Class 8 – 16 April 2025, 1.00pm

LS1201

Introduction to Biology II

Part B - Evolution

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Sexual Selection

Video of Birds of Paradise to start off the class

Sexual selection

"The sight of a feather in a peacock's tail, whenever I gaze at it makes me sick"

Darwin

Alternative explanations:

- Species specific recognition signals
- Camouflage in its natural habitat
- Females nest so its important for them to be more drab
- Incidental – no selection forces apply

Sexual selection

What about display?

> “ It is a well known fact that when male birds possess any unusual ornaments, they take such positions or perform such evolutions as to exhibit them to the best advantage while endeavoring to attract or charm the females.”
>
> Wallace

Display – Super abundance of energy & vitality

Implications of Natural Selection

Motto of every organism:

Increase the number of offspring that themselves reproduce

Increase in fitness

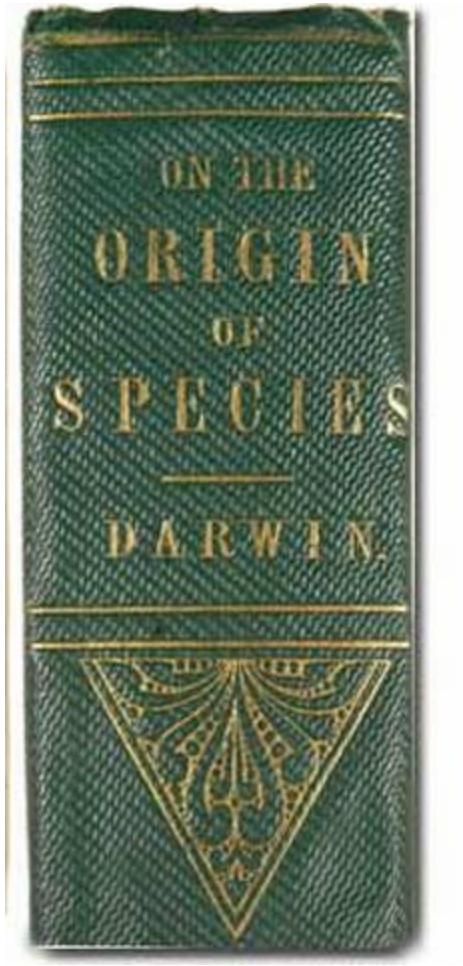
Sexual selection

Selection that acts directly on mating success

No matter how long an organism survives if it does not reproduce, this phenotype is not favored

- Intrasexual selection
- Epigamic selection
- combination of both of the above

Books written by Darwin



THE

DESCENT OF MAN,

AND

SELECTION IN RELATION TO SEX.

By CHARLES DARWIN, M.A., F.R.S., &c.

IN TWO VOLUMES.—Vol. I.

WITH ILLUSTRATIONS.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1871.

Published in 1871

Sexual selection

Intra-sexual selection: Direct competition among individuals of one sex for mates of the opposite sex .
Examples: Elephant seal Harems

Strong individuals can fight with more males and defend a larger number of females in his harem.

- Males skewed reproductive success
- Females will not show this skew in their reproductive success

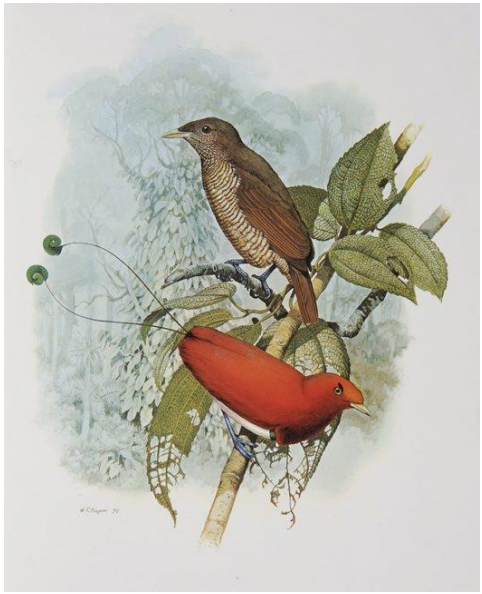
Case Study – Red winged blackbird

Displayed during courtship and threat

What is the function of the colors on its wing?

Display is used as a threat to other males

Sexual selection



Epigamic selection or Mate choice: individuals of one sex (usually females) are choosy in selecting their mates from the opposite sex.
Examples: Peacock

Fisher 1930

More showy the males more reproductive success

offspring → males will be showy

→ females will carry an liking for showy males

Mate choice

Case Study – Long tailed widowbird

Males with elongated tail had higher number of nests in their territory

Tail treatment experiment

Andersson 1982

Sexual selection

Selection that acts directly on mating success

Females are attracted to ornaments the bigger, the brighter the better

Why?

Mate choice

Showy males carry better genes

- survive despite the disadvantages
- free of disease/parasites

Zahavi 1977

Handicap principle

Secondary sexual traits act as Condition dependent badge

Syllabus Covered

- Diversity of life, Variation, how do we explain it
- Proximate and Ultimate questions
- Interactions : Host –parasite interactions, mimicry
- Why evolution is true
    - Background
    - Evolution in action – case studies
    - Concepts that support evolution

- Theories of evolution
    - Use and Disuse theory (Lamarck)
    - Theory of Natural Selection (Darwin & Wallace)
    - Descent with Modification (Darwin & Wallace)
    - Theory of Sexual selection (Darwin)
    - Handicap theory (Zahavi)

Keep asking

WHY?

Internal Assessment – 5

Additional assessment particularly for those who have missed earlier assessments

Consider the bird – Red vented bulbul, that lives on campus. As you can see in this picture, males have a red colored area at the base of its tail. Can you propose a function for this colored patch based on what you understood in class today. (1 marks)

If both the male and female had this colored area at the base of their tail, will the function you have proposed change? Explain your answer (1 mark)

Design an experiment to test your hypothesis. (2 marks)

Total = 4 marks

Internal Assessment – 5
Answer key (total marks 4)

1. **Consider the bird – Red vented bulbul, that lives on campus. As you can see in this picture, males have a red colored area at the base of its tail. Can you propose a function for this colored patch based on what you understood in class today. (1 marks)**

Answer - Has to be sexual selection based, can be intrasexual, epigamic, both or handicap principle based. For a clear hypothesis in any of these headings we will give 0.75 marks. Any extra information or clear explanation 0.25 marks.

2. **If both the male and female had this colored area at the base of their tail, will the function you have proposed change? Explain your answer (1 mark)**

Answer – If original hypothesis – epigamic selections – then function will change. Explanation – females do not need to showoff to the males.
– If original hypothesis – intra-sexual selections, then it need not change. Explanation – males are using the red patch to showoff to other males and females are showing it off to other females to build hierarchies or territory.
For clear explanation 1 mark.

3**. Design an experiment to test your hypothesis. (2 marks)**
Answer -
Any experiment will be alright if it make logical sense. Three points that should be mentioned as part of the experiment are

a) Number of offspring the measure
b) Control needs to be mentioned
c) Number of Replicates

Each of these points 0.5 marks. Additional information that is clearly mentioned, extra 0.5 marks.