



ANIMAL BEHAVIOUR

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A panda is the central focus, sitting on a tree branch. The background is dark with vibrant, flowing abstract shapes in red, orange, yellow, green, and blue. The text is overlaid on the left side of the image.

SOCIAL BEHAVIOUR IN ANIMALS

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WHAT IS SOCIAL BEHAVIOUR?

- Society can be defined as a group of individuals belonging to the same species and organized in a cooperative manner. Animals that live in a society are known as social animals.
- Different types of behaviour evolved in animals because the behaviors helped them survive or reproduce.
- **Social behaviour** is behaviour among two or more organisms within the same species, and encompasses any behavior in which one member affects the other.
- This behavior can be affected by both the qualities of the individual and the environmental (situational) factors. Therefore, social behavior arises as a result of an interaction between the two—the organism and its environment.

RANGE OF SOCIAL BEHAVIOUR IN ANIMALS

- Aggression
- Cohesion/Aggregation
- Cooperation
- Altruism and Reciprocal altruism
- Communication
- Selfish behaviour
- Caste system and Division of labour
- Kin selection
- Antipredation
- Agonistic behaviour
- Dominance
- Territoriality

AGGRESSION

- **Aggressive behaviour:** animal behaviour that involves actual or potential harm to another animal.
- Two types of aggressive behaviour: 1. Interspecific (Predatory or Antipredatory)aggression
2. Intraspecific aggression
- 1. Interspecific(Predatory or Antipredatory)aggression: in this type, animals prey upon or defend themselves from other animals of different species.
- 2. Intraspecific aggression: in this type, animals attack members of their own species. Intraspecific aggression is widespread across the animal kingdom, being seen in creatures as diverse as sea anemones, rag worms, wolf spiders, field crickets, lobsters, salmon, tree frogs, lizards, songbirds, rats, and chimpanzees. Sea anemones lash at one another with tentacles armed with stinging cells, rag worms batter each other with the proboscises that they use for digging burrows, lobsters use their large claws for hitting and grasping, tree frogs wrestle, robins peck, red deer use their antlers to push and batter one another, and one chimpanzee, made famous through the work of British behavioral scientist Jane Goodall, intimidated rivals by banging two oilcans together.
- Aggression sometimes occurs when parents defend their young from attack by members of their own species. Female mice, for example, defend their pups against hostile neighbours, while male stickleback fish defend eggs and fry against cannibalistic attack.
- The neurohormone serotonin is clearly involved in the control of aggression and dominance, as is octopamine (an invertebrate analog of norepinephrine, or noradrenaline, which in vertebrates acts in response to stressful situations). At least two pairs of serotonin-containing nerve cells have been identified in the central nervous system (CNS). These have connections with the motor neurons responsible for generating dominant and subordinate postures and with the motor neurons promoting more intense attack and escape.

AGONISTIC BEHAVIOUR

Agonistic behaviour is any social behaviour related to fighting. The term has broader meaning than aggressive behaviour because it includes threats, displays, retreats, placation, and conciliation.



INTERSPECIFIC AND INTRASPECIFIC AGRESSION



COHESION /AGGREGATION

- The individuals constituting a society tend to remain in close proximity to one another. This is called cohesion or aggregation. **As nouns the difference between aggregation and cohesion** is that **aggregation** is the act of collecting together (aggregating) while **cohesion** is state of cohering, or of working together.
- For example all the bees of a group live in one hive. From shoals of fish, to swarms of locusts, to zebras on the Serengeti -- live in tightly-coordinated social groups. This can help them avoid predation and find food.
- aggregation may provide individuals with increased access to food through information sharing and cooperative defense against non-group members. Conversely, close contact with members of the same species increases the risk of cannibalism, parasitism, and disease.

COHESION IN ANIMAL WORLD



COOPERATION

- Animals that live in a society are known as **social animals**. They live and work together for the good of the group. This is called **cooperation**.
- Cooperation allows the group to do many things that a lone animal could never do. In the ants colony by working together, they are able to carry a large insect back to the nest to feed other members of their society.

COOPERATION IN A SOCIAL INSECT

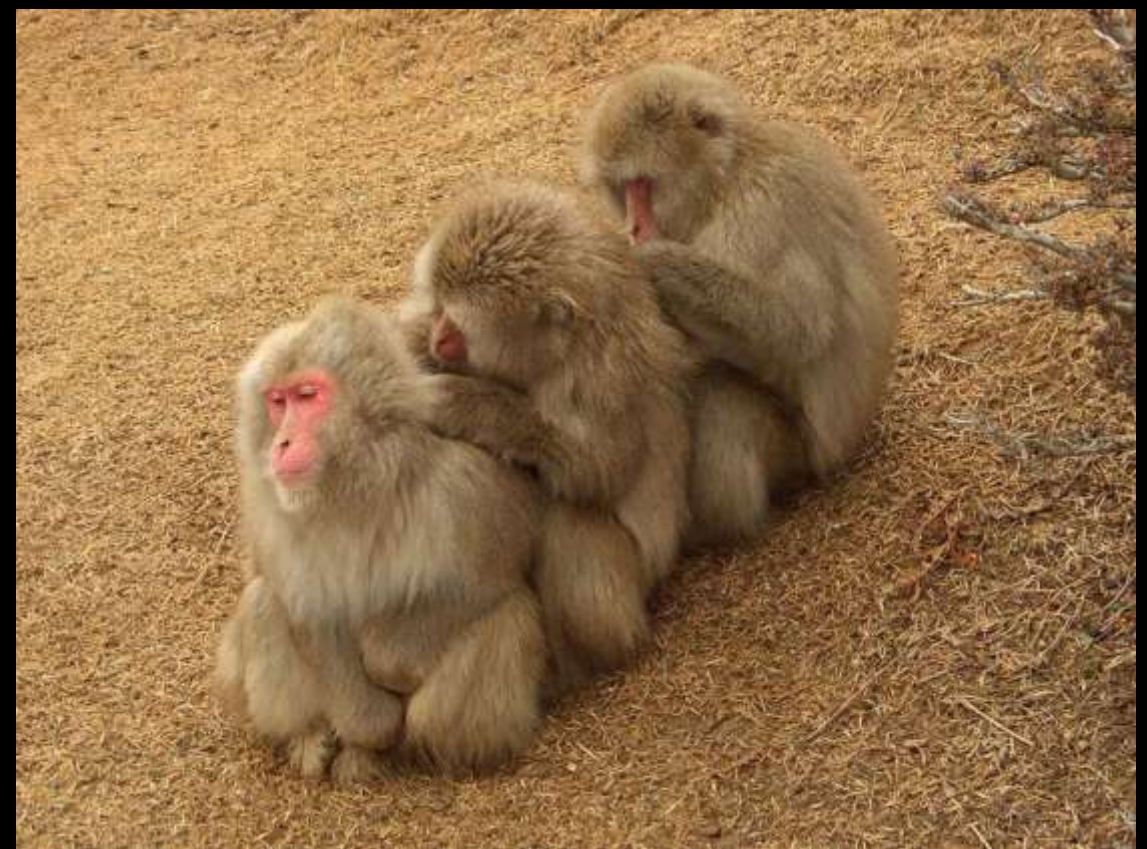
These ants are cooperating in a task that a single ant would be too small to do alone.



ALTRUISM AND RECIPROCAL ALTRUISM

- *Altruism* refers to a selfless helping act, wherein the primary intention of the helper is to relieve the other person from distress. The altruistic person does not seek any rewards such as gratitude, praise, or recognition in exchange for the help rather, it is voluntary and motivated by the helper's concerns for the well-being of the person receiving the help. *Altruistic* cooperation between related individuals (by which the behaviour benefits the recipient but is costly to the actor), for example, infertility of female workers in social insects (Hymenoptera).
- *Reciprocal altruism* is a behaviour whereby an organism acts in a manner that temporarily reduces its fitness while increasing another organism's fitness, with the expectation that the other organism will act in a similar manner at a later time.
- Example of reciprocal altruism: The vampire bats feed each other by regurgitating blood. Since bats only feed on blood and will die after just 70 hours of not eating, this food sharing is a great benefit to the receiver and a great cost to the giver. These bats usually die if they do not find a blood meal two nights in a row. Also, the requirement of that individuals who have behaved altruistically in the past are helped by others in the future is confirmed by this incident.

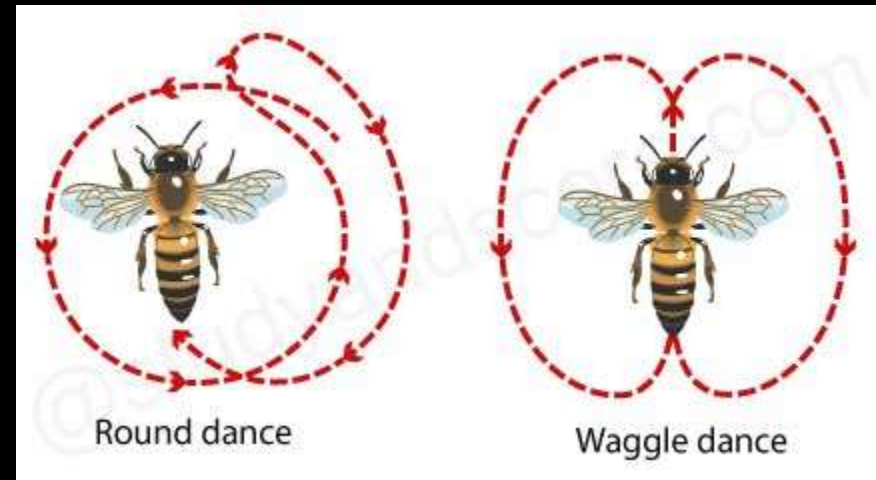
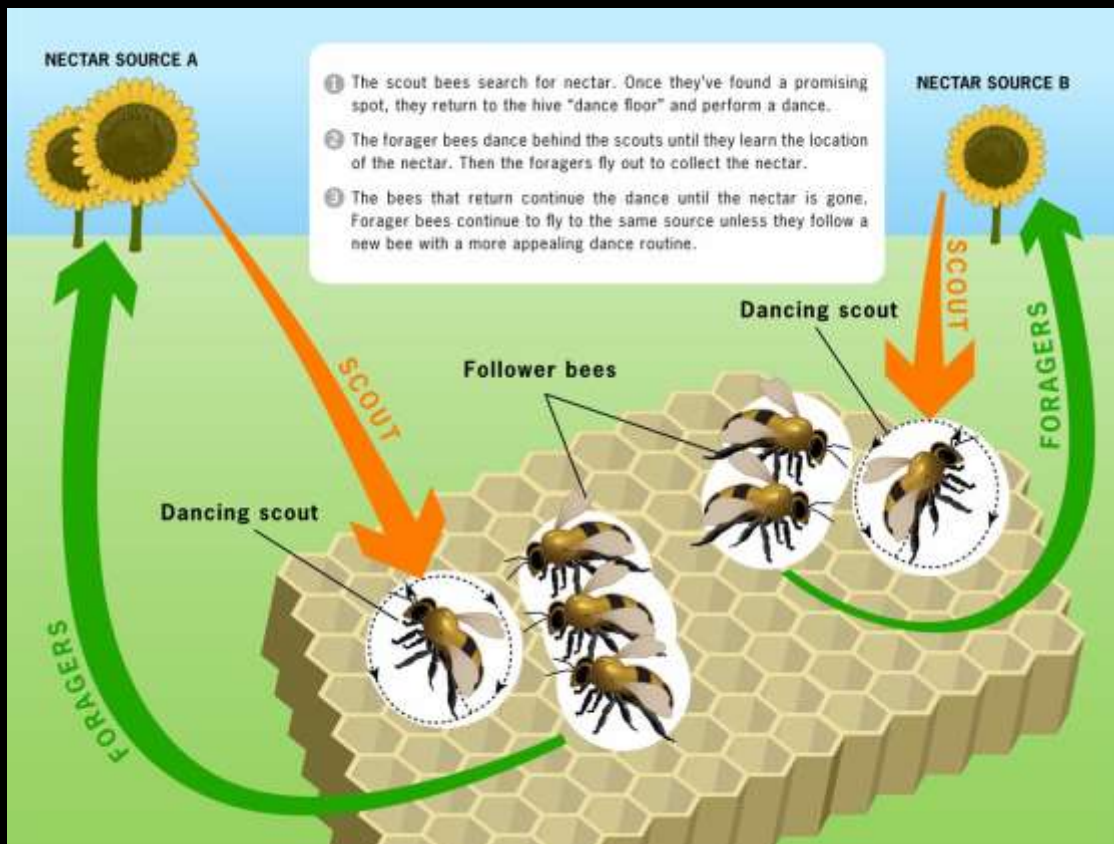
IF YOU SCRATCH MY BACK, I WILL SCRATCH YOURS !!



COMMUNICATION

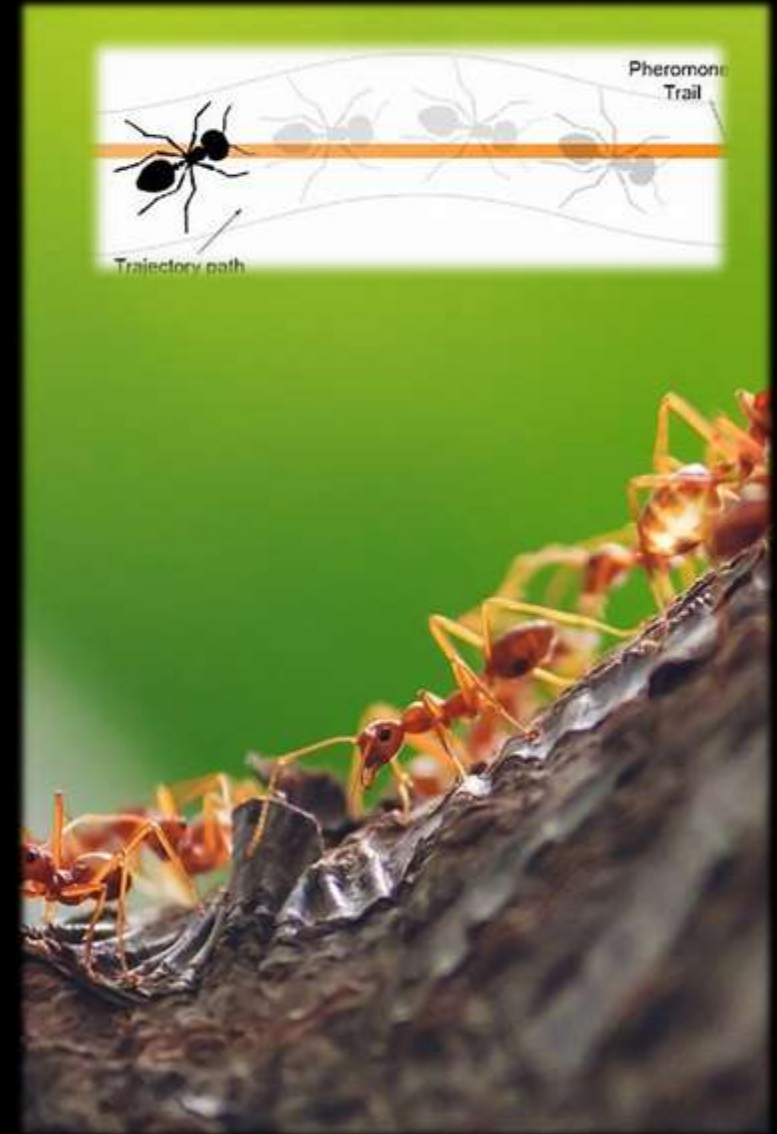
- For individuals to cooperate, they need to **communicate**. Animals can communicate with sounds, chemicals, or visual cues. For example, to communicate with sounds, birds sing and frogs croak. Both may be communicating that they are good mates. Ants communicate with chemicals called **pheromones**. For example, they use the chemicals to mark trails to food sources so other ants can find them. Male dogs use pheromones in urine to mark their territory. They are “telling” other dogs to stay out of their yard.
- In some treehopper (family Membracidae) aggregations, nymphs communicate the threat of a predator by using vibrations, which humans can detect only with electronic instruments. A more sophisticated form of communication is found in eastern tent caterpillars (*Malacosoma americanum*), which rest in a communal tent that increases in size as they grow and add silk.

BEE DANCE FOR COMMUNICATION



PHEROMONES IN COMMUNICATION

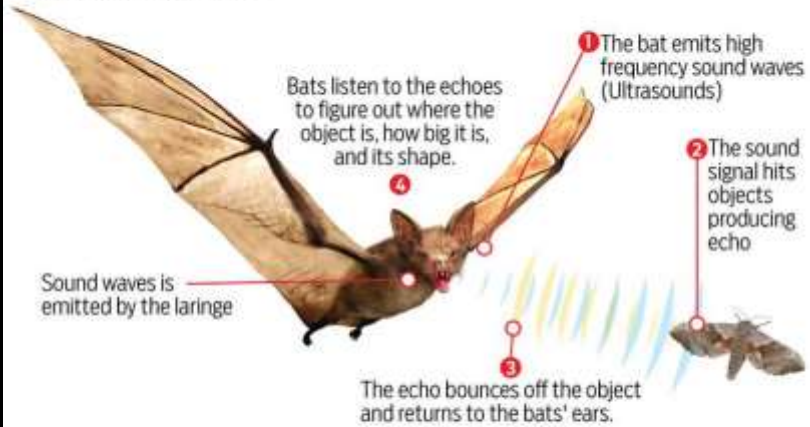
- Pheromones are chemical signals that have evolved for communication between members of the same species.
- Pheromones are especially common among social insects, such as ants and bees. Pheromones may attract the opposite sex, raise an alarm, mark a food trail, or trigger other, more complex behaviours.
- The picture in this slide shows pheromone trails laid down by ants to direct others in the colony to sources of food. When a food source is rich, ants will deposit pheromone on both the outgoing and return legs of their trip, building up the trail and attracting more ants. When the food source is about to run out, the ants will stop adding pheromone on the way back, letting the trail fade out.



AUDITORY COMMUNICATION

Echolocation

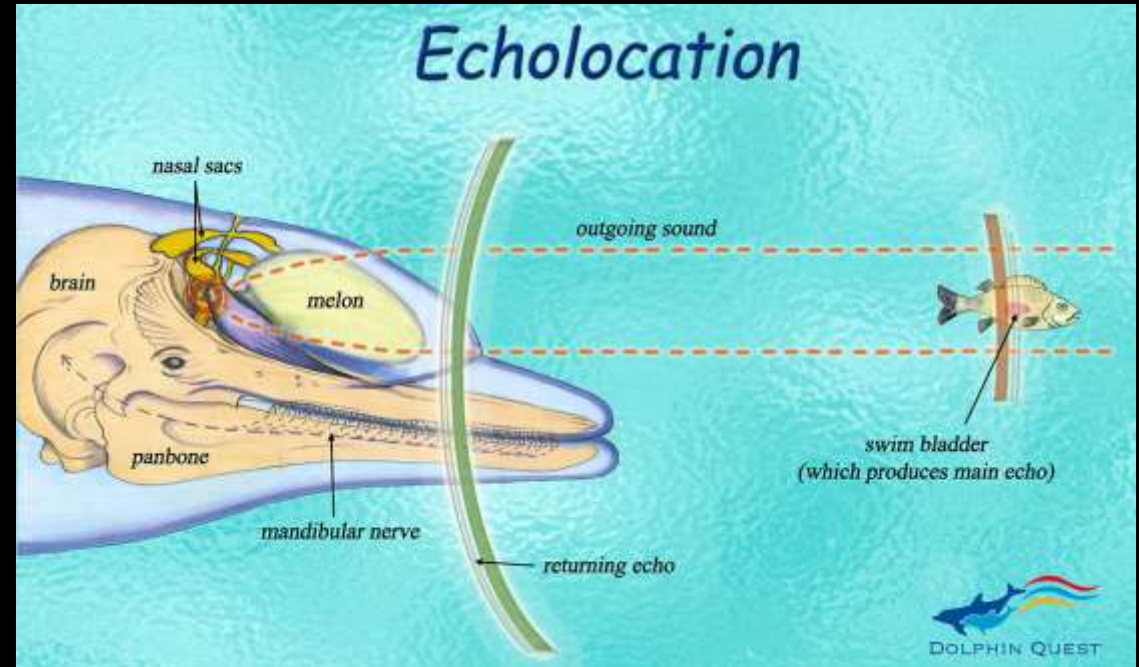
Echolocation is the use of sound waves and echoes to determine where objects are in space. bats can detect objects as thin as a human hair in complete darkness.



World's Fastest Mammal



According to a research led by ecologists at the University of Tennessee at Knoxville, the bats were documented flapping, level to the ground, at a whopping 161 kmh. Peregrine falcons hit 354 kmh but only when traveling downward vertically — given an accelerating boost from gravity.



SELFISH BEHAVIOUR

- Selfish behaviour occurs when one individual benefits at the expense of another. Examples, unsurprisingly, are common. In birds, females sometimes exhibit egg-dumping behaviour or intraspecific brood parasitism (that is, the laying of eggs in nests of other pairs, thus parasitizing their parental care). Even though female birds usually cannot tell their eggs from those of other conspecific females, this sort of parasitism is not particularly common, probably because territoriality and nest guarding help to minimize it. Conspecific brood parasitism, however, occurs in over 30 species of ducks and geese as well as in the northern bobwhite quail (*Colinus virginianus*), ring-necked pheasant (*Phasianus colchicus*), wood pigeon (*Columba palumbus*), European starling (*Sturnus vulgaris*), cuckoo (Cuculidae), and a variety of other species. Heterospecific brood parasitism is even more common with cuckoos and cowbirds (*Molothrus*), which lay eggs in the nests of a diversity of other species.

CASTE SYSTEM AND DIVISION OF LABOUR

- Social animals such as ants, bees, termites, and wasps are the main species known to have developed caste systems. Typical castes in insect societies include the queen, the sexual female responsible for reproduction; the workers, the usually sterile caretakers of the queen and her eggs and larvae; and the soldiers, defenders of the colony (and also sterile).
- Morphological differences between castes, which enable their members' performance of different tasks, are sometimes noted; e.g., the pollen basket on the legs of the worker honeybee (*Apis mellifera*) does not exist on the queen.

CASTE SYSTEM AND DIVISION OF LABOUR IN HONEY BEE COLONY

Honeybee Castes









Queen



Worker



Drone

Type of adult bee	What they do	How many in a honey bee colony	How many in a bumble bee colony	What they look like in a honey bee colony	What they look like in a bumble bee colony
Queen	Lay eggs	1	1		
Worker	Take care of larvae, build and clean nest, forage	10,000-50,000	Less than 50 to over 400, depending on species		
Male	Leave nest to mate, then die	100-500	0-50, depending on species and season		

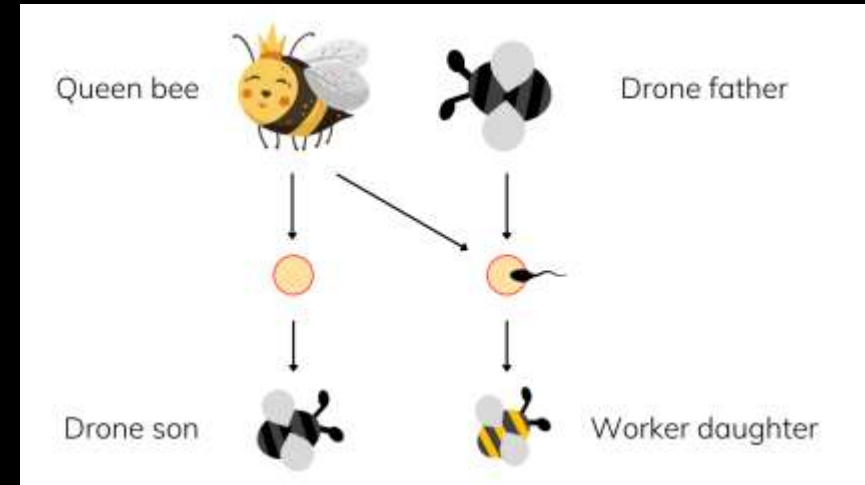
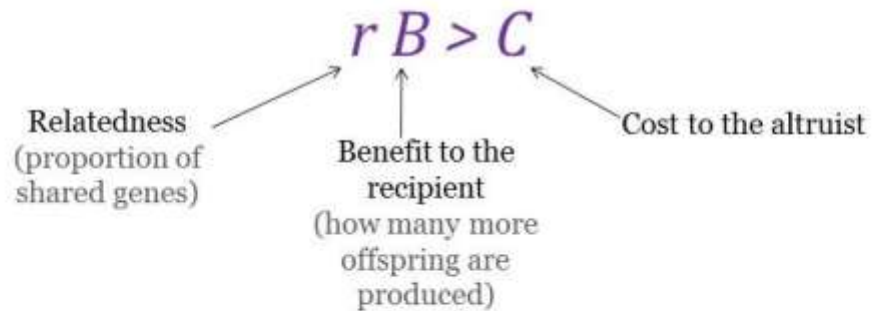
KIN SELECTION

- **Kin selection** is a process whereby natural selection favours a trait due to its positive effects on the reproductive success of an organism's relatives, even when at a cost to the organism's own survival and reproduction.
- This concept was proposed by W.D. Hamilton (1964)
- Honeybees will certainly lay down their lives for dozens of relatives, as illustrated by their self-sacrificing stingers. It is the worker bees of the hive that engage in this behavior in addition to foregoing reproduction in favor of helping to raise their sisters. There is one more important observation here: all worker bees are female. Female honeybees are much more closely related to their sisters, sharing 75% of their DNA, than they are to their progeny, who only inherit half of their mother's genes. Therefore, female honeybees on the whole favor helping their sisters over-producing their own offspring. Conversely, male honeybees share their DNA disproportionately with their offspring, passing on their full set of genes to their daughters while only sharing half of their genes with their siblings. Since altruistic behavior is contingent upon the genetic similarity between individuals, the observed difference between the sexes in reproductive behavior, with all males preferring to reproduce and most females preferring to raise sisters, is expected. The worker bees have different fathers but all have the same mother: the queen of the hive. Therefore, the genes from the mother would favor helping the individual's sisters, while the genes from the father would only benefit from reproduction.

Hamilton's Rule & Altruism

Hamilton's rule

Altruism is favored by natural selection when:



Kin selection and eusociality

- Females are more closely related to their sisters ($r = 3/4$) than they would be to their own offspring ($r = 1/2$)!
 - Females maximize inclusive fitness by not reproducing, instead helping their sister reproduce
 - They should invest in sisters, not daughters or sons ($r = 1/2$) or brothers ($r = 1/4$)



ANTIPREDATION

- Alarm calls
- Guard behaviour
- Induction of startle response in predators
- Mobbing

SOME ANTIPREDATION BEHAVIOUR IN ANIMALS



warning calls/alarm call by the Vervet monkey :

alarm calls for different types of predators sounded distinctly different and each call was able to elicit a distinct defensive response. When the leopard call was played, the subjects ran up into the trees while when eagle call were played, subjects looked up and run out of trees into lower bushes. When snake calls were played, subjects immediately stood on their hind legs and looked on the ground around them.



Mobbing by Musk oxen:

No other animal has the defense method of musk oxen. When danger threatens they do not run away. Instead, a herd of twenty to forty individuals backs into a rough circle facing outward with the calves in the center or under their mother's bellies. This ring of horned heads can defy such natural enemies as the arctic wolf and the grizzly bear.

DOMINANCE

- Dominance is a common relationship between the members of a group in which some animals, the *dominant ones* have priority over other, the *subordinate ones*.
- The males of hamadryas baboons display their fangs for claiming superiority. higher rank of the male is displayed by the bigger and larger fang it possesses. In gorillas , the silver backed males remain at the top in ranking and females with young ones rank second.
- A weaker animal submits to the stronger animal by exhibiting a submissive pose. For example, carp (fish) closes its fins while submitting to submissive behaviour.

DOMINANCE BEHAVIOUR IN ANIMALS



TERRITORIALITY

- Territory is a selectively defended area. Territoriality is one way that animals compete for and partition resources.
- Typically, territories include sites of egg deposition, burrow entrances, nest sites, food plants, feeding space, advertisement perches or display sites, roosting sites, shelters, grazing areas, food stores or communal caches, foraging space, and even patches of sunlight in the forest.
- The costs and benefits of competing for space, and ultimately resources, depend on the density of competitors and on how resources are distributed. When resources are clumped, they are more easily managed and defended. Conversely, when resources are too high in quality, competition may be so intense that exclusivity is impossible or simply too costly to maintain.

USE OF URINE AND FAECES FOR TERRITORY MARKING

Territorial marking

- Dogs are territorial animals; they mark their territories with poop and urine. A fight can ensue if a dog watched another pooping or urinating in the territory he has already marked.
- Also sometimes it's a way of attracting or tracking down mates for dogs.



USE OF SPECIAL GLANDS FOR TERRITORY MARKING

Ring-tailed lemur (*Lemur catta*) marks its territory. This lemur is rubbing scent glands at the base of its tail against the wood. This will warn other lemurs away from its territory. The ring-tailed lemur inhabits the rocky mountains of south- western Madagascar, feeding on leaves, flowers and fruits.





THAT'S ALL!!