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**PSG PROGRAMME (NCQF LEVEL 5)**

**MODULE 15**

**ANIMAL BEHAVIOUR (ETHOLOGY)**

## ➢ OBJECTIVES (15.1)

❖ **On** completion of this module, you will:

- Know what animal behavior is (Ethology)
- Understand the difference types of grouping behavior of animals.
- Be able to explain the difference form of animal communication making use of relevant examples.
- Have an understanding of various types of animal protective behavior.
- Be able to explain the differences between animal home ranges and territories.
- Be able to identify and interpret animal signs and sounds of the flagship species and other common indicator species.

## THE BEHAVIOUR PATTERNS OF ANIMALS (15.1.1)

- **Animal behavior (Ethology):** Ethology is the science or study of animal behavior in its natural habitat. In addition to the question of what an animal does, when, where, how and how often, and with whom; Ethology asks and tries to answer the question **'WHY'?**

- The animal behavior responses are also part of the animal-habitat interaction. Behavior is involved in obtaining food, finding shelter, finding a mate, courting, escaping enemies and unfavorable environments, and caring for the young ones.
- Animal behavior and nature guiding: When conducting any form of nature guiding, an understanding of animal behavior from bacteria to elephants is important in providing your guests with a comprehensive understanding of the natural environment. Any guests looking at an elephant or pangolin can easily look up what he/she is looking at, the weight, longevity and various other aspects.
- It is therefore up to you as the nature guide to provide insight into what the elephant or the pangolin is doing in terms of its behavior. There are many aspects to animal behavior and this module just touches on a few examples of possible behavior you may come across while guiding. You need to ensure that you look up any behavior that you observe so as to improve your own knowledge to ensure that your guests will benefit from the guided experience

## PRIMARY COMPONENTS OF ANIMAL BEHAVIOUR (15.1.2)

- Animal behavior has two primary components, namely: **INSTINCTIVE BEHAVIOUR** and **LEARNED BEHAVIOUR**. All animals display elements of both components. Instinctive behavior can be seen as inherited wisdom, such as the suckling behavior of young animals. Learning is acquired over time, and becomes more important as the animal develops into adulthood.

❖ Behavior is learned in three ways:

- **CLASSICAL CONDITIONING** - a vulture learns to associate a helicopter with a culling operation and therefore food, every time a helicopter flies past, it follows the helicopter anticipating food.

NB// In classical conditioning a neutral stimulus is the helicopter and systematically associated with another stimulus (culling) that produces a strong uncontrolled response (feeding) in the subject.

- **OPERANT CONDITIONING** - an animal discovers in random ways that certain behavior are rewarded or punished, e.g. a falcon learning to capture red-billed queleas flying in a valley late afternoon. A lion cub plays with its father's tail and gives it a sharp bite. He is then punished with a clout, and after repeating this several times, it learns not to bite its father's tail.

  NB//In operant conditioning the subject's activity produces an environment effect that could either be positively reinforced (rewarded by the capture of the bird) or negatively reinforced (punished by a clout from dad ), in this way behavior that leads to positive outcomes is strengthened.

- **MODELLING** -young animals imitate the behavior of their parents and other adult animals.

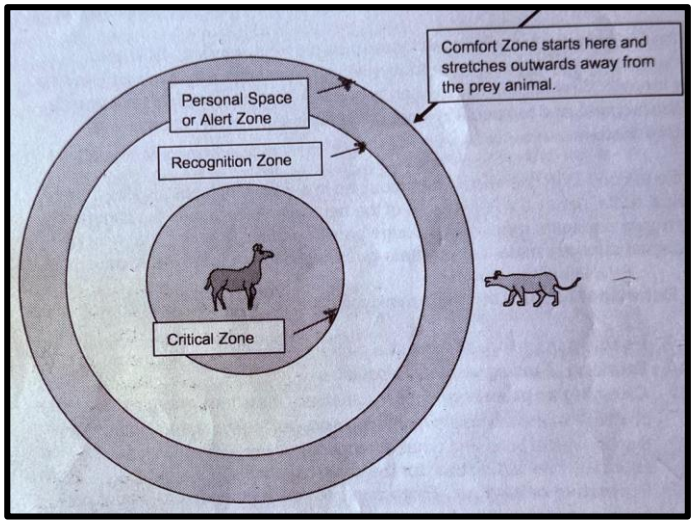
❖ It is important to note that animal behavior operates at two levels, namely:

1. The level of personal survival
2. The level of social interaction

- Many social behaviors have an instinctive base e.g., males fighting for dominance. In interpreting animal behavior, one should therefore take note of the underlying trigger for a specific behavior.

❖ Behavior for personal survival-Typically encompasses the following:

- Feeding-hunting, seeking and gathering food.
- Drinking-finding water or substitutes.
- Cleaning or preening-This is especially important where parasites are plentiful. Many animals (warthogs, rhino, and buffalo) take mud baths to rid themselves of ticks and other external parasites. Others like ostrich and zebra will take a dust bath for the same reasons.
- Protective behavior-Protection from the elements and predators remains a high priority for personal safety. Animals project themselves from predation by being very alert when vulnerable, using all their senses, e.g. Giraffe at a water hole. Many other protective methods are used for example, Camouflage which hides the animal from detection e.g. (puff adder and chameleon), thanatosis (e.g., rinkhals snake).
- Chemical defense (e.g., pole cat or snouted termites), Aposematic coloration (e.g., grasshoppers), and autotomy (e.g., lizards). Some animals will threaten potential attackers by making themselves appear larger (e.g., barn owl or an elephant spreading its ears), or by making threatening noises (hissing or growling).
- Fleeing from danger, fighting against a dangerous intruder-when danger approaches animals are often left with only two options, either to **flee or fight.** Both options would help the animal escape alive. The typical reaction of an animal first becoming aware of danger is to **freeze** when the danger enters its personal space or alert zone. Personal space is the distance that an animal requires between itself and potential danger to feel safe. This distance is not fixed and can vary according to terrain, the threat, the presence of young animals etc. The comfort zone will therefore start from the personal space and reach outwards.
- Should the danger object come closer, it will eventually pass through the recognition zone where the animal will start signaling discomfort and making alarm noises etc. Eventually the intruder will get to the critical zone, where the animal is forced to either flee or fight, depending on its options. (See diagram below):



- **Practicing life skills** - young animal have to practice life skills by playing and acting out the activities of their parents. They will observe these skills being performed by their parents, and they learn through modelling. This is a good example of a social interaction that is applied for personal survival.

❖ **Social Interaction or Behavior - aimed at the long-term survival of the social group consists of:**

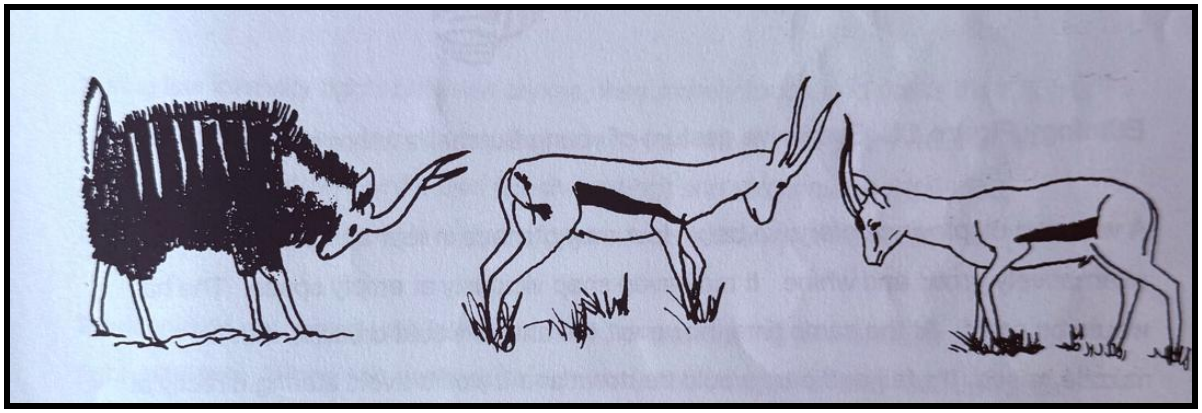
- **Parental Care -** In most mammal's parental care is common, especially with the females. Elephants and baboons are good examples. In other animal classes parental care is often absent, e.g., with insects or reptiles. A notable exception is the Nile crocodile, where the female does perform parental care. Among the insects, bees, termites, ants and wasps display care for the young. This is not surprising, considering that they are all social insects. Birds exercise parental care, the exception being the **brood parasites** such as cuckoo's, whydahs, honeyguides and widow finches who allow hosts to rear their chicks. Also, d**istraction** displays are used by birds like lapwings and ducks to lure predators away from nesting sites, when the female pretends to be injured (e.g. broken-wing display).

- **Communication** - This can take many different forms, either vocal, chemical or through visual signs such as body posture or color display. Pheromones are specialized chemical secretions which elicit a very specific response in other animals of the same species. Secretions are produced by a variety of glands, for instance the **pre-orbital glands** of the klipspringer are used to communicate territorial information. Animals have a rich variety of signs that are used in communication. Although many of these signs are often not easily perceived or understood by humans. Only through **observation** and **dedicated study** do these signs become apparent to human observers.

- **Warning signal**s - Kudu and bush buck emit a deep bark as a warning signal, while reedbuck and klipspringer whistle, and impala and wildebeest snort. The sounds serve as a warning signal to other members of the group to alert them of danger.

- **Courtship and mating -** Courtship behavior ensures that cross-breeding between closely related species does not take place. Differing courtship behavior of birds similar in appearance (e.g., weavers) distinguishes between species. Courtship behavior also tests the readiness of the females for mating. Advertising the readiness for mating (e.g., urine-marking by female leopards) also helps solitary animals find one another at the right time. Examples of courtship display include aerial displays by korhaan or fish eagle, elaborate dances by cranes, puffing of throat feathers by Kori bustards, urine testing by sable and eland, genital licking by grey duiker and pursuit by impala. **Flehmen** is the act of drawing back the upper lip to expose the sensitive **vemero-nasal organ (VNO) or Jacobson's organ** in reptiles), which is situated between the mouth and nasal passages. Animal like zebra /stallions will test the sexual readiness of a female by displaying flehmens, thus pumping air into the vemero-nasal organ (VNO), while sniffing and licking her genitals and urine. Mating entails either external or internal fertilization. External fertilization is more common with amphibians and fish, while internal fertilization is more common with mammal's birds and reptiles.

- **Dominance and Submission**-Dominance and submission help create a social order. Non – dominant animals will show submissiveness to the dominant animals. This social hierarchy will also determine the privileges of mating within a group, which ensures that only the most successful-animals will contribute their genes, ensuring the vitality of the group. See picture below:



- **Bonding** - While humans do special courses in team building, social animals have their own way of improving the functioning of the team. This is essentially an exercise of building trust, so that the team will operate as effectively as possible. The greeting ceremony of hyenas is a good example of bonding. The animals stand head to tail, each exposing its most vulnerable parts (the genitals) to the most lethal parts of the other (the fangs). This re-awakens the mutual trust that they require to hunt successfully as a group. See hyena greeting behavior picture below:



- **Diet and Group Size**-Animals are solitary, or occur in pairs, in small groups or in large groups. This can be related directly to their feeding preferences. Generally speaking, highly territorial animals are very selective feeders. They feed on high quality food items (which are scarce), have small bodies and occur in pairs. A typical example is the klipspringer. Large bulk feeders such as buffalo are non-selective feeders, feeding on an abundance of low-quality food. They have large bodies to accommodate large bellies, occur in large groups and are not territorial. With predators, the hunting style also determines group behavior. Compare

the solitary behavior of leopards and their stealthy hunting style with the social behavior of wild dogs and team approach to hunting.

## ANIMAL GROUPING BEHAVIOR (15.1.3)

- Involves the social habits of the animal. Some animals like leopards prefer to be solitary, others like Steenbock and duiker live in pairs. Gregarious animals live in herds (buffalo, zebra wildebeest and springbok) or in prides of lions or clans of hyenas. The benefits of gregarious life style have a lot to do with safety in numbers (prey animals) and better ground coverage for communal feeding (predators).

❖ Animal Grouping Behavior-Types and Facts - Each species creates its own unique combination of social groupings. There are several groupings into which animals may be divided:

- **SOLITARY** - The adults live alone and join up only in the breeding season. After courtship and mating the male and female part company and have nothing more to do with each other until the next season. In most cases the female takes full responsibility for the young without the help of the male. In very few cases does the male rear the young without the help of the females, as in the African jacana (polyandrous). This category includes a number of reptiles, mainly certain snakes, a number of fish species, a few bird species and some mammals like serval, caracal, leopard, adult male black and white rhino.

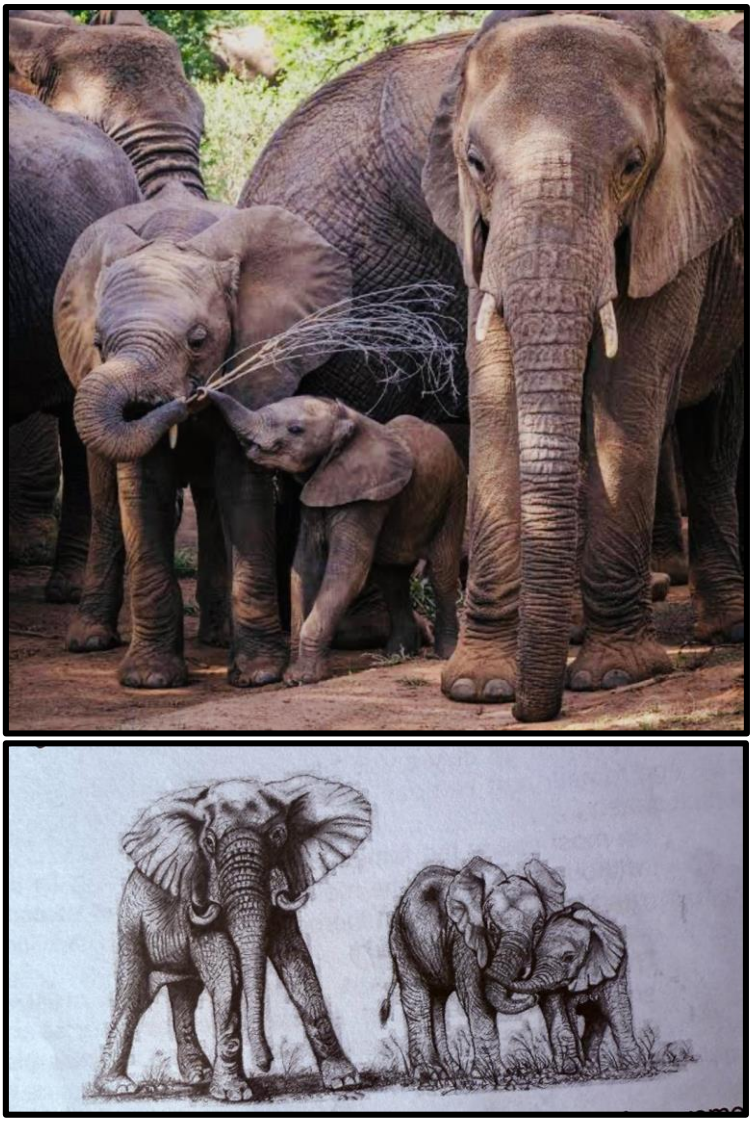
- **PAIR** - In animal species where parental duties are too much for a single parent, the male and female form a strong attachment to one another, usually living together as a bonded pair. Over 90% of all bird species live in pairs. Pair bonding is quite rare in reptiles. Certain mammals live in pairs (monogamous) as in jackals. Jackals do not necessarily mate for life, however some pairs do. Some small antelope species like steenbok, klipspringer and most species of duiker are monogamous living in pairs.

- **FAMILY -** The family group is merely an extension of the pair. The young often stay with the adults (parents) until fully grown or almost grown (delayed dispersal as in jackals). During the later stages of development, the young frequently move around with the adults creating a larger family grouping. Every now and then there may be overlapping litter with older offspring remaining while new youngsters are being cared for. In the wild dog, family groupings turn into larger packs that consists of a breeding pair, the offspring and new siblings. The wild dogs in the pack provide for the pups and the lactating mother (usually the dominant female)-this extended family is however, still based on the original pair and when the young do reach adulthood, they either leave on their own accord, or are driven off to form separate pairs. The advantage of a large pack is that they can hunt and bring down larger animals (prey) due to the group size. The less social species hunt and forage smaller prey animals singly or in pairs.

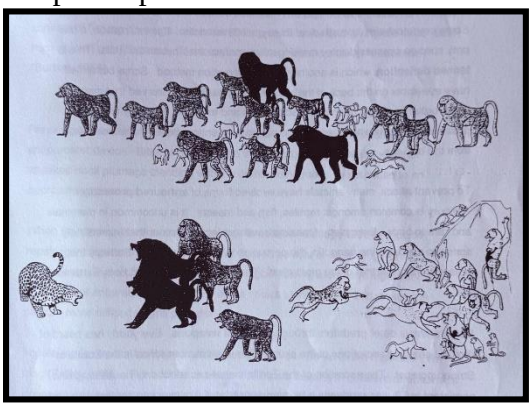
- **HAREM -** The typical mammalian grouping consists of one dominant male and a harem of females. The size of a harem is will vary from species to species. The plain zebra is a good example of a harem grouping. A herd of zebra is usually comprised of a stallion, and two to five mares and their offspring. Some harems are of a permanent basis, as in the zebra, while others, like the impala dissolve at the end of the breeding season. Male impala are capable of collecting and controlling a great number of females in the breeding season.

- **MATRIACHY** - This system is very evident in elephants and spotted hyenas. The basic social unit of the African savanna elephant is a group of related females, usually the oldest (and largest) female being the Matriarch, her young and grown daughters and all their

offspring. The matriarch determines the activity, rate and direction of movement of the herd. When the number of elephants in a family group becomes too big, they split up and form a splinter herd with its own matriarch. (See pic below):

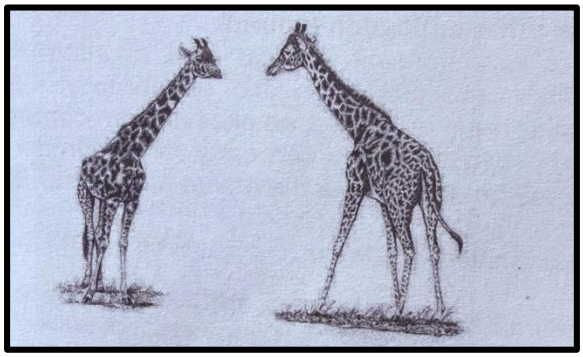


- **OLIGARCHY** - This is a more complex social grouping, where the power is invested in an elite gang of dominant males. The Chacma baboon belongs to this social grouping. A troop of baboons in their home range consists of a number of powerful males, their shared females and their combined offspring. The advantage of this system is that it provides a very efficient means of defending the troop against predators and rival foreign male baboons. All the dominant males are known to rush at an attacking leopard intimidating it and thus protect the troop. See picture below:



- **ARENA** - Some species particularly some birds have developed an all-male grouping of a special nature. The males all cluster together in the breeding season on a special patch of ground known as a **Lek** or an **Arena.** Each male display as vividly as he can. The females attend the lek and having selected a male of their choice, mate with him and depart to have and rear the young on their own. The indigo birds (widow finches) in southern Africa form this kind of group system, but the females do not rear their own chicks, as they are parasitic brooders laying their eggs in a host birds' nest.

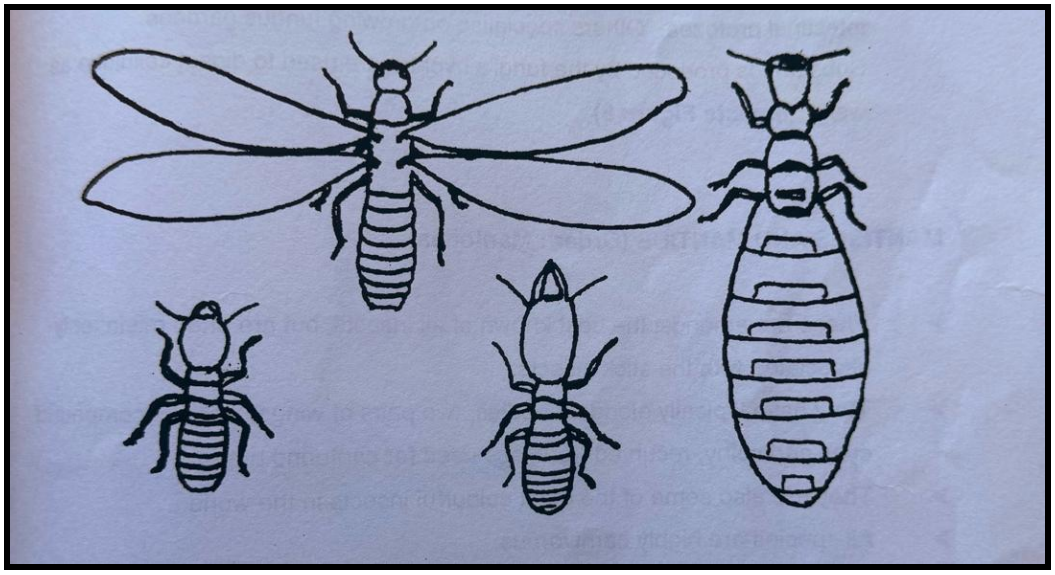
- **TEMPORARY ASSOCIATION** - Animal that are not bonded on a permanent basis to one another may establish temporary associations. Giraffe are not territorial but are sociable, living in loose, open herds whose home-ranges overlap. At any given time, a giraffe may be within a herd composed of all males, all females, females and young or both sexes, or sometimes solitary. There are no leaders and there is minimum co-ordination of the movements of the herd. (See picture below):



- **AGGREGATION** - When non breeding groups of animals such as springbok, wildebeest and zebra congregate during migrations due to localized feeding areas, these groups engage in short or long-distance movements in search of food. these are called aggregations (See picture below):



- **CASTE SYSTEM** - Social insects display extremely complex social organization, in which their various differing classes of individuals, each adding to the provision of an efficient division of labor. Wasps, ants, bees and termites all display various forms of the caste system: showing a level of differentiation that is not found in other vertebrates besides man. Within this system there are queens, kings, workers, soldiers and flying alates (drones), each performing a separate task with a large nest body that operates as a defense against possible enemies. See picture below:



## ANIMAL COMMUNICATION (15.1.4)

- Communication is the means by which animals influence the behavior of other animals. This may be through sound, sight and in some cases tactile communication. The focus here is a brief introduction to the use of different types of communication.
- **Vocal communication** (sound) - Sound signal can transmit a great deal of information, because they can be changed quickly and turned on and off abruptly. Sound as a signal can be transmitted over great distances, an elephant can communicate through sound up to around 15km away whale sounds can carry for hundreds of kilometers, an even as humans we may be able to hear the roar of a lion up to 8km away.

❖ Vocal calls emitted (made) to:
- Indicate territories
- As alarm calls to indicate potential danger
- To attract prospective mates
- Between mother and offspring
- To main contact between the members of a particular social structure.
- To determine the location of group members.
- To locate prey through the use of echo-location in bats.

❖ There are few other means of sound communication
- Many antelopes snort through their noses
- Warthog may cheat sound by champing their teeth.
- Some antelopes rasp their horns on vegetation.
- Elephant's shrews and rabbits thump their feet on the ground as a danger signal.
- Porcupines rattle their quills as a sign of danger.
- Many male insects communicate by stridulating caused by wing or leg rubbing
- Some animal species like dwarf mongoose and velvet monkeys, make a variety of alarm calls to indicate a different kind of predator. Fourteen different calls have been recognized in the spotted hyena; each call used to communicate something different.

- Vocal communication in birds is represented by calls and songs. A bird song functions as a means of territory advertisement and mate attraction. A bird call, consisting usually of simple notes, may be produced by both male and female birds to indicate a threatening situation (alarm call,) or as a cohesion call between members of a flock or between a mating pair during their breeding and chick bearing season.
- **Visual Communication** - Be it in the form of body posture, facial expression, body and facial markings, plays an important role in mating displays, parental care, dominance and

submissive displays, defensive and anti- predator behavior. Visual displays clearly indicate a behavioral stand point, either aggressive or passive, and elicit some behavioral response in another animal or group of animals.

- **Flehmen** - The unusual facial grimace and upper lip-curling seen when animals are sniffing something is an exhibition of flehmen, a German word, which describes the action of an animal analyzing a gaseous or liquid scent signal in this way. It is variously referred to as the flehmen response/action or simply just flehming. It is practiced by most hooved animals and many carnivores. This action causes ducts to open in the mouth and nasal passages, allowing the scent signals (predominantly pheromones) to be transferred to and analyzed by a special organ called the vemero-nasal organ (VNO) or Jacobson's organ in reptiles, which is situated between the nose and mouth cavities. The head is tilted and held up as the neck is stretched forward. The top lip is pulled upwards and back exposing the top teeth and occasionally the upper gums. The mouth is also slightly opened and the nostrils wrinkles. (See picture below):

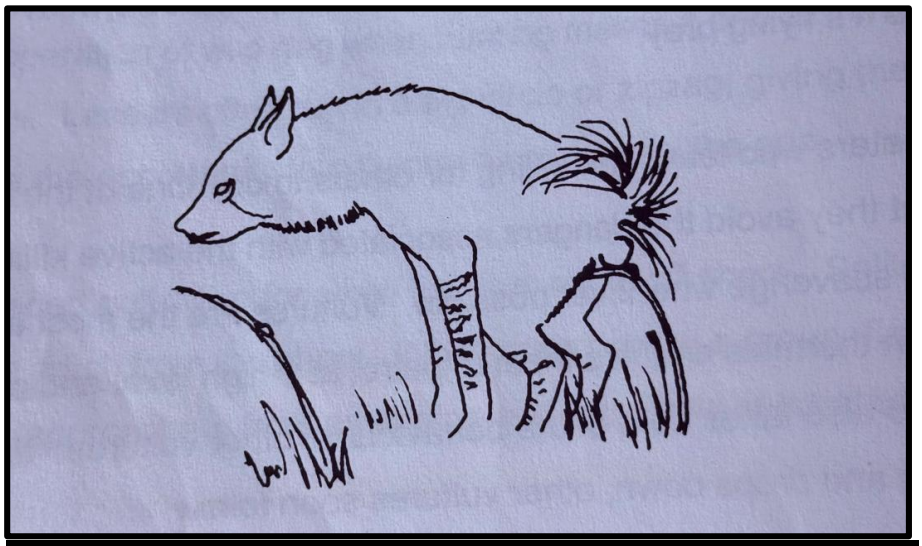


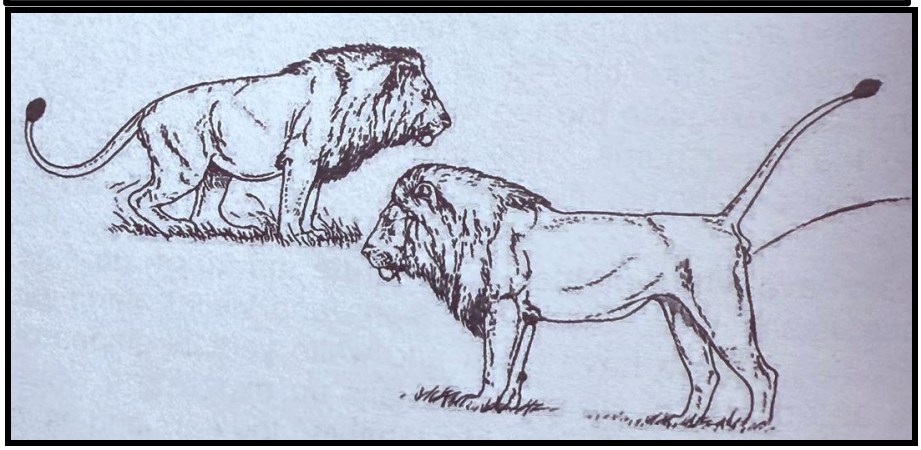
- Many animals have white or black and white markings on their tails or rump area. These flashes are "follow-me" signs and visual alarm signals. Waterbuck have a white ring, impala have black and white stripes on their rumps, the kudu, nyala, and bushbuck all curl their tails up exposing a white flash, Giraffe are white behind the ears and lions are black behind the ears and have a black tassel on the tip of the tail.
- Of all the animals, color is obviously important for the primates (being able to see color). A lot of insects also display bright colors and often eye partens on their wings as a warning signal to birds and reptiles who may be potential enemies, also having the ability to see color. Glow –worms and fireflies make use of visual communication through the use of flash signals to indicate their species and mating readiness.
- Birds use visual displays in courtship, mating and conflict situations. The bright breeding plumage of many birds' species (like bishop and weavers) serves to attract prospective mates. The aerobatic display of the red crested korhaan is also a form of visual communication to improve mate selection.
- **Olfactory communication (scent marking**) - The secretions of various skin glands, urine and feces are all employed in olfactory communication. These secretions convey information about the sex, age, social status, individual identity reproductive condition, group membership and emotional state of the animal. The main aim of scent marking is to convey information about territory boundaries and reproductive condition. The behavior of scent marking differs among species but is most common along the pathways that an animal usually follows on a regular basis, on territorial boundaries and around a denning area.

- **Scent** - Marking by means of anal-gland secretions is very common in mongoose, genets, and civets. Most ungulates have pre-orbital glands that have openings just in front of their eyes

and whose secretions are wiped onto vegetation giving off a particular scent not always picked up by humans. Many mammals also have glands on their feet and legs, which leave a scent in the soil and vegetation as the animal walks. Some animals make use of feces as signals to demarcate territory, such as white rhino making of dung middens or dung hips/piles, at which the dominant male deposits his dung and then proceeds to scatter the dung with slow backward kicking of the hind legs.

- The large cats; Lion, leopard and cheetah scent –mark mainly through the use of their urine. This behavior may take the form of urine spraying, scuffing, clawing and urine testing. Urine spraying is directed backwards against vegetation at nose level or higher. Scuffing is a rhythmic treading and forward-kicking motion of the back feet with claws extended, while urinating. The urine is mixed with the soil and impregnates the hind feet.
- Besides removing loose claw sheath, clawing leaves a visual and possibly a scent mark. (See pic below):

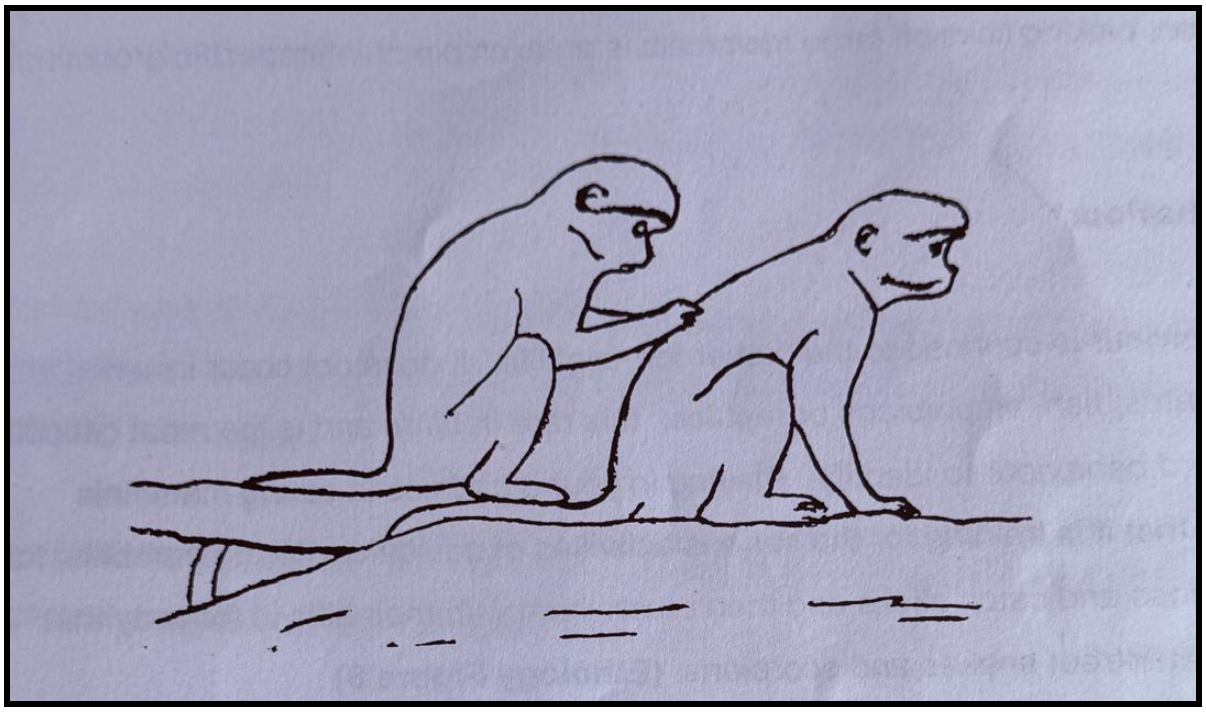




- Insects also communicate by means of chemical signals in the form of pheromones. Pheromones are substances secreted by one individual that affect the behavior and physiological processes of another individual. Insects like bees, ants, wasps and termites recognize each other or alien in the nest by means of identification pheromones. Most social insects produce alarm pheromones when their colony is attacked. The alarm pheromones emitted by soldier ants attract other soldiers and arouse them to aggressive behavior.

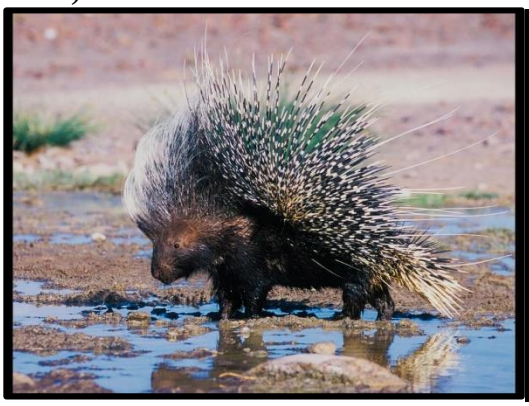
- **Tactile communication (touch**) - Touch communication may take on various forms as in, play behavior, courtship and mating, fighting grooming and parental care. Contact behavior is generally demonstrated by social animals. Touching for example in mutual cleaning (all grooming) provides a means of social bonding that establishes and maintains friendly relationships within a social group, or social-group status as in the dwarf mongoose society. Touch is an important as the sense of smell for new born animals, as it allows them to find

their mothers nipples so as to obtain milk and body warmth. See picture of monkey grooming below:



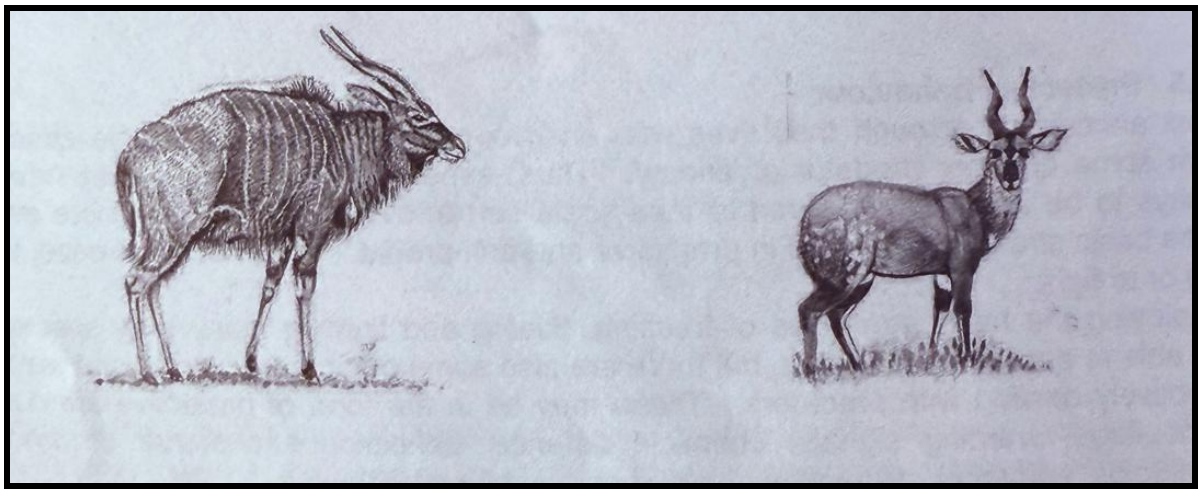
- Within lion prides touching plays an important role in strengthening social bonds with each other. This may sometime take the form of licking each other, it one-sided or reciprocal. This kind of social licking is usually confined to the mother-cub relationship.

- **Protective behavior** - Most animals go through their lives with an ever-present threat of possible attack from some or other predator or enemy. Thus, especially when active, they have always to be alert and prepared to take some sort of avoidance action. There are three basic strategies involved in protective and anti-predator behavior, to freeze, to flee or to fight. Employing the basic strategies of freezing, fleeing and fighting many-prey species are able to survive another day, but there are also some other more specialized ways effectively dealing with predators. These may be in the form of protective amour, camouflage, warning, distraction displays and mobbing behavior.
- **Protective Amour** - Animals that possess body armor need to be concerned with constant alertness or speedy retreat. Protective amour is fairly common amongst reptiles, fish and insects. Tortoise and terrapins have protective shell boxes or horn. Certain mammals make use of armor with the most common in southern Africa being the porcupine and hedgehog with protective quills and the pangolin, which rolls itself up into a hard scaly ball. (See pic below):





- **Camouflage -** Many animals conceal their form with some sort of camouflage, this being part of the freeze response strategy, is the most basic form of attack prevention. Movement of an animal is the most obvious way of attracting attention, so in order for certain types of camouflage to work, the animal must be prepared to remain extremely still for long periods of time, or to change its position very slowly and carefully, so as not be detected.
- **Disruptive Markings** - an important aspect of camouflage is the concealment of the animals' characteristics outline disruptive markings that break up the broad body and are found in a large number of spotted and striped animal species. Leopards and serval cats have spotted coats that aid camouflage in dappled light. Bushbucks and nyala also make use of spots in dappled light. Nyala and kudu use stripes to break the body outline and shape. Zebra striping is also a form of disruptive markings. The stripes break up the animal's shape and create an optical illusion, making it difficult to single out an individual animal. (See picture below):



- **Warning signals and chemical defense**-Animal that are brightly colored are warning their possible enemies that they may have a secret weapon that may be, an obnoxious smell, foul tasting flesh, poison glands, a painful sting or a venomous bite. Colors that are used in this way are called "aposematic" (stems from the word **apo - sema** which literally means '**away signal'**).
- Display of color and color-contrast are mainly in insects, snakes and other reptiles and in a few mammals. Insects displaying bright colors do this due to the fact that their predators which are usually birds, reptiles and some primates are able to see color. Certain mammals display contrasting black and white color, like the African civet and striped pole cat. These mammals are indicating that they have a foul-smelling defense and this is for the benefit of their enemies that can only see in shades of black and white (monochrome or monochromatic image) See pic below:

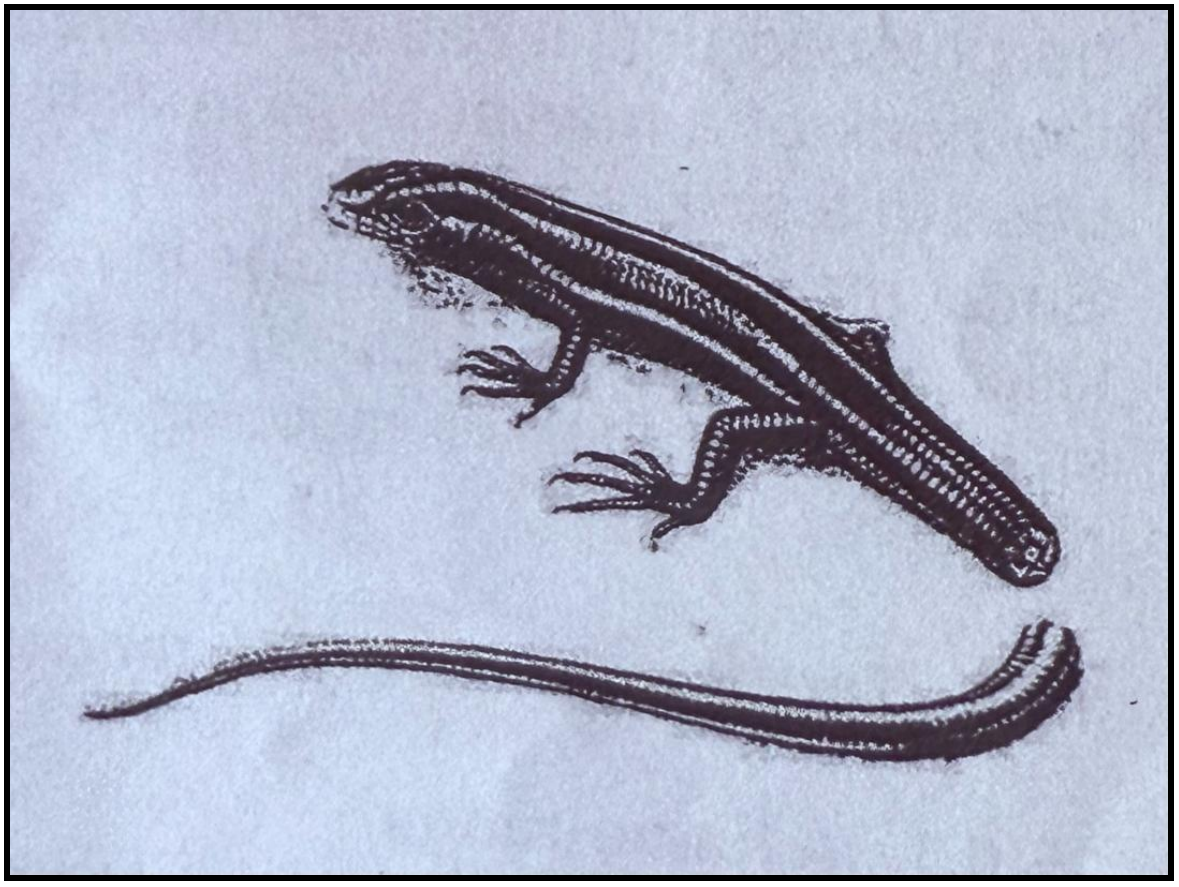


- **Startle displays -** If an animal is approached by a possible enemy, it can try to defend itself by giving the predator a fright. If it is able to startle the predator, there is a good chance that it may panic and move off, or it may pause a moment before attacking, thus giving the prey a gap to escape. Many animals attempt to startle enemies by either making sudden sounds or suddenly display fright-patterns.

- **Visual Startle displays -** involves the sudden appearance of bright color patches or large eye-spots, to intimidate any approaching predator. There is startle value in suddenly flashing a bright color patch pretending to be a poisonous animal. The combination of mimicry and the sudden exposure has a negative effect on the predator. The most common form of startle display involves the sudden exposure of a large pair of eyes, possibly mimicking the eyes of a bird of prey. This is found on the hood of a rearing cobra and on the back head of the pearl-spotted owlet. Many moths and butterflies have large eye spots on their rear wings, which they reveal by suddenly "flashing "open the front wings, giving the predator the impression that it is dealing with a much larger animal

- **Death-feigning (thanatosis**) - Pretending to be dead has been observed in a variety of insects, frogs, snakes, birds and some mammals. When the animal is attacked, it suddenly collapses and remains motionless. Being very limp and appearing to be lifeless, it is often left alone, after which it quickly revives and makes a break for freedom. Chameleons have been seen to play dead, lying motionless on their sides, feet held out rigidly and eyes half closed. The striped pole cat sometimes plays dead as yet another one of its defense behaviors. In insects, thanatosis occurs in some beetles, bugs, grasshopper's stick-insects and mantids.

- **Self-Mutilation (autotomy**) - Reptiles, lizards in particular, sometimes lose their tails as a way of saving their head and body. This specialized process is called autotomy which literally means self-cutting. Autotomy takes place when a lizard is not fast enough to elude the attentions of a possible predator. As the predator strikes at the moving lizard, it is usually the tail that is most likely to be caught. At the moment of impact, the tail of the lizard breaks off from the body. The tail wriggled in the mouth, or in the predators' claws keeping the attention of the predator to such an extent that it hardly notices the escaping form of the rest of the lizard. (See pic below):



- **Distraction Display -** Display of this nature are found in a large variety of birds, but are more often seen in the ground nesting species. Ground nesting birds' nests, their eggs and nestlings are all very well camouflaged, and may be easily overlooked by predators. So the nesting bird often sits tight on the nest in the hope that the predator will pass by. If this camouflage fails, then the eggs or nestling are at serious risk. If the adult bird was to fly off when the predator is almost at the nest it would make the nest too vulnerable, so just flying off would not save the nestlings or eggs. At this point a distraction display comes into operation. The nest –owners can make exaggerated movements away from the nest and draw the predator towards itself. This kind of display must not only be very obvious (conspicuous), but has also to be attractive to and lure the predator. If the adult bird displays to the predator that it is injured (the broken wing display),or has some physical disability while it moves away from its nest, this behavior will attract the predators attention causing it to slowly move away from the nest area. Once the parent bird has led the predator far enough away from the vulnerable nest (using the broken wing display) the predator will have difficulty in rediscovering the position of the nest and will in most cases move off in search elsewhere.

- **Birds Distraction Display** - Are not only towards potential predators, but animal that could harm the nest. Example: blacksmith lapwing display towards an intruding elephant.

- **Mobbing Behavior** - A mobbing attack is another form of anti-predator behavior. If a bird of prey, an owl for example is sitting on a branch during day-light hours, it may attract the attention of smaller birds that will begin to sound an alarm call, attracting more & more small birds to the scene until the bird of prey is surrounded by noisy angry mob. They now begin to harass the bigger bird calling incessantly and loudly, twisting and jerking their bodies and sometimes making mock attacks. When it flies away it may be pursued until it has left the area. Fork-tailed drongo have been seen sitting on the neck of a martial eagle in flight and pecking its head. Birds also mob snakes in trees in a similar fashion.

- Small mammals also indulge in mobbing behavior to rid themselves of a predatory killer. Meerkats (suricates) are often seen mobbing cobras, employing similar strategies to that of mobbing birds with the knowledge that there is safety in numbers.

## TERRITORIES AND HOME RANGE (15.1.5)

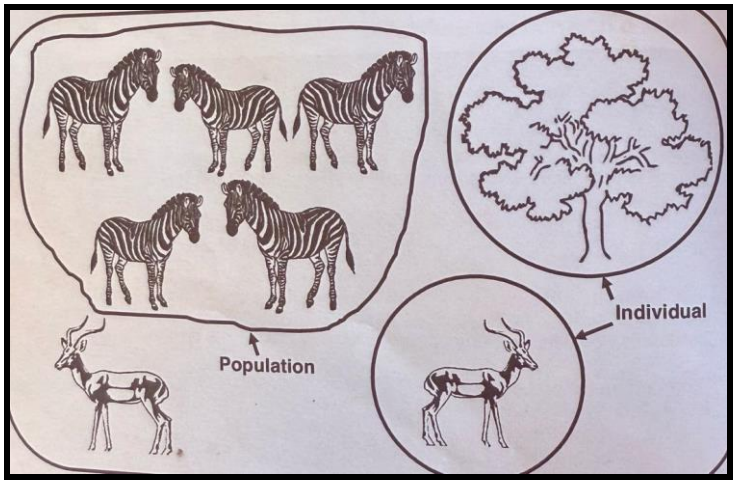
- A home range- an animal's home range is that part of a habitat occupied by an individual living within a population. The individual uses the home range in the fulfilment of its daily activities such as eating, drinking and sleeping. Home ranges may overlap but territories do not. Where two territories border there may be territorial disputes between dominant males.
- A territory-A home range becomes a territory when the resident animal or group of animals does not share the resources (available food and water) in that area with others of the same species. The use of scent marking and middens (dung piles) to demarcate territorial boundaries does not keep other species, -specific animals out of that area. These markings merely inform intruders that this area is occupied and is not available for squatting. However, these markings are backed up by the threat of aggressive behavior from the resident if an intruder chose to ignore the markings. Intruders that not deplete the defended resources are usually tolerated as long as they remain subordinate to the resident territorial male. For example, an intruding steenbok wanting to gain access to a waterhole has to differ (express submission) to the dominant territorial male.

❖ A summary of animal home-range and territory:

| Home range. | Territory |
|---|---|
| All animals have a home range | Not all animals have a territory |
| Usually a large area | A smaller area within a home range |
| Can support several territories | An exclusive are depending on size |
| Not occupied permanently, animals move according to availability of resources | Occupied on a permanent basis under extreme conditions it might be moved. |
| No definite boundaries-it fluctuates according to availability of resources | Specific area with boundaries |
| Many different families share the area | Occupied by a family unit |
| Not demarcated or defended | Demarcated and actively defended to keep out individuals of same species. |
| Overlap other home-ranges | Could be next to each other but do not overlap. |
| Used for feeding, drinking, shelter and Interacting. | The main purpose is reproduction and Rearing young ones. |

❖ Group Hierarchies - A hierarchy is an animal group organization.it is a form of social organization in animals in which different levels of status, affecting their feeding and mating behavior. Within the natural guiding environment, like a game reserve, all animals can be grouped into a hierarchy of organization. The make-up of the hierarchy for the purpose here includes, the individual, the population and the community.

- **Individual** - The lowest level of organization within the biosphere is the organism itself. This individual comprises a single organism of a particular species, for example a single lead wood tree, or a particular individual female leopard.
- **Population** - A population is a discrete group of organisms belonging to the same species that interacts within the confines of its own group sharing a particular space in a geographic area. Because members of a population are interbreeding, they share a common gene pool and are thus a distinct genetic unit. All the zebra in a particular game reserve makes up a population.
- **Community** - all the populations found within a given area are collectively called a community. The population of zebra and the population of impala in a game reserve together are known as a community or form part of the mixed bush willow woodlands community. (See pic below):




❖ **INTERPRETATION AND SENSES.**

- The behavior of animals is strongly linked to their interpretation of their environment. Like us they use their senses to gather information and interpret things. They have all

five of the primary senses available, namely touch, taste, smell, hearing and sight. The senses are developed to different degrees in different kinds of animals. With birds, the senses of smell hardly exist, while their senses of sight and hearing is very good. With mammals, and especially antelope, the sense of smell is very highly developed, together with a good sense of sight and hearing. However, the interpretive ability of antelope is not equally good for all senses. Their ability to interpret what they smell is very highly developed.

- **NB//** The habits of animals differ considerably. When animals are active at night, their habits are referred to as **nocturna**l (e.g., leopard, spotted thick –knee (dikkop). Animals active by day (most antelope) are referred to as **diurnal**, and animals active at the twilight of dawn and dusk are called **crepuscular.**

## ➢ IDENTIFICATION AND INTERPRETATION OF ANIMAL SIGNS AND SOUNDS (15.1.6)

- The value of track and sign knowledge- tracks and other signs left behind by animals are an indication of the animal's behavior. What they did and when they carried out that behavior and from this we can gain an understanding of why they did it. Having an understanding of signs and sounds of the natural environment will enhance the guided experience you offer to your guests in a number of ways:
- Provide you with the knowledge to give your guests interesting and informative explanations for signs left behind by animals.
- Provide you with the ability to interpret the tracks in terms of what animal made them and how fresh they are.
- This will determine if the tracking of the animal is to be included in your guided experience based on how fresh the tracks are.
- Knowing the alarm calls of various mammals and birds will provide you with information as to what the animals are sounding the alarm for.
- This could possibly lead you to viewing a predator (lion, leopard and cheetah) and any of the smaller cats, birds of prey of snakes).
- Provide you with the ability to identify insects and frogs which you may not be able to see but are emitting a loud call.
- It is important to note that the signs and sounds of animals in nature can only really be learnt through practical training and experience. You may be able to identify a hyena track from a picture however, the track (spoor) in real conditions may not conform entirely to that portrayed in the picture. When observing track and signs it is important to also take into consideration the context (environmental conditions) in which the tracks and signs appear.

### ❖ FOOD FOR THOUGHTS:

- **Cat and dog mating differences**- cats and dogs physically copulate differently because of their generally different social structures and resultant mating/breeding systems. Cats are generally all induced ovulators and therefore require the marathon mating session where frequent copulations are witnessed. This is because they have polygamous and promiscuous mating relationships where superior genes are usually not granted.

- Dogs on the other hand usually have a monogamous system. Domestic dogs should not always be viewed as a good example of this because domestication and selective breeding has led to a slight blurring of natural behavior. This is where Alpha males and females, as the top specimens of each sex hierarchy (in pack species) are exclusive mates of the pair-bond, and dominant partners are thus guaranteed.

- To ensure, therefore that fertilization does indeed occur in as few copulations as is possible (from energy and safety view point), the penis base swells up during intromission. This makes withdrawal difficult and the inner lining of the female vulval entrance in turn then also swells up to hold the swollen penis in place-effectively locking the mates together. Blood flow into these areas causes the muscle tissue of these organs to swell. The male's bulbous swelling, called the bulbous glandis or bulbo urethral process, is huge in relation to body size, as is the rest of the swollen penis. This adaptation is probably to ensure that sperm is effectively transferred (none spilled or wasted) in a single successful mating session so that less time is spent on this non-vigilant behavior (from a safety perspective). Once locked together the male invariably cocks a leg over the female's back and the two individuals stand tail to tail. This is a prerequisite for survival and safety so that each individual is scanning in opposite directions for danger during the few minutes they are vulnerable to attack. The male's penis is remarkably flexible and can accommodate this seemingly dangerous maneuver. Only after a minute or two of no stimulation does the bulb shrink enough (because of blood dispersion) to allow the male to free himself.

- **Surviving Desert Heat**-Most desert mammals survive extreme heat by simply avoiding it-they seek shade, elevated breezy positions or most commonly subterranean refuges where cooler conditions prevail. Many are therefore nocturnal. Most desert antelopes are however active during the heat of the day-examples being springbok, red hartebeest, and gemsbok. What is even more astounding is that they will often remain totally exposed in the sun during extreme temperatures. They achieve this quite simply by fooling the brain into thinking that it is not hot. The mechanism is equally simple and wonderfully ingenious and is called the **RETE MIRABILE or CAROTID-RETE SYSTEM** (Latin for wonderful net), and is probably most acutely developed locally in the gemsbok. As the Latin name suggests, the pulmonary artery (carrying warm oxygenated blood to the brain) divides into a fine network of capillaries near the base of the brain. This is interwoven with a network of capillaries of the carotid vein that has just its deoxygenated blood cooled when passing close to the nasal cavity. Here the venous blood passes over a series of cartilaginous plates where cooling takes place via evaporation of moisture on the nasal mucosa. This is assisted at higher temperatures (usually above 40 degrees) by nasal painting. The painting only takes place at higher temperatures in an effort to save water. This cooled blood then passes through the RETE system of capillaries, in close proximity to the warm arterial blood.
- The body temperature is therefore allowed to rise without ill effects to levels that would ordinary fatal by destroying brain function-up to 42 degrees (5degrees above normal body temperature of approx. 37). As night falls, these antelope will then allow this body heat to dissipate via radiation to the atmosphere and effectively cool down again. They possibly move to the tops of dunes or ridges where cooling breezes can accelerate this temperature regulation.

- **GIRRAFE CIRCULATORY SYSTEM** - Giraffe have large powerful hearts (up to 12kg) that are needed to pump blood through the large body and, especially against the force of gravity up to the brain. A selection of valves prevents sudden pressure changes and damage to organs-particularly the brain. A special pressure-reducing mechanism prevents brain damage when the head is lowered. The skin and muscle of the lower legs also fits tightly around the leg bone to keep the pressure high and force the blood up against-much like a pilot's G-suit.

- The pressure is immense-it is said that the blood would shoot a few feet into the head were suddenly removed-and this is increased by the effect of gravity when the head is

lowered. The giraffe has evolved various mechanisms to deal with this problem and prevent brain damage or even death. Firstly, there is a special system of capillaries bunched as an organ at the base of the brain, which absorbs and effectively reduces this pressure by pooling the blood and slowing it down. It is therefore commonly called the **blood sponge.** Coupled to this are two sets of valves in the neck. One set is located in the carotid artery going to the brain, restrict flow when the head is lowered-effectively reducing pressure. A second set in the veins leading from the brain to the heart restricts flow when the head is up. These stop blood draining too fast that can cause blackouts. This keeps the animal conscious when it rapidly and frequently raises the head while drinking or feeding.

- **MUSTH -** The word often mispronounced as "**musk**". Musth is a word that describes a physiological condition in elephant males where higher testosterone levels, among other things can make them aggressive in their quest to find mates. Originally a Hindi word meaning (mischievous), musth was used to describe the condition in Asian elephant. It is equally applicable to African specimens. As unpredictable and little understood phenomenon, musth first becomes prevalent for very short periods of time in animals in their early twenties. At this stage, it is usually suppressed by older, bigger males. As they get older musth occur more frequently and lasts for longer periods (although it is usually cyclical). It establishes it's self-best in bulls 30-40 years where musth could last a few months. Some bulls never enter musth but can still successfully find mates and sire offspring. Musth is characterized internally by chemical and hormonal imbalances, most notably surges in testosterone in the blood. Externally the temporal glands, midway between the eye and ear, become swollen and secrete a clear oily liquid that runs down and stains the side of the face black. This must not be confused with the secretions that signifies stress or excitement-either positive or negative. These secretions occur in both sexes and in juveniles. The easiest way to check if the secretions are as a result of musth is to look at the back legs. During 'true musth' if I may call it that, there is a constant dribble from the penis (usually sheathed) that runs onto the inside of the back legs and stains them black. The urine, a greenish-yellow color which smell strongly of testosterone, then runs down the feet to the ground where it can be clearly seen. This is a clear advertisement and the scent lingers for a while after the animal has passed. Not all musth bulls are aggressive, some are remarkably docile but it is best to respect these individuals and give them right of way.
- **DELAY MECHANISM -** These are a variety of processes that nature has set in place to ensure that the best genes get propagated. In other words, stumbling blocks are set in place to make life difficult for low-ranking males to fertilize females as this will be bad for the gene pool. While they are trying their hardest the delays allow the top-ranking males to arrive, chase them off, and then mate with female concerned-ensuring that the strongest and best genes are continued. **"Survival of the fittest".**
- **ELEPHANT TEETH - many people believe that elephant** starve to death but this not entirely true. What actually happens is that their teeth get worn down (they do not suddenly wake up to find they have no teeth and the die) and become less efficient at breaking the food down for digestion. They therefore, over a period of a few weeks to months, lose condition and become weaker-usually dying from complications like a heart attack. Elephant have unique teeth in that they do not move in the normal way from top to bottom but travel in a track-like motion from the back of the jaw to the front-each tooth pushed by the one behind. As the tooth move past the front line of the jaw it fragments off in pieces and fall to the ground. They are born with the first set of teeth, including tusks (although these are lost at about 1 year and never protrude below the lip). The permanent tusks-modified incisors –then continually grow for the rest of their life. They have six sets of cheek –teeth (24 in total), each set taking about 5-15 years to pass through the mouth. There will always be at least 2 teeth in each part

of the jaw at any one time. Elephants therefore have a total of 28 teeth in their lives (4tusks+24 cheek teeth). The cheek teeth have angled ridges on them that make it look like a lot of teeth bundled together but they all come from a single root/pulp cavity. These ridges give the animal the name of Loxodonta meaning angled tooth.

❖ **PERRISODACTYLA-RHINO (ODD TOED UNGULATE**

- **Dung middens -** Derived from a Dutch word meaning (haystack). For carnivores these demarcations are called latrines. These sites are used to advertise the presence of the animal and differ quite a lot between the two rhino species:
- **White rhino** - only the dominant territorial male will make use of these middens and will only defecate here. There may be between 10 and 30 within the territory, scattered widely along favored footpaths and a territory boundary. These males usually do not urinate at the middens, saving this instead for spraying backwards while marking territory. Before defecating the feet are dragged forward-probably in an effort to loosen the soil or vegetation so that the scent will stay longer on the amp, loose surface. Sometimes the feet are not dragged but the horn is used to rub the vegetation instead. During and after defecation the feet are kicked backwards, scattering the dung over a large area-making it easily visible-but this also gets the scent onto the feet so that the territory can be marked as he walks. White rhino dung is dark green when fresh-they are grazers (grass is green) and it turns black with age. It is well compacted with a fine texture.

- **Black rhino** - Are usually not territorial but can be in high concentrations. Both sexes will make use of mi dens but do not use them religiously-the dung is only kicked back by the males. These animals are browsers, feeding off the trees-but they dint eat leaves, they prefer twigs. They have small, prehensile (able to grab) upper lips that pulls the branches into the side of the mouth and they are then neatly sniffed off by the premolar cheek-teeth-resulting in the twigs having 45degrees angles on either end. They are not pounded up like the wood in elephant dung. The tannins in the wood and bark cause the dung to have a reddish-brown color-the same as with elephant and helps to avoid confusion with dung of white rhino.

❖ <u>ARTIODACTYLA-EVEN TOED UNGULATES</u>

- GIRRAFE:

  - **HORN GROWTH -** Most animals are not born with horns as this would make birth very difficult and dangerous for the female. Giraffe are however born with little horns BUT these are made of cartilage and are not attached properly to the bone of the skull so that the move and don't break during birth-they are called floating horns. When the baby starts to drink milk, a unique bone growth process starts to deposits bone onto the tip of the horns and it slowly starts to coat the cartilage all the way down until it fuses with the **bone of the skull between 3-6months. The process then stops in females, but continues in** males because the horns need to get bigger so they can be used as weapons during fights-called **sparring**. Once the horns have reached a maximum size then the bone deposits start to concentrate on other parts of the skull like the ridge in front of the eye and at the back of the skull. This is an attempt to make the skull a heavier and more effective weapon in fights. Injuries on the skull create a nucleus where the bone deposits and can cause big bony growths-especially over the eye area.

❖ **WARTHOG:** Why do they feed on their knees?

- During the winter months they need to get food from underground. This they do by digging with the hard cartilage disc at the end of the snout. Because the ground is often dry and hard and because extensive digging is usually requiring the warthog to drop to its knees to generate more pressure and leverage for driving the snout in a more efficient way of digging with a reduced angle for an animal with a short neck.

## ❖ ANTELOPE:

- Antelope sub families; all have different glands.

- Bovinae- buffalo and spiral-horned antelope, (eland, kudu, bushbuck, sitatunga, nyala and) buffalo. All but buffalo have false hoof glands
- Hippotraginae - horse antelopes - (roan. Sable & gemsbok) pedal (foot glands on all 4 feet)
- Reduncinae - reedbuck and relatives-red lechwe, phuku, reedbuck and water buck sebaceous (skin), sub auricular below the ear in reedbuck
- Alcelaphinae - hartebeest and relative's wildebeest and tsessebe, red hartebeest and lichetenstein hartebeest. Pre-orbital (in front of eye) and pedal (foot) and front teeth
- Aepyceronatinae - impala. Metatarsal (above back feet) gland
- Peleianae-grey rhebok. Preputial (at penis) gland
- Cephalophinae - duikers, common duiker, red duiker and blue duiker. Pre orbital in front of eye and omnivores
- Neotraginae - dwarf antelopes- steenbok, dik dik, suni, grysbok, klipspringer and oribi, Sharpe's/cape grysbok. Pre orbitals in front of eye and vegetarian.

### ❖ Carnivore-flesh eater: Why do cats mate so often?

- This is the behavior common to all true cats because they have what are called induced ovulators. This means that the female needs to be mated with continuously for a period of a few days (over 100 times) before he actually ovulates (produce an egg) and can have any chance of falling pregnant. This is one of the **nature's delay mechanisms** that ensures that the male with the female is worthy-if not there is time for the dominant male to chase him off. Cats are polygamous (more than 1 male) and the female cannot be sure that she is accepting the dominant male. Often but not always when there is **a pride take over** the new males will kill young cubs-presumably in an effort to force the females into oestrous so that they can father and spend their energy on their offspring rather than those of the previous male. This is called INFANTICIDE (baby killing). Some females will hide their cubs when the new males arrive and then go into what is called a 'pseudo-estrous' or false estrous. In fact all the females in the pride will go into this type of estrous and mate with the new males. The males will be now happy that there are no cubs left (a female will not be mating if she had cubs) and then they move off to patrol their new territory. But none of the females will conceive nobody knows how they do this but it is another of nature's delay mechanisms that ensures that while everything is uncertain (the new males still proves that they are capable of staying) the females will not waste energy on having and raising cubs that will just be killed by another male coming in a few weeks. This infertility period lasts about 6months-the females only have cubs once the males are certain to stay.

❖ **LION:**

- Have two types of social groups:
- Female prides-probably stay together to protect their cubs against male lions (infanticides) and secondly to make hunting of larger prey (exploitation of a niche) possible and efficient.
- Male coalitions-related or strangers stay together to ensure survival during the tough time between eviction and pride take over (about 2-5 years) to make taking over a pride easier and to ensure they keep the territory for longer and ensuring breeding success. STRENHTGH IN NUMBERS, there is often no hierarchy among the members.

❖ **HYENA:**

- Probably have evolved sociability in response to lions-they have to complete and can only do so in numbers (whether to hunt or scavenge). They have evolved a matriarchal (led by female) society as a result where **all** females generally out rank **all** males. Interestingly, only nomadic males get to mate with the females to ensure fresh genes**.**
  **NB: female spotted hyena have the clitoris that looks like penis-called peniform clitoris or false phallus, also used for mating on their first pregnancy, the babies will get stuck in the clitoris and they will die. Hyena are not hermaphrodites**

❖ **CHEETAH:**

- Have two types of social groups:

- **Sibling groups** (mother with full grown young prior to dispersal) will temporarily stay together to ensure that they perfect their hunting technics before going their separate ways. Cheetah needs to stay together for as long as possible to learn to hunt and make use of everyday of the +-18 months until the female comes into estrous again and chases them off. Each will go their own way but brothers may stay in coalitions.
- **Male coalitions** - often have a hierarchy and are almost always brothers. The main reason is to ensure survival and to secure a territory but not for direct breeding opportunities. Cheetah females are loners, so unlike lion coalition where there are enough females to go around, cheetah males will not all get a chance to mate. The fact that the members are related means that shared genetic material is being passed on any so it is beneficial to all members.
- **Honey badgers** - males will occasionally form what appear to be stable groups (little aggression) but this are merely temporary associations that are on the trail of an estrous female. When finding her they will fight for the rights to mate with the losers all dispersin.

❖ **JACKALS:**

- Often the offspring will delay their emigration for a year as they decide to stay and help raise the next litter (delay dispersal) this a benefit to them as they learn to be better parents and therefore hopefully reduce mortality of their own pups. They are again helping to raise their own siblings so 50% of genes are shared –so they are being reproductively successful without actually breeding. These temporary packs only last for about a year. When food is very abundant these packs will form territories and break down, and they can remain stable for a long –time with the result that an alpha pair will establish dominance and the pack may behave like wild dogs.