## Mating Systems

Species-specific pattern of association between males, females and offspring

### April 14: Mating Systems: Definitions

**What defines a mating system?**
- Whether each individual of one sex mates with one or many of the opposite sex
- Whether each individual of a given sex mates with one or many of the opposite sex
- Who cares for the offspring

### Male-female association

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<th>Name</th>
<th>Examples</th>
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<th>Who cares for the offspring</th>
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Why Do Mating Systems Vary Among Species?

Mating system results from conflict of interest between males and females (and is outcome of evolutionary game)

- For both sexes, RS would be maximized by having multiple mates, and having each mate care for offspring produced.
- Whether either sex can achieve this outcome depends upon sex-specific ecological factors and/or high parental investment, and/or offspring requiring high parental care.
- Female not widely dispersed (hence defendable), males widely dispersed (hence not defendable by males).

Specific ecological factors:
- Offspring require high parental investment, and/or
- Offspring require high parental care (hence defendable).

Outcome matrix:

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"Monogamy" in Birds

April 14: Mating Systems: Bird monogamy

More than 90% of bird species are socially monogamous

Both males and females form stable pair for duration of breeding season

Males and females help rear offspring (sometimes longer)

But DNA fingerprinting studies find high levels of Extra-Pair Copulation (EPC)

Both males and females must be fooling around

Raise functional questions
Why should EPCs be furtive?

• Males: female may leave altogether (find male that will invest more)
• Females: female visits per hour
  - Why should EPCs be furtive?
  - Male incentive to invest in brood is diluted by loss of paternity
  - Female visits per hour

In other species, tendency to attract extra-pair females is correlated with the same sort of traits (song, plumage) that affect ability to attract first mate

Female visits per hour
  - Why should EPCs be furtive?
  - Male incentive to invest in brood is diluted by loss of paternity

Why should males and females seek additional mates?

• Males: RS not limited by mating opportunities (but there may be costs)
  - Why should males and females seek additional mates?
  - Males: RS maximized by finding additional mates

Benefits of genetic diversity

Good genes (better than mate’s)?

Fig. 13.7 Alcock: Blue tit males that attract more EPCs have more faithful mates. In other species, tendency to attract extra-pair females is correlated with the same sort of traits (song, plumage) that affect ability to attract first mate.
Genetic diversity and mate choice in mammals

(many allele) gene complex involved in immune response

MHC*: Major Histocompatibility Complex: a highly polymorphic

Your eggs in one MHC basket

Suggests advantage of extra-pair copulations by females: don’t put all

• to that of men or are similar at MHC (sweaty T-shirt test)
  Women prefer the body odor of men who are different at MHC

• would expect for random mating (i.e., mating is assortative)
  Human mated pairs more likely to differ at MHC than you

• With respect to MHC, the ideal mate is one different from you

• MHC* locus (allows greater diversity of antibody production)

Females mammals benefit by having offspring that are heterozygous at

Genetic diversity and mate choice in mammals

April 14: Mating Systems: Bird monogamy
**Major functional question in resource defense polygyny**

Why should female settle with already mated male?

- She can’t count on as much help from mate (COST)
- She must share resources with female already there (COST)

Males that offer better resources (e.g., territory) may attract additional mates.

I. Polygyny based on resource defense

Polygyny I

Female

Male red-winged blackbird

Photo by Jim Sasser
H3: Female search costs/male deception

- A chance of recognizing costs by producing sexy sons
- This works only if male mating success is high enough for females to have
- Typically, if male mating success is highly heritable

H2: Perhaps there are good-genes benefits (sexy son hypothesis)

- Male mating success is heritable, but heritable enough for females to have
- This works only if male mating success is high
- Typically, if does, secondary females would probably produce more
- Offspring if they found unmated male

H1: Perhaps quality of territory more than compensates for costs

- Male with already mated female

Major functional question: In resource defense polygyny, why should Resource Defense Polygyny (cont'd)
Polygyny--cont'd

II. Polygyny based on female defense

- If females are aggregated spatially, then one male can exclude other males.
- Conflicts of interest in marmots
  - Marmot females don't disperse, so there may be several (up to 6) breeding females in group.

Females do better in small groups.
- Males that gain access have high RS.
- Polygyny based on female defense

Several hypotheses: See book

Why should females ever live in large groups?

Female group size

Alcock Fig. 13.14

Male RS

Female RS

[Graph showing relationship between male RS and female RS]
III. Polygyny based on female choice of male traits (Lek polygyny)

- Lek: Aggregation of males from which females choose mates
- NO resource defense; NO female defense; (may be male dominance hierarchy)

Sage Grouse

http://ndwild.psych.und.nodak.edu/tvpages/sage1.html

Polygyny - cont'd

Stalk-eyed Flies
III. What favors evolution of leks?

H1: Hotspot hypothesis (some feature of environment attracts males, which attracts females; which attracts males)

H2: Hotspot hypothesis (males recognize attractive females, and gather near him)

H3: Femal discrimination against males in small groups

See book! There is some evidence for each of these—see book!

http://ndwild.psych.und.nodak.edu/tvpages/sage1.html

Polygyny -cont'd
Polygyny

April 14: Mating Systems: Bird monogamy
Why Do Mating Systems Vary Among Species?

Mating system evolution as a game

Part of what determines optimal decisions for each sex are payoffs that depend on what partner does. Part of what determines optimal decisions for each sex are payoffs that depend on what partner does.

Payoff matrix (male payoffs)

\( B, b = \text{number of offspring reared successfully} \)

\( P = \text{probability of remating after desertion} \)

If probability of remating (\( P \)) is very high, then monogamy is not stable compared with polygyny and polyandry.

Deserts

Deserts

Desert

Desert

Mating system evolution as a game

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Mating system evolution as a game

• Part of what determines optimal decision for each sex are payoffs that depend on what partner does after desertion.

If probability of remating ($p$) is very high, then monogamy is not stable compared with polygyny and polyandry.

![Payoff matrix](image)

$b + P \times b$
$b$
$B + P \times b$
$B, b =$ number of offspring reared successfully
$P =$ probability of remating after desertion

Deserts
B
desert
Deserts

B
Desert
Male

Cares
Female

Payoff matrix
Mating system evolution as a game

- Part of what determines optimal decision for each sex are payoffs that depend on what partner does.

\[ \text{ Females } \]
\[ \text{ Males } \]

Payoff matrix (male + female)

\[ b + P \cdot b-x \]
\[ 0 \]
\[ 0 \]
\[ b \]
\[ b + P \cdot b-C \]
\[ B \]

- If, males also incur costs for desertion, then monogamy may be stable outcome. Polygyny is only stable outcome if cost of desertion is often higher for females than for males, then.

- If cost of desertion is often higher for females than for males, then polygyny is only stable outcome. Monogamy may be stable.

Payoff matrix (male + female):

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\[ 0 \]
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