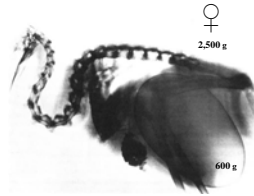
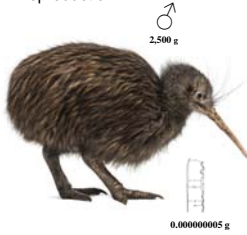


Mating Systems

- Males and females often differ greatly in their contributions to reproduction



- Mating systems represent different strategies by which males and females maximize their fitness
- Basis is usually male-male competition and female choice

How to choose a mate?

- Plumage
- Song
- Territory/nest quality
- Displays
- Courtship feeding



Visual and vocal displays



Displays

- A **display** is a behavior that has been modified by natural selection to serve communication through the process of **ritualization** - N. Tinbergen, K. Lorenz
- Displays are used to:
 - Identify individuals
 - Signal intent to attack, escape, or remain neutral
 - Communicate desire to play, mate, defend territory, feed, etc.



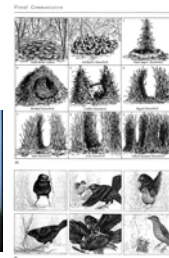
Sexual selection

- Natural selection driven by competition for mates. Results from:
 - Competition, usually male-male
 - Mate choice, usually females choosing males
- Handicap principle (Zahavi 1975)
 - Signals must be honest
 - Signals must have a cost



Extrinsic forms of sexual selection

- Bowerbirds
 - Females choose males based on the elaborateness of their bowers



Bowerbird Illusions



Scala Regia



Palazzo Spada

Mating system terminology

- **Monogamy** (one marriage) - Prolonged, essentially exclusive pair bond with a single member of opposite sex
- **Polygamy** (many marriages) – Pair bonds with multiple mates of opposite sex
 - **Polygyny** (many women) – males pair with 2 or more females
 - **Polyandry** (many men) – females pair with 2 or more males
 - **Polygynandry** (many ?) – males pair with several females, each of which pairs with several males
- **Promiscuity** – Indiscriminate sexual relationships, usually of brief duration (a feature of every mating system)

Monogamy

- > 95% of bird species are socially monogamous
- Both sexes needed for successful reproduction
- However, things are never as simple as they appear...



Seasonal pair bond

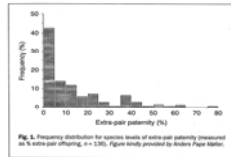


Lifetime pair bond

Extra-pair paternity.....

"It's a wise child that knows its own father"

- Widespread but highly variable in extent among species, populations, etc.
- Controlled by females
- Frequency depends on:
 - Costs and benefits to females
 - Constraints on female choice



The story of "Alpha" and "Beta"

Extra-pair paternity

Potential benefits to females

- Increased genetic diversity of offspring
- Seek "better genes" if mated with low quality male
- Reduce cost of mate loss
- Direct benefits

Potential costs to females

- Loss of partner's investment
- Energetically expensive to find, assess other males
- Sexually-transmitted diseases

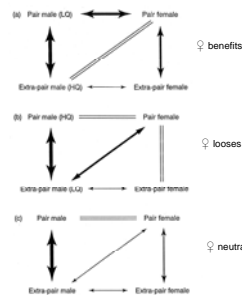
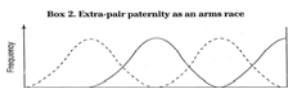
Constraints

- Mate guarding/frequent copulations by males
- Competition among females

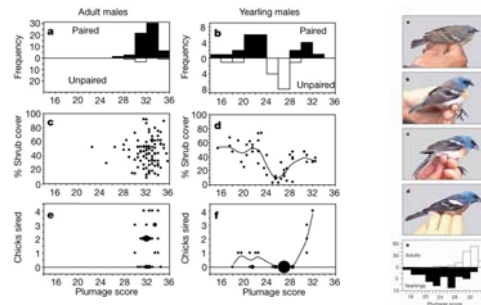


When to seek extra-pair copulations?

- Arrows indicate conflict (size indicates level of conflict)
- Double line = individuals have similar interests



Why are some males dull?



From Greene et al. 2000. Nature 407:1000-1003

Polygamy (many marriages)

- Pair bonds with multiple mates of opposite sex
 - Polygyny – males pair with 2 or more females
 - Polyandry – females pair with 2 or more males
 - Polygynandry – males pair with several females, each of which pairs with several males

Polygyny (many females)

- 2% of bird species
- Successful strategy only when female can raise brood alone
 - Food super-abundant, easy to find
 - Precocial young
- Or, when males can commandeer patchy resources (resource defense polygyny)



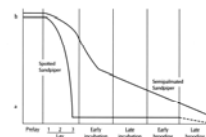
Polyandry (many men)

- < 1% of bird species
- Females defend territories and compete for males
- Males incubate eggs and care for young
- 2 types: "classic" and cooperative
- Origins??



Sex role reversal and hormones

- Testosterone drops sharply in male Spotted Sandpipers, lower than levels in the aggressive females



- Prolactin levels rise in males to level higher than females

Polygynandry (many women and men)

- Covers a range of more complicated, rare situations, some of which are poorly understood
- Ostrich (Africa) and Rhea (S. America) show similar patterns



Leks

- Leks are courtship arenas where males display
- Often involve intense male-male competition leading to a dominance hierarchy
- Dominance reflects male fitness. It is assessed by females as a function of the male's:
 - Size (Sage Grouse)
 - Nest quality (Golden Palm Weavers)
 - Artistic talent! (Bowerbirds)
 - Voice (Calf Bird)
 - Plumage (Cock-of-the-Rock)
 - Displays (Manakins)



Evolution of leks

- Predation** Safety in numbers (for open-country grouse)
- Male or female initiated "hot spots" (e.g., Ruff)
- Cooperative** leks: Young males gathering near older, successful males to gain experience, an occasional mating, and gradually achieve higher rank (e.g., S. American Manakins, Turkeys)



PERSPECTIVES

Avian supergenes

Genetic loci control two complex bird mating systems evolved

A male sage grouse (Centrocercus urophasianus) is a particularly well-studied example of a lekking species. Males display at leks, or arenas, where they perform elaborate displays to attract females. The displays are often highly synchronized, and the males compete for the attention of the females. The displays are often highly synchronized, and the males compete for the attention of the females. The displays are often highly synchronized, and the males compete for the attention of the females.

Avian supergenes are a group of genes that control the evolution of leks. They are found in many species of birds, including sage grouse, turkeys, and manakins. These genes control the development of the male's display, the timing of the display, and the male's ability to attract females. The evolution of leks is thought to be driven by sexual selection, as females choose to mate with the most attractive males. This leads to the evolution of increasingly elaborate displays and the formation of leks.

Summary

- Males and females differ in their contributions to reproduction
- Different mating systems represent strategies by which males and females maximize their fitness
- The basis is usually male-male competition and female choice
- Most birds socially monogamous, but extra-pair paternity is common
- Other mating systems evolve when one parent can successfully care for young without assistance