Quadrant II – Notes

Programme : Bachelor of Science (First year)

Subject : Zoology

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Paper Title : Animal Behaviour

Unit : Social and sexual behaviour

Module Name : Intra-sexual selection (male rivalry), Inter-sexual selection (female choice)

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NOTES

Sexual Selection is a form of natural selection that favors the evolution of elaborate traits (and preferences for those traits in the opposite sex) if they increase the mating success of those that bear them or those that chose mates that bears them.

Darwin described two mechanisms of sexual selection: Intra sexual selection and Inter sexual selection.

INTRA SEXUAL SELECTION

It is when Combat and threat display using armaments/ornaments in the same sex individuals. Typically seen to be exhibited by males. It also involves female-female competition in few species.

a. *Competition and Access to Mates*

Males possess traits (adaptations) that help them to compete effectively with other males to gain access to mate a female. Males develop armaments such as horns, tusks, antlers, clubbed tails, enlarged spiny legs which are used during

male-male combat. Fighting among males is common and winners of male-male competition mate frequently. Sexual selection for fighting ability often leads to the evolution of large body size in males as they possess more chances of winning than smaller ones.

Sometimes the male-male combat is not for the direct sexual selection but for dominance hierarchy. Male's dominance rank predicts his mating success and also his genetic success.

Example: Male satin bowerbird's builds bower during breeding period to attract females. Males often dismantle other male's bowers, since males with destroyed bowers lose opportunities to copulate. Males have to keep close eye on display territories and willing to fight with rivals.

b. *Coexistence of Conditional Mating Tactics*

In baboons a lower ranking males develops relationships with females demonstrating to protect female and her off springs has better chances of mating than dominant male. They also form friendship with other males in the area. By forming friendships with other males and with females, subordinate baboons are adopting an alternative mating tactic, or a type of behavioral polyphenism.

c. *Coexistence of Alternative Mating Strategies*

In many cases, animals adopt one or another mating tactics as male tries to mate. Some animals exhibit an alternative mating strategy, or a type of behavioral polymorphism that has a strong genetic component and is therefore inflexible and fixed throughout an individual's life.

Example: In ruff (*Philomachus pugnax),* males are categorized as independents (territorial), satellites (join an independent on his territory) or faeders (female mimics). These three types are hereditary, controlled by a set of supergenes that evolved independently. Supergenes controls behaviour, reproductive hormones and feather color.

d. *Sperm Competition*

The reproductive competition need not stop with the behavioral differences that influence how males access mates. When females mate with more than one male in a short period of time, the males rarely distribute up a female's eggs evenly. Sperm competition is a sperm has to race to fertilize the female eggs. Thus, males must not only compete with other males for access to mates; in many cases, their sperm must also compete with those of other males once they have mated.

Example: In bluegill sunfish (*Lepomis macrochirus),* older males nesting in the interior of the colony produce ejaculates with more sperm, and their sperm swim faster than those of younger bluegills, suggesting that older males succeed in fertilizing the egg. However, when both a sneaker male bluegill and a guarding territorial male release their sperm over a mass of eggs, the sneaker male fertilizes a higher proportion of the eggs than the nest-guarding male, in part because the sneaker gets closer to the egg mass before spawning. Males compete with each other to carry out fertilization of the egg. Alternate way in which males of some species attempt to gain an advantage in sperm competition is to simply produce more gametes. This can be achieved by producing larger testes, which produces more sperms very rapidly.

INTER SEXUAL SELECTION

Intersexual selection involves selection of mate by female. Selective mate choice (by females) enables members of the opposite sex with certain traits to reproduce more successfully than others. Females choose mate either who possess the best traits or the winners of male-male combat. Females are choosy when it comes deciding on a mate because, Direct Benefits - increases the fitness of the female, parental care, access to resources, safety and Indirect benefits - increase fitness of her offsprings.

Female Mate Choice for Direct Benefits

1. Parental care: Females prefer to mate with males that provide high-quality care. Females choose males with bright color, ornamentation and courtship behavior as it indicates male's capacity to provide parental care, a factor of obvious significance for female reproductive success

Example: In fifteen-spined stickleback (*Spinachia spinachia),* has small males that protects the nests. Females mate with males that shake their body relatively frequently when courting. Males that behave in this way also perform more nest fanning after courtship is over and eggs have been laid in their nests. Nest fanning allows proper water flowing (oxygenation) past the eggs, thus increasing success of egg hatching. Females evaluate courtship display of a male for its parental care capacities

2. Resources: In many species, females receive access to resources or a nutritious meal.

Example: In chimpanzees (*Pan troglodytes),* males hunt and kill other, smaller primates and the meat is offered to the female; females that receive meat from successful hunters are more likely to copulate with these individuals over the long term.

In some dung beetles, male constructs a ball of dung, and then rolls it away to a burrow to provide nutrients for the young. Female may escort male to the burrow where mating occurs. Mating is reward for the male for his contribution of food to her and her offsprings.

Female Mate Choice for Indirect Benefits

Female chooses a high-quality male, as she is more likely to produce high-quality offspring. Occurrence of demanding courtship displays and ornaments suggests that these behaviors and allied structural features evolved to enhance the demonstrations of male quality to observant females.

Example: Female satin bowerbirds choose males that build the best bowers. According to the good genes model of sexual selection attractive, well-decorated bowers are built by males that are superior in some way to birds that cannot construct a top-flight bower. Best built Bowers could be an indicator of a male's cognitive ability.

Runaway versus Chase-away Sexual Selection

Runaway selection model of sexual selection: female choice creates a genetic link between mate choice by females and the male trait and, because of this correlation, leads to the evolution of preferences for ever more extreme traits over time. Female mate choice genes as well as genes for the preferred male attribute could be inherited together.

Example: A sexual preference for the elegant song of male canaries could be adaptive for females if their sons inherit the capacity to sing attractive songs, even if they are costly to produce, as these males may be especially appealing to females in the next generation.

Chase-away selection model of sexual selection: It is when a male happens to have a mutation for a novel display trait (Extreme ornaments and elaborate courtship displays) that manages to tap into a preexisting sensory bias that affects female mate references in his species. This model suggests that some male traits that attract females may be disadvantageous to the female, as they gain neither material nor genetic benefits. Development of these characters has led to the evolution of costly ornaments of no real value to the female and useful to the male only because without them, he would have no chance of stimulating females to mate with him.

Cryptic Female Choice

In species with internal fertilization, cryptic female choice represents a female-driven bias in fertilization that occurs after mating or the release of gametes. Cryptic choice can begin immediately after mating through the manipulation of sperm, or continue well into the period of development through the manipulation of fetal growth or survival.

Example: Female *Drosophila melanogaster* can discriminate among sperm from different males and preferentially eject sperm from specific partners. It is observed in many species of D*rosophila* where sperm precedence occurs.