

MATING SYSTEMS

Competition and territoriality reach a zenith during the breeding season as individuals vie for mates, breeding opportunities, and resources to care for young

- Outline:
 - Types of mating systems
 - Mating systems and ecology



TYPES OF MATING SYSTEMS

- **Monogamy** – an exclusive association with a single member of the opposite sex – *most common type in birds*
 - **Polygamy** – any system that involves pair bonds with multiple mates of the opposite sex
 - **Polygyny** – (many females) a type of polygamy where a male mates with several females
 - **Polyandry** – (many males) a type of polygamy where a female mates with several males
 - **Polygynandry** – several females and several males form a communal breeding unit
 - **Promiscuity** – indiscriminate sexual encounters, usually brief, where both males and females mate with several individuals

MONOGAMY

- **Monogamy** is the most common avian mating system
- **Pair bonds** may last for a single breeding attempt, a breeding season, or many breeding seasons
 - Parrots, albatross, eagles, and pigeons all have life-long pair bonds
- **Monogamy occurs when:**
 - Male participation is essential for successfully raising young
 - Males cannot monopolize resources necessary for supporting extra mates

MONOGAMY

Monogamy should be considered an armed compromise rather than happy collaboration.

Males would generally like to seek extra mates but in many bird species it takes two parents to successfully raise young



MONOGAMY

In Tree Swallows polygynous males father fewer surviving young (0.8 fledglings) than monogamous males (3.0 fledglings).



Polygyny

Some males in a population regularly have two or more mates

In North America, 14 of 278 breeding songbird species (11 of which nest in marshes or grasslands) are polygynous

Examples include Red-winged Blackbirds & Marsh Wrens

Why should a female pair with an already mated male while there are still unmated males available?

This question is addressed by the 'polygyny threshold model':

Polygyny

Predictions of the Polygyny Threshold model:

1) A male's territory quality will be correlated with his mating success

demonstrated in species such as Dickcissel, Bobolink, & Lark Bunting

2) Polygyny should be more common in patchy environments (where there is more variation in territory quality)

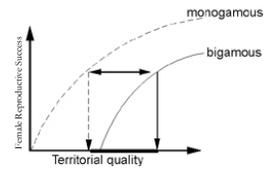
Polygyny

Verner & Wilson (1966):
compared habitats & mating systems in North American passerines

14 polygynous species & 13 of 14 occur in marsh or grassland habitats

'patchy' habitats with much variation in productivity/quality

The Polygyny Threshold



Example of polygyny threshold

Male Lark Buntings establish territories in grassy, open habitats

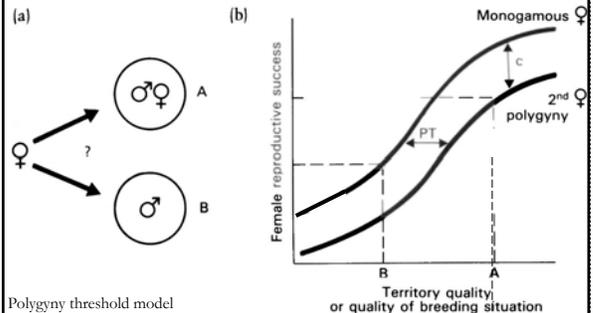
Mate with > 1 female but assist only first female to settle on their territory

Some female Lark Buntings accept secondary female role on good territories to obtain a high quality nesting site

In bad nest sites young die from exposure to the sun



Female can choose between males A and B



Male Dominance Polygyny

Males compete for 'status' in communal displays (leks) & females choose among males

Females receive only sperm from males (males do not help raise young)

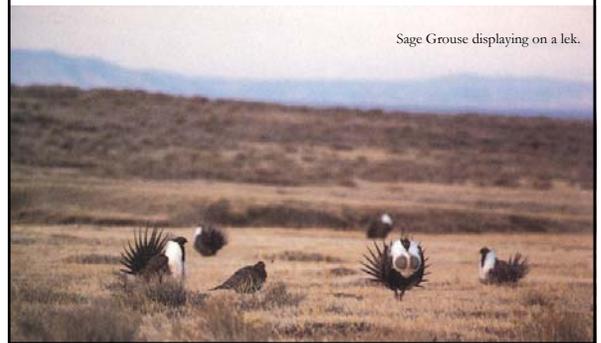
Extreme variation in male mating success (one or a few males copulate with many females; other males with none)



Males display for females

Females choose males on basis of appearance and displays (*sexual selection*)

Sage Grouse displaying on a lek.



Male Dominance Polygyny

Characteristics that appear to influence a male's mating success:
Age, experience, & status

by mating with dominant male, females may obtain the genes responsible for a male's superior traits

females may judge male quality based on quality of plumage or displays (better plumage & displays = healthier male, i.e., a better forager or less susceptible to parasites/infections)

Male Dominance Polygyny

What conditions favor the evolution of leks?

reduced risk of predation

'hot spots' - males gather at sites where females are more likely to congregate

'hot spots' - females prefer to choose mates from aggregations of males (i.e., group displays facilitate comparisons)



In well-studied Black Grouse and Sage Grouse lekking systems < 10% of males obtain 70-80% of the copulations.

Polyandry

Polyandry: One female forms pair bonds with two or more males.

evolved primarily in 2 orders of birds:
Gruiformes & Charadriiformes

Typically involves sex-role reversal (females larger & more brightly colored)

Males incubate eggs & care for young

examples include Spotted Sandpipers & the jacanas



Female Red Phalarope



Male Red Phalarope

Polyandry

Female reproductive success is more variable than male reproductive success in polyandrous mating systems

There are two forms:

classic polyandry

and *cooperative polyandry*.



Spotted Sandpiper

Classic Polyandry

Classic Polyandry: Females lay clutches for multiple males and compete for males.

Examples : Jacanas, Phalaropes, Spotted Sandpiper.

Cooperative Polyandry: Two or more males cooperate to assist a female at one nest.

Examples: Acorn Woodpeckers, Dunnock.

Classic Polyandry

Male Jacanas (lilytrotters) defend small territories against other males

Females defend larger territories that include several male territories

Males are seduced by a domineering, two-timing female and then abandoned to raise young that are not his own



Classic Polyandry

Emlen et al. (1999) observed jacanas on Panama's Chagres River, witnessing more than 1,400 copulations between dominant females and much smaller males

Males were left to incubate eggs and raise chicks of uncertain paternity

Females, meanwhile, were copulating with other males



Classic Polyandry

If female jacana loses her territory or dies and another female takes over the territory, the new female destroys the eggs and kills young of any male on territory

This behavior frees the male to incubate a replacement clutch, which new female provides



Classic Polyandry

Jacanas are practically unique among vertebrate animals, in that females pair simultaneously with a harem of males and the males care for the young

DNA fingerprinting revealed that more than 40% of jacana broods that males were tending included chicks fathered by a different male



Classic Polyandry

Why does the male jacana tolerate this behavior by his mate?

In heavily populated and highly competitive habitats with limited space for nests, some males never get the chance to reproduce at all and therefore accept the cost of uncertain paternity



Classic Polyandry

SPOTTED SANDPIPER

Female Spotted Sandpipers are 25% larger than males

Female will lay clutches for a primary male and for 1-3 secondary males

Only the last secondary male is assisted by the female in caring for the young

Later males are likely to have lower reproductive success because sperm from earlier males may fertilize some of eggs



Ecological Factors in Sandpiper Mating System

- Adult sex ratio biased towards males
- There is a superabundant food source (mayfly hatches)
- A single parent can care for a clutch as well as a pair
- Young are precocial (relatively mature and mobile from the moment of birth)
- First arriving male may get extra fitness due to sperm storage by female

Classic Polyandry

How classic polyandry evolved is unclear

May be a result of heavy losses of eggs which favor females maximizing egg output (Jacanas)

Alternatively, in Spotted Sandpipers cause may be phylogenetic constraints that limit females to four egg clutches

Females can produce more eggs because food sources are rich, but must lay more clutches not bigger ones. Hence, need males to incubate

Cooperative Polyandry

Cooperative Polyandry also occurs in which more than one male assists a female

Appears to be result of shortage of breeding opportunities because there are few territories available



Groups of Acorn Woodpeckers compete for territories that contain granary trees.

Cooperative Polyandry may arise when a multiple male coalition controls a territory with only one breeding female

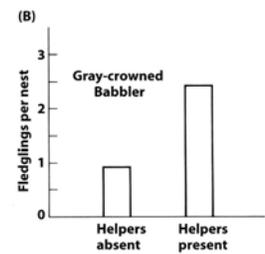
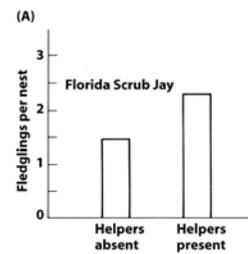
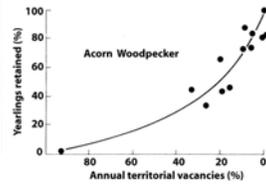


Figure 13-11
Ornithology, Third Edition
© 2007 W. H. Freeman and Company

End Mating Systems