases and parasites.
- Actual fighting between organisms which would detrimental to the species is rare and replaced by mere threats.
- The species protect and achieve maximum utilization of the habitat.
- Population growth is easily controlled.
- Intraspecific competition is reduced.
- Genes from strong organisms or the fittest are passed on to the next generation

(ii) Disadvantage of territorial behavior

- A lot of energy is lost in guarding the territory against intruders.
- May lead to death of weak individuals.
- Unfavorable genes carried by strong individuals end up being propagated to future generations.
- Individuals in the territory have limited choices of food and mates because tier supply is limited to those present in the territory.
- In case of a diseases outbreak, all individuals in the territory may die without escaping from it for fear of being killed by animals in other territories.



## 21. Solution.

(a) Displacement activity is when an animal, faced with a conflicting situation, performs an act which is trivially irrelevant to the situation in order to release the tension developed thereof. For example, after being annoyed, a man bangs a table.

### (b) Importance of territorial behavior

- Provide defense of an area in which organisms live against organisms of the same or different species.
- The mating pair of organisms of the same species and their offspring are well spaced to receive the available resources, e.g. food, space and shelter.
- The available resource is protected and shared amongst the population.

Others:

- Actual fighting between organisms, which would be detrimental to the species is rare and replaced by mere threats.
- Intraspecific competition is reduced.
- It minimizes spread of disease and parasites.
- Genes from strong organisms or the fittest are passed on to the next generation.

(ii) Importance of courtship behavior.

- It leads to rise levels of reproductive hormones
- It stimulates organisms to sexual activity.
- It tightens pair bonding between the mating pair.

#### **Others:**

- It synchronizes time to produce offspring in right seasons.
- It induces mating of individuals who accept each other.
- It synchronizes gonad development, enabling gametes to mature at the same time, this ensures that fertilization occurs when mating takes place.

(c) Mimicry

Camouflage.

**Others:**

## 22. Solution

- (a) (i) Territorial behavior ensures that each mating pair of organisms and their offspring are adequately spaced to receive a share of the available resources such as food and breeding space.
- (ii) It ensures that available resources are protected and distributed evenly among the population. This is because the size of the territory formed depends on the amount of resource available.
- (iii) It reduces actual fighting between organisms, which would be detrimental to the species, and replaces it with mere threats.
- (iv) It promotes natural selection as it ensures that only the 'fittest' organisms find a territory, breed and thus pass on their genes to the next generation
- (v) Territorial behaviour also regulates population size as weaker organisms are out competed and fail to mate.
- (vi) It also minimizes the spread of diseases and parasites, since organisms not belonging to a given territory are prevented from entering it.
- (vii) Courtship stimulates organisms to sexual activity, thus increasing the chances of reproduction. This ensures the continuity of the species.
- (viii) It tightens the pair bond between the mating pair, which result in the subsequent rearing of the offspring by both sexes.
- (ix) It synchronizes gonad development so that gametes mature at the same time. This ensure that fertilization occurs when mating takes place.
- (x) It also synchronizes time to produce offspring in right seasons. This ensures that offspring are produced when resources are available or conditions are favorable to support them.
- (xi) Courtship reduces inter-species mating. This is because it involves use of species specific set, of activates to attract members of the opposite sex. Hence membrane of different species fails to attract each other.

(b) Differences between learned and instinctive behavior

Learned behaviour	Instinctive behaviour
<p>Mostly individual-specific.</p> <p>Develops over time through experience or observation.</p> <p>Absent within an individual at birth.</p> <p>It greatly influenced by the environment.</p>	<p>Mostly species- specific</p> <p>In impulsive immediate</p> <p>Present and complete within an individual at birth.</p> <p>Is greatly independent of the environment.</p>