

9.20 M.I.T. 2005

Class #19

**Mating and reproduction,**  
introduction

*Scott ch 8, Reproductive behavior*

About evolutionary dynamics

1. In discussions of evolution, one hears the terms “natural selection” and “sexual selection”. Contrast these terms. Give examples of a trait that evolved by natural selection and of a trait that evolved by sexual selection.

See p 168 “concept” box.

Trait(s) that evolved by natural selection: Alarm calls of ground squirrels or various monkeys, as well as other species.

Traits due to sexual selection: The tail feathers of male peacocks, or the long tail of swordtail fish.

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## Reproductive investment

2. Give an example of the extreme differences in reproductive investment of males and females of some species.

Stickleback fish: the male does all the nesting and care of the eggs. Other species where the male disappears after fertilizing the eggs.

Lions: females invest more than two years, in gestation followed by nearly two years of care of the pup.

Spotted sandpipers: males do most of the brood-tending, while females desert the nest in order to lay another clutch of four eggs with a different male.

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### Reproductive output

3. Describe the very different ways in which an animal can maximize its reproductive output.

The easiest way for males and females to maximize reproductive output is usually very different. It is easiest for the **male** to increase number of offspring. For the **female**, with limited egg production, it is better to try to maximize quality of offspring (including the choice of a father with “good genes” and with good resources to contribute). The resulting mating systems amount to various **compromises**.

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### Mate choice by females

4. Mate choice by females appears to be based, in general, on one of two properties of the males, or on both of these. What are they?

Give an example of how a female of a particular species bases her choice on one of these traits.

Give an example also of selection based on the other trait.

p 169-172 resource provision

p 172-173 other material benefit

p 175-176 “attractiveness” per se

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## The male's gift

5. Evolution by natural selection is often summarized as evolution by “survival of the fittest”. How is it, then, that in certain species of spiders (also in certain insects) the male is eaten by the female in the act of copulation?

p 171 Australian red-backed spider: Two reasons why it can benefit the male in terms of his passing on his genes

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## Mate choice by males

6. What are the conditions that make it likely in a species that mate choice will be exercised by the males?

p 174 (box): sex-role reversal? But there are exceptions.

Other influences: more females than males,

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Male mating strategies

7. Give an example of how in some species different individual males adopt very different mating strategies.

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**Various mating systems**

8. Name and define the different mating systems.

Why are there so many different ones? How is the answer expressed by Nick Davies based on his studies of the reproductive behavior of the dunnock, a small European songbird (the hedge sparrow)?

(Note that all of the different mating systems have been seen in humans, some much more than others.)

- We should view the mating game not as a cooperation between the sexes but as a conflict resulting in a compromise in the interests of one or both of them ( p 179-180).

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When monogamy is favored

9. Describe a situation that makes monogamy much more likely. Use an example with an explanation.

p 171 re Siberian hamster (Djungarian hamster, *Phodopus campbelii*)

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Protecting fatherhood

10. The physical guarding of his mate by a male can greatly reduce the chances of extra-pair copulations. What other methods of preventing fertilization by another male have been found in some species? Describe two.

- p 183 re crabs in which the male's ejaculate forms a "sperm plug"
- p 185-187: re male dunnocks and "last sperm precedence"
- P 186: Sperm removal by male invertebrates

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## Sperm competition

11. Describe at least one means by which sperm competition could occur after mating.

p 187-188: re quantity of ejaculate. Other possibilities?

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**Serial polyandry in sandpipers**

12. What has DNA analysis revealed about female sandpipers who desert a first clutch of eggs and find another mate with whom she lays more eggs?

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**Males on display: the lek**

13. What is a lek? How can a male in a lek who never succeeds in mating with a female nevertheless “benefit” by his participation?

p 194-195: kin-selection model of lek formation