Behavioral Ecology of Vertebrates

Unit 7. Sexual Selection

Module 3. Social

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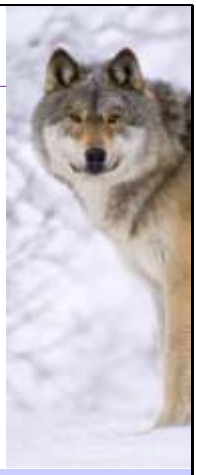


Learning, Discovering and Sharing Knowledge

Coevolution of male and female strategies: (1) same sex rivalry (competition by force or by charm), (2) mate choice (good genes or "bling"), (3) antagonistic "mating game" (strategies and counterstrategies)

Learning Objectives (Davies et al. 2012:144)

Co-evolution of female and male genotypes:

1. **Evolutionary "dance":** gamete size, parental care, investment, operational sex ratio, sperm competition
2. **Mate choice**: good resources, good genes, attractive ornaments, sensory bias
3. **Same-sex rivalry**: intimidation of competitors, sexual dimorphism, defense of resources (turf, food, &/or mates).

Davies et al. 2012 Fig. 7.13

Stepwise co-evolution: strategy/counterstrategy

1. EVOLUTIONARY "DANCE"

1.1 Strategy & counter-strategy

Female genotypes

- Invest more nutrients in a few large eggs
- Maternal care of hatchlings (offspring with care survived better)
- Mate choice based on cues (select good over bad dads)
- "Cheater moms" with more attractive "fake" ornaments
- Discriminating moms reject "bling", choose "diamonds"
- Females defend mates against rival females

Male genotypes

- Invest few nutrients in many small sperm
- Paternal care of hatchlings (offspring of "dead beat" dads did not survive)
- Mate choice based on cues (select moms that attract attention)
- "Cheater dads"- fake "bling"
- More "honest" than "cheater" male genotypes
- Males defend mates against rival males

1.2 Asymmetric strategies (Davies et al. 2012 Fig. 7.4)

- Elephant seals
- Sexual dimorphism
  - Female strategy provides parental care
  - Male strategy does not

- Strategy that invests the least, competes the most

1.3 Parental care vs investment

Proximate care

- Behavioral decisions that influence the probability each offspring survives and reproduces (physical fitness)
- Examples:
  - Nutrients in eggs
  - Pregnancy & lactation
  - Brooding & provisioning
  - Defending nest & territory
  - Social learning (forage, etc.)

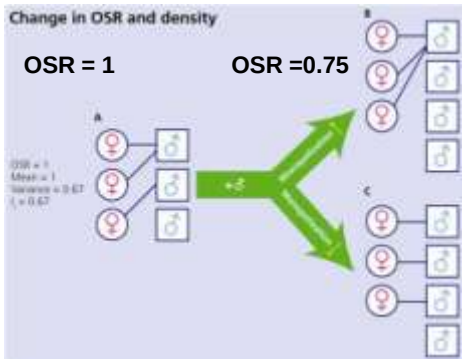
Ultimate Investment

- Behavioral decisions that influence lifetime reproductive success (genetic fitness)
- Examples:
  - Clutch size too large, resulting in decline in body condition and smaller next clutch
  - Too much milk, resulting in decline in body condition and longer inter-birth interval
  - Too much defense, resulting in premature death of parent

1.4 Lifetime reproductive success (Table 7.1)

Asymmetry	Species	Payoff for Female Strategy	Payoff for Male Strategy
None	Kittiwake gull	26	28
Female invests more than male	Elephant seal	8	100
Male invests more than female	Pipefish *(Davies et al. 2012:202)*	Several clutches per "male pregnancy"	One clutch per "male pregnancy"

1.5 Operational sex ratio (Table B7.1.1)



Male monopoly Increases variance in lifetime reproductive success (LRS)

Too many males, none can monopolize females, reduces variance in LRS

Payoffs for behavioral decisions depend on "cards played" by others in the population. "Switcher genotypes" change tactics depending on the OSR.

1.6 Sperm competition (Davies et al. 2012, Table 7.4)

Species	Male adaptive trait	Female counter-adaptation
Water striders	Enforced copulation	Female resistance
Waterfowl *(ducks: p218)*	Intromittant organ increases mating success	"Obstacle course" for sperm in female reproductive tract
Songbirds *(p206)*	Mate guarding, frequent copulation, strategic allocation of sperm	Seek extra-pair copulations

1.4 Poll- lets see if you understand

On which topics would you like to chat more about?

a) Stepwise coevolution of strategy/counter (grebes)
b) Asymmetry: low investors compete (elephant seal)
c) Parental care (phenotype) vs. investment (genotype)
d) Lifetime reproductive success (males vs. females)
e) Operational sex ratio (changing % of male vs female)
f) Sperm competition (female counter-adaptations)
g) I'm good, lets move on

Davies et al. 2012 Fig. 7.1

Competition by charm: true value or "bling"

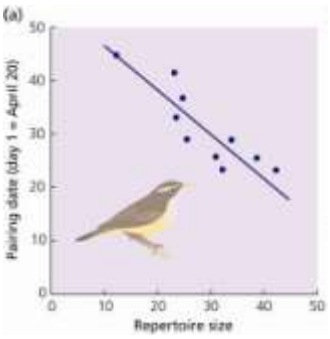
3. MATE CHOICE

Sex that invests the most is the one that is the most choosy. Competition by "charm".

2.1 Good resources

(Davies et al. 2012, Fig. 7.4)

- Sedge warblers defend territories that vary in resources
- Males with larger repertoires control better territories
- Females choose males with larger repertoires first (earlier pairing day)



2.2 Good genes *(Davies et al. 2012: 194, Fig. 7.9)*

- In some cases, males only contribute sperm to fertilize the egg
- These males still need to attract "choosy" female mates
- Bowerbirds are an example of such a case
  - Males construct impressive bowers filled with found objects (natural and manmade) that attract a female's attention
  - Bowers are used only to attract mates, mating occurs in a separate nest and no paternal parental care or nuptial gifts are given
  - The male with the "best decorated" bower attracts the most matings (Borgia, 1985; Madden, 2003a)

(credit: K. Wedemeyer)

2.3 Good Genes: Bower Birds *(credit: K. Wedemeyer)*

- It seems that females may be able to judge the social status, and health of males based on their bower
  - If they can survive while collecting items for the bower, displaying their conspicuous bower and protecting their bower from being pilfered by other bowers they must have "good genes" that allow them to survive...

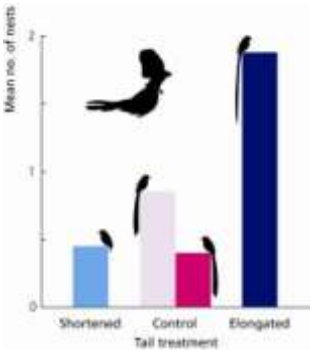
insert bowerbird video here

→Is the good genes hypothesis a "true sign" of the potential fitness of the offspring, should this always be the assumption?

Great video links:
http://www.youtube.com/user/DrGBorgia

2.4 Attractive ornaments (Davies et al. 2012, Fig. 7.5)

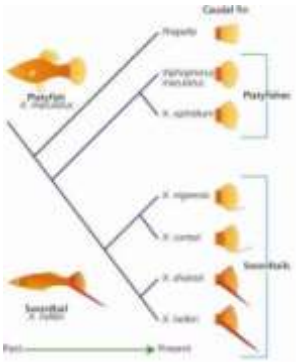
- Long-tailed widowbirds
- H1: Females choose longer tails ("bling")
- Treatment
  - Elongated tails
  - Controls
  - Shortened tails
- Result: elongated tails attracted more females



2.2 Sensory bias

(Davies et al. 2012:90, Fig. 5.11)

- "Chase away model"
- Ancestral: platyfish
  - No ornaments (swords)
  - Pre-existing female bias toward choice of sword
- Derived: swordtail
  - Sword ornament
  - Weaker female preference for sword
  - Resistance to "bling"
  - Giving in to male charm is costly



2.5 Poll- lets see if you understand

About which of the previous topics would you like to chat more?

a) Good resources ("high value home" sedge warblers)
b) Good genes ("high value ornaments" bowerbirds)
c) Attractive ornaments ("cheap bling" widowbirds)
d) Sensory bias (swordfish "chase away selection")
e) I'm good, lets move on

Lets dialogue more about this using the elearning discussion tool

Davies et al. 2012, Fig 7.4

Competition by "force"

2. SAME SEX RIVALRY

Sex that invests the least is the one that competes the most (mates are a valued resource). Competition by "force". intimidation of competitors, sexual dimorphism, defense of resources (turf, food, &/or mates).

3.1 Intimidation (Davies et al. 2012, fig 7.4)

- Elephant seals
- Females are clumped on breeding beaches
- Oldest, heaviest males defend the moste females
- Males delay breeding until 6-9 yrs

3.2 Sexual dimorphism (Davies et al. 2012, Fig. 7.16)

- Eclectus parrot
- Females bright (concealed in nest)
- Males camouflaged (bright underwing coverts)
- Females choose nest
- Males compete for females

3.1 Defense of resources (Davies et al. 2012, Fig. 7.7)

- Bullfrogs
- Females choose warmer sites where eggs are more likely to survive
- Males compete for the territories best for egg-laying

3.4 Poll- lets see if you understand

About which topic would you like to chat about more?

a) Intimidation (elephant seals)
b) Sexual dimorphism (eclectic parrots)
c) Defense of resources (bullfrog territories)
d) I'm good, let's move on

Lets dialogue more about this using the elearning discussion tool

Summary

(Davies et al. 2012:220)

Co-evolution of female and male genotypes:

1. **Evolutionary "dance":** gamete size, parental care, investment, operational sex ratio, sperm competition
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3. **Same-sex rivalry**: intimidation of competitors, sexual dimorphism, defense of resources (turf, food, &/or mates).