INDIVIDUAL BEHAVIOURAL PATTERNS

Q. 1. What do you mean by individual behaviour patterns ? Name some of them. Describe exploration and its significance for an individual.

The behavioural patterns which organisms display for acquiring food, water, oxygen, energy, homeostasis, reproduction and harmony within its environment are called **individual behavioural patterns.** These are characteristics of the individual and help in its survival.

List of Individual Behavioural Patterns

The most common behavioural patterns observed during the life cycle of an individual are :

1. Exploration
2. Learning
3. Conflict
4. Aggression
5. Avoidance
6. Fear or Threat
7. Communication
8. Play
9. Movements
10. Locomotion
11. Feeding and drinking
12. Social behaviour
13. Sleep
14. Biological rhythms.

Exploration

Exploration is searching through for something specific or just out of curiosity. Therefore exploration includes two sets of behavioural patterns :

1. **Exploration activities** are directed towards specific goal, such as for acquring knowledge of the surroundings about food resources, safe hide outs, most suitable locations or for the mates.
2. **Exploration activities** are not specific, but just to satisfy the curiosity.

Trends of Exploration

The exploratory responsiveness is widely spread out throughout the animal kingdom but it is more in primates and carnivores than in rodents, marsupials and insectivorous mammals. Reptiles show least exploaration to novel objects. The

trend of exploration is associated with complexity of brain and complexity of external stimuli.

Measurement of Exploratory Behaviour

Exploratory behaviour is highly influenced with learning responses. It is stimulated and increased by novelty and complexity of the surroundings. The exploratory activities in animals can be measured by the following methods :

1. by recording the frequency or occasions an animal intends to examine a test object in the controlled expeiment in a given time.
2. by recording marked field area covered by an individual in a given time period.
3. by measuring in terms of reward or reinforcement in a learning process or the rate of learning by an animal in different types of opportunites of exploration.
4. by recording the frequency of avoidance of a novel object.

Role of Novelty, Complexity and Bareness

The novelty and complexity of surrounding environment promotes exploration. The most complex stimulus evokes fastest exploration. Repeated exposures to a novel situation declines the rate of exploration.

The barenes and spaciousness of the environment cause vigorous exploration because animal wants to have more informations about the surroundings in shortest possible period.

Demonstration of Exploratory Behaviour

Murphy and **Wood Gush** (1978) studied exploratory behaviour of two strains of chicken; one of which was **docile** and other **flighty.** The amount of locomotion was taken as a measure of exploration. Both strains were allowed to go from a starting box into a large empty pan. The area of pan was divided into a number of squares. It was observed that :

1. The flighty chicken took less time than the docile strain to come out from the box.
2. The flighty chicken before stopping to investigate were not relaxed as the docile chicken were. The docile chicken explored visually before emergence, slowly and continously.

Physiology of Exploratory Behaviour

Berlyne (1960) suggested that exploratory behaviour in animals was controlled by a diffused network of fibre tract in brain (CNS). It is called **reticular formation.** It has **modulatory effect.** It allows and stimulates the relevant information to be expressed and inhibits the irrelevant ones. **Weingarten** and **White** (1978) and **Rompore** and **Miliaressis** (1980) showed that exploration is influenced by specific nuclei in CNS.

CONFLICT BEHAVIOUR

Q. 2. What is conflict behaviour? Describe different types of conflict behaviours.

It includes conflict between behavioural tendencies. The conflict situation is seen in two coditions :

1. It is a condition when two mutually incompatible tendencies arouse together and compete one another to dominate in the regulation of a behaviour. For example, an animal is hungry and wants to approach the food source but avoids to do so because of some fear. The animal shows conflict between approach and avoidance.
2. It is a condition when only one tendency is aroused in animal to achieve a specific goal but the goal remains inaccessible and animal feels defeated (thwarted).

In both cases naimal behaviour is much different from normal behaviour.

Types of Conflict Behaviour

Following types of conflicting behaviours have been recognised in animals :

1. Displacement Activities : In conflicting situations, a new behavioural pattern emerges. It is unrelated and irrelevant to the situation and is called **displacement activity.** It appears in the absence of any eliciting stimulus and remains unrelated to preceding behaviour.

Example : A male stickleback fish while courting a female swims to its nest and performs fanning movements. The nest does not have eggs to be fanned but male repeats this activity during coutship.

2. Redirected Acitivites : In this conflict situation, one of the two motivational systems of the conflict is directed towards an object which has not stimulated them or which has nothing to do with the present situation.

Example : Herring gulls in conflict during aggressive encounters redirect their pecking on objects in the environment rather than the enemy.

3. Alternation Movements : When an animal, during conflict, alternates its behavioural pattern between two conflicting tendencies, it exhibits alternation movements.

Example : An animal is desirious to approach a food source, but is frightened to do so. It repeats approach and avoidance movements alternately.

4. Intention Movements : During conflict period, the intention repeats a modified form of behavioural movement.

For example, a flying in bird is preceded by some expressions or behaviours indicative of its readiness to fly, say raising of tail, withdrawl of head. But in a conflicting situation these movements are repeated but bird does not take off.

5. Ambivalent Movements : In a conflcit situation, an animal some times maintains a posture which represents both types of behavioural tendencies *i.e.* approach and avoid behaviours simultaneously.

Example : When a ruminant is served with an unusual food, the position of its head and neck expresses apporach towards food but the position of legs shows its disapproval and intention to move away.

Aggression

Aggression is a group of behavioural activities including threat postures, rituals and occasionally physical attacks on other organisms, other those associated with predation. They are usually directed towards members of the same sex and species and have various functions including the displacement of other animals from an area usually a territory or a source of food, the defence of a mate or offspring or establishment of rank in a social hierarchy.

The term 'aggression' is controversial and suggested an existence of unnecessary violence within animal groups; the alternative term "agonistic" is preferable.

Agonistic Behaviour

According to Dewsbury (1978) agonistic behaviour encompasses a wide range of behavioural patterns related to inter-animal conflict, including fighting, defensive

behaviour, fleeing and freezing. Hinde (1970) has defined agonistic behaviour as a complex behaviour including attack, threat, submissive and fleeing behaviours. Manning (1979) used the term 'agonistic behaviour' to cover all different types of responses seen in fighting and territorial behaviour. Behaviours usually lumped as agonistic are among the most frequently studied of all animals and human activities because of their distinctness and evident significance in the lives of social animals.

Agonistic behaviour is an alternative term for aggressive behaviour (R. J. Miller, 1978) which refers simply to fighting and competitive behaviour, usually in animals and includes threats and offensive attacks as well as defensive fighting. Agonistic behaviour tends to occur in situations involving conflict or competition for space, resources, mates or status or for protection of self or young.

Aggression and Agonistic Behaviour

Psychologists have defined aggression as behaviour that appears to be intended to inflict noxious stimulation or destruction on another organism (Moyer, 1976). Many definitions of *aggression* include predatory behaviour in which the animal being attacked is eaten in the process. Use of the word aggression as a form of *resource competition*, in which an animal activity excludes rivals from some resource such as food, shelter, or mates (Archer, 1988).

Agonistic behaviour includes all aspects of conflicts, such as threats, submissions, chases, and physical combat, but it specifically exclude predatory aggression, since, according to **Scot** (1972), ingestive behaviour is part of a separate behavioural system with a different function.

Ethologists (Moyer, 1976; Wilson, 1975) have listed following forms of aggressive behaviour:

1. **Territorial aggressive behavior :** in which takes place exclusion of others from some physical space.
2. **Dominance :** In this type of aggressive behaviour control of a conspecific as a result of a previous encounter is done.
3. **Sexual aggressive behavior :** In this case, use of threats and physical punishment usually by males, to obtain and retain mates.
4. **Parental aggressive behavior :** In this case, attacks are made on intruders when young are present.
5. **Parent-offspring aggressive behavior :** This is disciplinary action by parent against offispring (mostly in mammals, usually associated with weaning).
6. **Predatory aggressive behavior :** In includes the act of predation, possibly including canibalism.
7. **Antipredatory aggressive behavior :** It includes defensive attack by prey on predator, such as mobbing.

safety from predators.

Causes of Aggression

The various causes of aggression have been categorized under the following two headings :

1. Endogenous factors of aggression

(i) **Role of hormones.** Aggressive behaviour in an animals appears to be associated with the breeding periodicity. Males become comparatively more aggressive with the onset of the breeding activity. Androgen levels are responsible for aggressive behaviour in many species. The effects of androgen on aggressiveness are via its effect on lowering the threshold for aggression. Injections of tstosterone restore aggression in castrated animals.

There are other hormones which influence aggressiveness in animals, because it has been found that male hormone does not completely regulate aggression. In fact, castrated individuals may often exhibit aggressiveness (Vavis, 1957). In some species, estrogens too affect aggressiveness to some extent (Guhl, 1961). In fact, in some species *estrogens* enhance aggressiveness. LH (Luteinzing hormone) in starling and African weaver birds controls aggressiveness. Similarly prolactin and progesterone seem to manipulate aggressiveness. Levels of ACTH also influence aggression. High levels of ACTH (Adrenocorticotrophic hormone) reduce and low levels change aggressive behaviour.

The effect of hormone on aggression is mediated by the brain.

Invertebrate hormones are much different from those of vertebrates, and much less is known about how they work (Breed and Bell, 1983). Most of our information comes from crustaceans and insects. Males of many species of crustaceans have enlarged claws used for display and fighting. Development of these claws seem to be under the influence of a hormone produced by androgenic glands near the testes. Large glands produce more hormones, which leads to larger claws and greater fighting efficiency (Nagamine and Knight, 1980). In Juvenile lobsters (*Homaraus americanus*), levels of aggression are related to the moult cycle. When levels of the moulting hormons ecdysterone are high, aggression is low. This makes sense because after a moult the exoskeleton is soft and the animals are vulnerable. Once the shell hardens, and the animals compete for a shelter for the next moult, aggression is high (Tamm and Cobb, 1978).

(ii) **Neural mechanisms.** The vertebrate brain structures most involved Among insects, the paired corpora allata, neurosecretory glands in the head, produce substances called juvenile hormones. In grasshoppers, females shift from responding

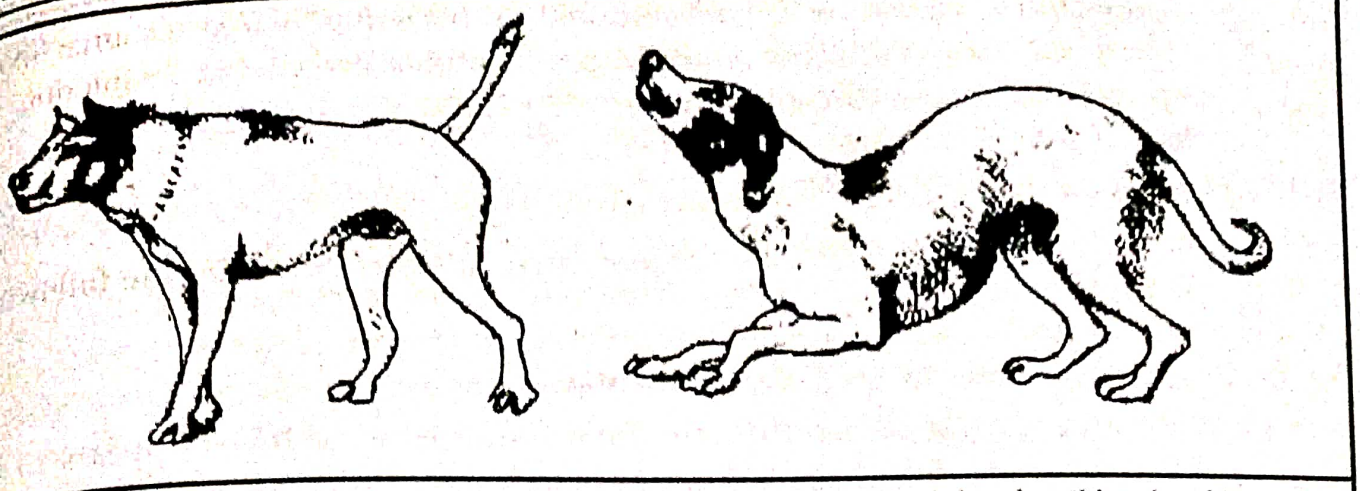

Fig 5.1 Aggression and submission in dog as explained by principle of antithesis of Darwin. The same dog is portrayed above approaching another dog with bostile intension and below in a humble and affectionate frame of mind.

aggressively to males to become sexually receptive under the influence of juvenile hormones. If the *corpora allata* are removed, females continue to reject males. In male field crickets (*Gryllus* sp.), however, removal of the corpora allata had no effect on agonistic behaviour (Adamo *et al.*, 1994). Roseler *et. al.*, (1986) implicated both juvenile hormone and ecdysteroids in the establishment of dominance hierarchies of female paper wasps (*Polister gallicus*), as they initiate nests in the spring. Subordinate females have lower levels of juvenile in aggression are part of the limbic system which includes structures such as the amygdala and the hypothalamus.

(a) **Role of hypothalamus in aggression.** The hypothalamus is involved in defense and escape behaviour in a wide variety of vertebrates, ranging from fish to primates (Hunting ford and Turner, 1987). Using lesions, electric stimulation, and single neurons recordings from specific areas of the brain, researchers have found that different brain sites are responsible for different types of aggression. For example, in cats, electric stimulation of the ventromedial nucleus of the hypothalamus produces growling, hissing and attacking with claws (defensive attack) (Flynn, 1967). Stimulation of the lateral hypothalmic area produces a biting attack with on defensive elements.

(b) **Role of amygdala and midbrain in aggression.** Areas of the brain that are involved in predatory aggression are the amygdala of the forebrain and the central gray of the midbrain. These areas are connected by nerve pathways, and they inreract. For example,electric stimulation of certain areas in the thalamus causes cats to attack rats (Bondler and Flynn, 1974).

(c) **Telestimulation.** The use of radio transmitters permitted electrical stimulation of specific brain areas in seminatural social groups (Delgado, 1967; Herndon *et al.*, 1979). Monkeys with electrodes implanted in certain

parts of the thalamus, hypothalamus, or central gray, become aggressive when the electrodes are activated. In some cases, when stimulation is applied to the hypothalamus, lower-ranking monkeys become dominant as a result (Robinson *et al.*, 1969).

(d) **Role of Fos protein in aggression.** Immunological techniques can be used to trace the paths of nerve axons to different brain areas. Kollack-Walker and Newman (1995) found in Syrian hamster brain that mating and agonistic behaviour are controlled by separate areas by the expression of Fos protein. Adult males were allowed to interact either with a sexually receptive female or an intruder male. They were then sacrificed and their brains sectioned and stained immunologically for Fos protien. In this way, active sites in the brain could be seen microscopically. The results show that some areas of the limbic system were activated by both mating and agonistic behaviour, others were selectively activated.

(e) **Role of neurotransmitters in aggression.** Chemical messengers, or neurotransmitters are involved in the transmission of nerve impulses across synapses or across nerve-muscle junctions. These can produce *excitatory* or *inhibitory* effects depending on the nature of the post-synaptic receptors. Best known perhaps is acetylcholine, which is involved in the neuromuscular junction and in the autonomic nervous system. Norephinephrine (noradrenaline) is wide-spread in the pons and medulla, with fibers projecting anteriorly to the mid-and forebrain. Dopamine and serotonin are found in the midbrain, with fibers projecting anterirorly to the hypothalamus amygdala and straitum.

(iii) **Role of genes on aggression.** The synthesis of nerve structure, neurosecretions and other compounds in under genetic control, and agonistic behaviour is shaped by natural selection, as is any other behaviour. Agonistic behaviour has long been known to have a heritable basis (Maxson,1981) : artificial selection can lead to significant changes in levels of aggression within just a few generations. For example, Ebert and Hyde (1976) tested wild female house mice for aggressiveness, and by selecting high-and low-scoring mice, they produced two lines: one with highly aggressive females and one with passive females. The unselected control lines were, as expected intermediate. Domestic laboratory strains of mice differ widely in aggressiveness (Southwick and Clark, 1968), as do dog breeds (Scott and Fuller, 1965). Siamese fighting fish (*Betta splendens*), fighting cocks, and even crickets have been artificially selected over the years for performance contests with large sums of money riding on the outsome.

Genes controlloing agonistic behaviour may be localized on certain chromosomes. Offensive behaviour in male mice, which involes bite-and-kick attacks on the flanks and rump of the opponent, is influenced by a region of Y chromosome. Genes in this area are hypothesized to affect synthesis of testosterone

dependent phenomena as well as the perception of olfactory stimuli triggering attacks (Maxson, 1996; Monahan and Maxson, 1998).

2. Exogenous Factors of Aggression

(i) **Starvation** is one such factor. Hungry animals fight vigorously. Chaffinches and yellow buntings fight more when hungry; fighting is over once the food becomes available to these birds after a period of starvation.

(ii) **Frustration** is another cause which elicits aggression. Frustration is defind as interference with the occurrence of an instigated goal response at its proper time in the behaviour sequence. Frustration is motivation for aggressive behaviour and leads to fighting in hungry animals.

(iii) **Role of experience in aggression.** Aggression is influenced by experience. Experience shapes levels of aggressiveness. Animals reared in isolation are relatively more aggressive. Absence of litter males in the preweaning stage and of peers in the post-weaning stage stimulates aggression in mice.

(iv) **Role of appetite.** Aggression is regarded as one of the motivated behavioural types. As such, there is a drive toward a goal. An animal which has been aroused demonstrated aggression rapidly. It appears that the animals become more aggressive if reared under some situations. For example, a winning animal fights readily than those with more succession of losses.

(v) **Sex.** The relationship between sex hormones, particularly testosterone, and aggression is striking in seasonally breeding species. As the gonads increase in size in response to environemental changes in photoperiod, rainfall, vegetation and so forth, fighting and wounding increase as well. Most of this increase is related to competition for breeding territories, social rank, or access of females. Key stimuli lying outside the body usually provoke aggression in animals. For example, a male stickleback fish defending its territory is aroused on seeing a rival male which it distinguished by a red spot on its belly. The aggression is so tightly associated with this red spot that a faithful model lacking the red spot on its belly becomes unable to elicit the aggression. Contrarity, crude model having a red spot provokes aggression. Similarly, aggression in robin is elicited by the red tuft of feathers in rival. A bird devoid of it will not provoke aggression.