

resources within the group and reduces aggression.

Sexual: Only the strongest/fittest are able to breed successfully.

Parental: Protects the offspring and the energetic investment made in them.

Parent/offspring: Ensures survival of young through teaching appropriate behaviour.

Predatory: Obtaining food for survival. In the case of cannibalism, may be an appropriate response to stress.

Anti-predatory: Protects conspecifics (and sometimes other species) against predators.

Sibling: Strongest offspring will survive. Individuals that are weaker will not survive to pass on their genes.

Competitive: disputes over a carcass between predators and

Competitive: Obtaining resources (food, space) for survival.

- Aggression within a social grouping tends to be very ritualised because its primary role is to reduce serious physical conflict between individuals and maintain social cohesion. Aggression between groups is often associated with resource acquisition. Such invasions represent more of a threat to an established group and are met with aggressive defence.
- This behaviour would occur when a previously dominant male is displaced from his position by the incoming male. The new male assumes the top position in the hierarchy and is able to kill those young sired by the ousted male.
 - The infanticide of offspring from an unrelated male is of benefit to the new male as he does not invest energy in ensuring the survival of offspring with none of his genes. By killing the infants, he also encourages the females to come into oestrus sooner, thereby siring his own young sooner.

59. Intraspecific Competition and Its Effects (page 80)

- Intraspecific competition refers to competition for resources between individuals of the same species.
 - Intraspecific competition occurs as a population grows and resources (e.g. food, water, breeding sites, nutrients, or light) become limited.
- Intraspecific competition limits a population's size because, as the population approaches carrying capacity, the intensity of competition increases greatly, resources become limiting, and population growth slows to zero.
- Scent markers; bellowing, roaring or calling; visual signals, claw waving.
 - Threat displays, facial grimaces, issuing threat calls.
 - Visual and vocal displays at close range and fighting.
- Establishing hierarchies within a social group to give orderly access to resources.
 - Establishing territories to defend the resource within a specified area.
- A territory allows the group occupying it to exploit the resources within it, without the constant threat of being challenged for that resource.
 - Defending a territory requires energy. This means that there is less energy to put into other activities such as mating and raising offspring.
- Hierarchies reduce a by permitting orderly access to resources within the group's habitat. Those animals that are most dominant will have priority access without challenge, while those further down the hierarchy wait their turn.
 - Animals with a hierarchical system benefit because the hierarchy ensures a strict, mostly unchallenged, order of access to resources. This allows individuals to expend their available energy on tasks other than fighting (such as rearing offspring and foraging or hunting). Reduced fighting also has benefits because there are fewer injuries and deaths.

60. Social Hierarchy in Pukekos (page 82)

- Intersection of W6 and B6: 18

Pukeko	No. Won	No. Lost	Total	% Won
W6	106	0	106	100
L9	31	57	88	35
L8	28	44	72	39
W7	6	42	48	13

- Top left to right, and down the side from top to bottom reflect the status ranking of dominant through to subordinate birds.
- These birds lost to birds normally subordinate to them.
- The result of an encounter is not completely predictable because their ranks overlap). B6 wins against W7 in 9 out of 15 encounters and it loses 6.
- Adult males are of higher status than adult females.
- Age (and size, which is related). Older birds (which will also be larger generally) dominate younger, smaller birds.
- R1 probably ranks between L8 and B6.
- R1 would probably lose to W3.
- For a hierarchy to remain stable, the birds within the group must act in accordance with their social status at all times (i.e. a lower ranked bird should not challenge a more highly ranked bird). The inclusion of new birds to the group would temporarily disrupt the hierarchy until their positions were established.
- An animal's social status refers to its position in a linear social hierarchy. It affects (and can be used to predict) how well individuals will do in competitive and social encounters with others of the same group. Animals will usually win against those that are subordinate to them, and 'lose' in encounters with individuals of higher social ranking.
 - Hierarchies reduce conflict and open aggression within the group. Within-group aggression is detrimental to the social cohesiveness of the group and, when group cooperation is required for survival, it is also detrimental to the species. Hierarchies also allow more energy to be directed from aggression into feeding and defence from external threats. This aids group survival.

61. Monkey Hierarchy (page 84)

- 22 times
- 0 times
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		Monkeys biting →										
		Most dominant					Most subordinate					
		Cornflake	Vinegar	Salt	Crisp	Marmalade	Peanut	Coffee	Pepper	Mustard	Tea	
Monkeys bitten ↓	Most dominant	Cornflake	0	0	0	0	0	0	0	0	0	
	Vinegar	13		3	0	0	0	0	0	0	0	
	Salt	10	18		0	0	0	0	0	0	0	
	Crisp	8	17	22		0	0	0	0	0	0	
	Marmalade	8	15	15	22		0	0	0	0	0	
	Peanut	5	9	14	13	25		0	0	0	0	
	Coffee	4	7	10	8	17	26		0	0	0	
	Pepper	2	3	1	4	6	14	27		0	0	
	Most subordinate	Mustard	2	2	0	1	4	8	20	32		0
	Tea	2	1	1	1	2	7	12	24	41		



4. Cornflake
5. Tea
6. Salt challenged Vinegar (Salt bit Vinegar 3 times, while Vinegar bit Salt 18 times).
7. Monkeys most often bite those monkeys that are immediately below them in the hierarchy.
8. Simple dominance hierarchy, linear hierarchy, or peck order are all acceptable answers.

62. Hierarchies in Baboons (page 85)

1. Group defence provides more effective surveillance and quicker response time to danger.
2. Either of: (1) Strict dominance hierarchy limits aggression between group members. (2) Group defence is effective against most external threats.
3. The dominant male maintains order through ritualised threat behaviour. This relieves conflict and maintains individual rankings within the troop without injury.
4. (a) By challenging (and defeating) the dominant male.
(b) Access to females as mates.

63. Territories and Home Ranges (page 86)

1. (a) A territory is an area occupied more or less exclusively by an individual or group and defended by aggression. A home range is an area used habitually by an animal or group, in which the animal spends most of its time. It may overlap with other home ranges, and is larger than a territory. A home range may not be fully defended.
(b) Core areas and territories contain most of the resources critical to the species survival. Depending on the species, core areas may be defended.
(c) The amount and quality of resources within it the area. A home range with more abundant resources does not need to be as large.
2. Although it takes time and energy to create and maintain a territory, once it is established, the territory allows exclusive rights to the resources within, without the constant threat of being challenged for access. This means less energy is spent directly competing with other individuals for food/water/habitat and more time and energy can be invested in raising offspring.

64. Home Ranges and Resources in Baboons (page 87)

1. The troop will defend the core area aggressively because it contains the most valuable resources. The effort (energy) expended in defence is worth it.
2. Note the letters A and B on the map are not required and have been removed. Apologies for any confusion.
(a) 8 home ranges
(b) There is a large degree of overlap in the home ranges of neighbouring troops. Core areas do not appear to overlap with neighbouring troops and are separated some distance from each other.
3. Regions with a higher annual rainfall (2000-1200 mm annual rainfall) support a greater number of animals per unit area. In the Ethiopian and Ugandan troops, each animal requires about 0.06 km² area but in drier regions (Kenya) the troops require approximately 6 times the area per animal. Regions with higher rainfall would have higher productivity, making resources more abundant, so home ranges can be smaller for any given troop size than in drier regions.

65. Home Ranges in Karearea (page 88)

1. If karearea defend their home range, it prevents other karearea or individuals from another species establishing themselves within the territory. This reduces the competition for resources.
2. The home range in a pine forest is considerably smaller (9 km²) than the home range in a native forest (75 km²). This suggests that prey availability within the pine forest is higher than the native forest.

3. (a) All the home ranges contain a mix of pine stands of different ages.
(b) They prefer to nest on the border between stands more than 20 years old and new stands (less than 4 years old). The old stands provide canopy cover to protect the nest from predators, while the parent birds can easily hunt prey in the new stand (while staying close to the nest).
4. Students to discuss. In essence, karearea conservation is enhanced if management practices ensure that the forest contains a mix of pine stands of varying ages.

66. Yellowhead Territories (page 89)

1. 200 m x 200 m
2. They are the effectively the same. Since the yellowheads rarely venture outside their territory, the two are equivalent (or there is not really a home range, only a territory).
3. The secondary birds act as nest helpers and help to feed the clutch of the breeding pair. Although they do not breed themselves, they will benefit from the resources within the territory and will have better survival (with a chance to breed in the future or occupy the territory if the breeding pair dies).
4. Secondary birds U, J, and M encroached on the existing territory of bird N (which had no mate or secondaries to support defence of its territory).

67. Breeding Behaviour (page 90)

1. (a) Courtship behaviour is a means of assessing the suitability, quality, and readiness of a mate and an effective way of ensuring reproductive isolation. It also has a role in reducing natural intraspecific aggression in the potential mate.
(b) Stereotypical behaviours are easily recognised and will elicit appropriate (and equally recognisable) behaviours in the prospective mate.
2. (a) and (b) any two of the following in any order:
 - A display that allows mates to recognise each other and facilitate acceptance of the male by the female.
 - Lock and key genitalia to ensure sperm survival.
 - A cocooned gift presented by the male that keeps the female occupied during mating and ensures she has a good meal that will help egg production.
3. (a) In most species, females have a greater investment in offspring. They lay the eggs or bear the young and, in species with parental care, are most commonly the carers. They therefore have more to lose if they make a poor mate choice.
(b) Females are usually the choosy sex, so there will be selection pressure in females for choose specific structures that indicate a superior mate. Female preference for specific male structures (e.g. eyes on the peacock's tail) can lead to these becoming exaggerated over time.
(c) The offspring will all be sired by the same dominant male, who has shown, through ritualistic fighting and defence of his territory, that he is the superior mate. This will benefit the offspring, which will receive his superior genes.

68. Reproductive Strategies (page 92)

1. Animals can apportion their reproductive effort (the amount of energy they are prepared to invest in reproduction) in such a way that they emphasise either the number of young they produce or how well they care for them. If they produce a very large number of young, there will not be the energy for parental care. Many will die but enough survive. If only a few offspring are produced, there is enough energy to care for them and most will survive.
2. In environments with plentiful resources and low risks, parental care is the task of only one parent (usually the female). When risks to the young increase and resources are more scarce, successful rearing of the young may require the input of both parents (e.g. kaka).
3. (a) A brood parasite can escape with moderate to low reproductive investment because its young are being

