

Mating Systems 2.

Dunnocks

dunnocks

Prunella modularis, the original LBJs:

From old English “dun” = brown, “ock” = little



Prefer dense underbrush habitat.

Dunnocks have a variable mating system. In a single population one can observe:

Monogamy
Polygyny
Polyandry
Polygynandry

Which you get depends on seasonal resources.
Obviously pair bonds (monogamy) not strong!

Both males and females have territories.

When plenty of food, and you don't have to travel far to get it...

- female territories smaller
- less territory overlap
- monogamy likely

When less food per square meter...

- Female territories larger
- female territories overlap male territories
- polyandry likely (F finds herself in more than one M territory)

Best scenario for female
= worst for male:

Polyandry → 2 males
help take care of eggs

Best scenario for male =
worst for female:

Polygyny → more
matings, less paternal care

Note that for either monogamy or
polygynandry → neither sex has an
advantage!

Dispersed food situation:

Male tries to copulate with all the females who come into/near his territory.

Male tries to prevent those females from copulating with other males → mate guarding.

At the same time...

Female tries to copulate with two males – ensures she will reproduce, wants polyandry for more male help raising brood.

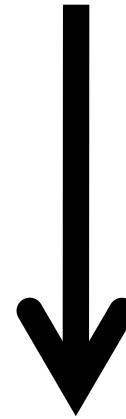
Who wins???

When females are in short supply → polyandry

When food less dispersed, female territories shrink, males can monopolize the more-clumped females → polygyny

Do all the mating strategies have the same fitness?

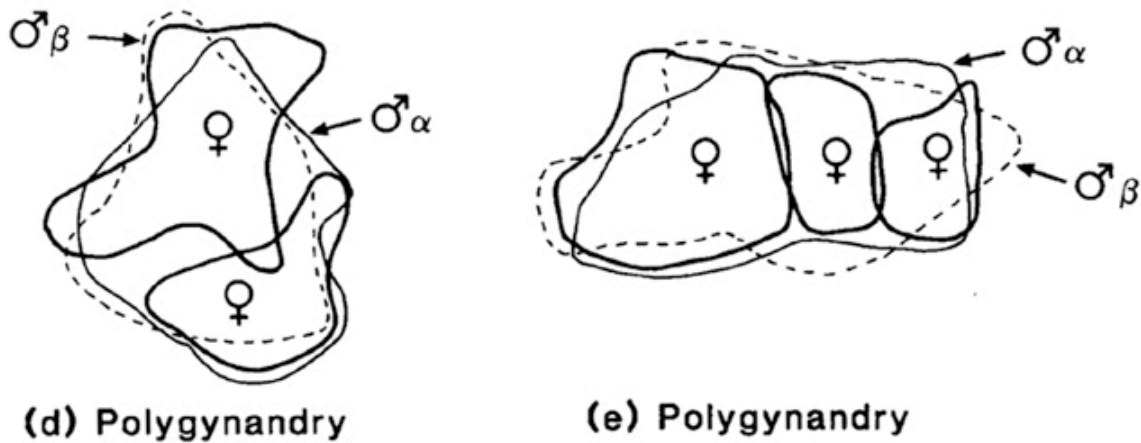
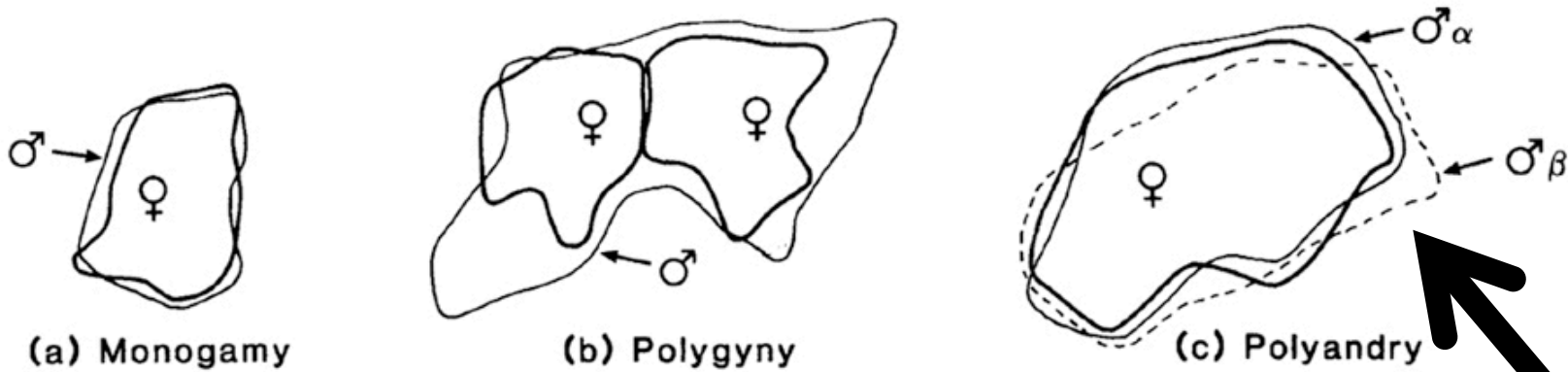
- ❖ Cooperative polyandry
- ❖ Monogamy
- ❖ Polygynandry
- ❖ polygyny



Decreasing
fitness

So females first choice, when environment permits, is to try for cooperative polyandry.

Different territory situations



Best deal for females

50 m

Female tries for cooperative polyandry...

→ Tries to evade male

→ α male tries to guard female

→ female meets β male in densest vegetation. β male pecks at female cloaca: This can cause female to eject sperm from previous mating.

→ female solicits copulations from one β male, to get more parental care. Why not more than 1 α and 1 β male? Don't want the "uncertainty of paternity" where no male will bother to take care of offspring.

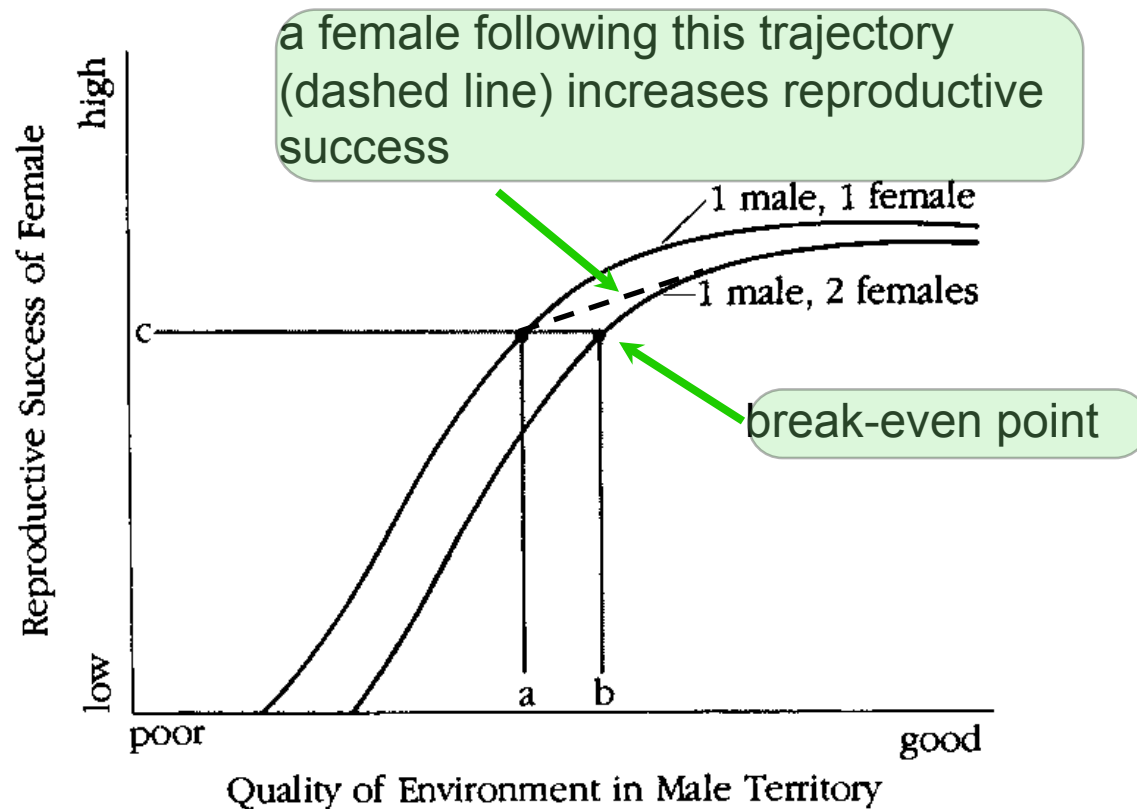
Material benefits Polyandry, cont'd

2. **Better protection hypothesis:** Males protecting a female against other dangerous males. Example: Polyandry appears in Galapagos hawks when territories are scarce. The competition for females and their territories have favored males who form cooperative defense teams. A breeding female may have up to 8 males ready to pair-bond with her for years, who will help protect and rear her single chick, per breeding stint. (pg. 380, 382).

3. **Infanticide reduction hypothesis:** Mating with several males can provide the stimulation that leads male partners to inhibit infanticidal tendencies when near her newborns because of paternity confusion – Example: Hanuman langur (pg. 22, 389).

polygamy: polygyny

What do females gain by choosing a male that may already have a mate?



The harem dilemma: It may be better to be the Sultan's 10th wife, than choose to marry the pauper.

Polygyny is a risky strategy for males

Suppose there are 10 males and 10 females in a population.

Five males copulate with all 10 females.

The females are all successful at reproduction...

...but only half of the males are successful.

Different styles of polygyny:

1. *Female defense*: Males monopolize females, typically by fighting other males. Usually the females are gregarious (a clumped, defendable resource).

2. *Resource defense*: Males defend territories. Usually females are not gregarious, but distributed more or less evenly in a controlled territory. Males fight other males for territory control.

Note that social monogamy in mammals never occurs when females live in defensible groups.

Example of resource-defense polygyny in fish: Cichlids

Male African cichlid fish defend territories (middens)

The territories have shells for females to nest in, and the more shells, the greater the potential for access to nesting females (see text pg. 407, 9th Ed.)

Of course you can always steal shells from your neighbor's territory and drop them in your territory!



Example of female-defense polygyny in mammals: Elk

- Cows of a herd join together to chase off coyotes that prey on young calves.
- The cow herds that exist for predator protection are a pre-adaptation to female-defense polygyny.
- Sure enough, bulls fight each other for breeding control of the female group (harem).
- (Elk are the most polygamous deer in North America)

Different styles of polygyny, cont'd:

3. *Leks*:

Males can predict where there will be a concentration of females.

Males do not fight with other males to control females, nor do they control territories.

Rather the lek is an arena for male display. Polygynous males congregate in small areas – display arenas - to which they attract several or many females to a display territory.

Females can simultaneously judge male quality by comparison!

This works if females are not sufficiently dispersed for monogamy, too difficult to control over time, and do not depend on controllable resources.

Three hypothesis about leks:

hotspot hypothesis: males cluster because females tend to travel along known routes and all the males have the same idea about where to intercept them.

hotshot hypothesis: subordinate males cling onto dominant males to have a chance at sneaking copulation, with the effect that there are groups of displaying males.

female preference hypothesis: female choice selects for genes that cause males to cluster because females are better able to choose males this way.

Different styles of polygyny, cont'd:

4. *Scrambles*: Free-for-all. The male who can mate with as many females as possible in a brief time wins.

Example of scramble polygyny in amphibians: Wood Frogs

- Polygynous males acquire multiple scattered mates by finding them first.
- Common with explosive breeders, for example temperate zone anurans.
- Female wood frogs are only available one or two nights a year to mate, so territoriality does not make sense.
- Males congregate around females at ponds and scramble to encounter one or more females with eggs before the night is over (see text pg. 410, 9th Ed.).

The original classic paper on this stuff: Emlen, S.T. and L.W. Oring. *Science*. Ecology, Sexual Selection, and the Evolution of Mating Systems. 18, 215. 1977.