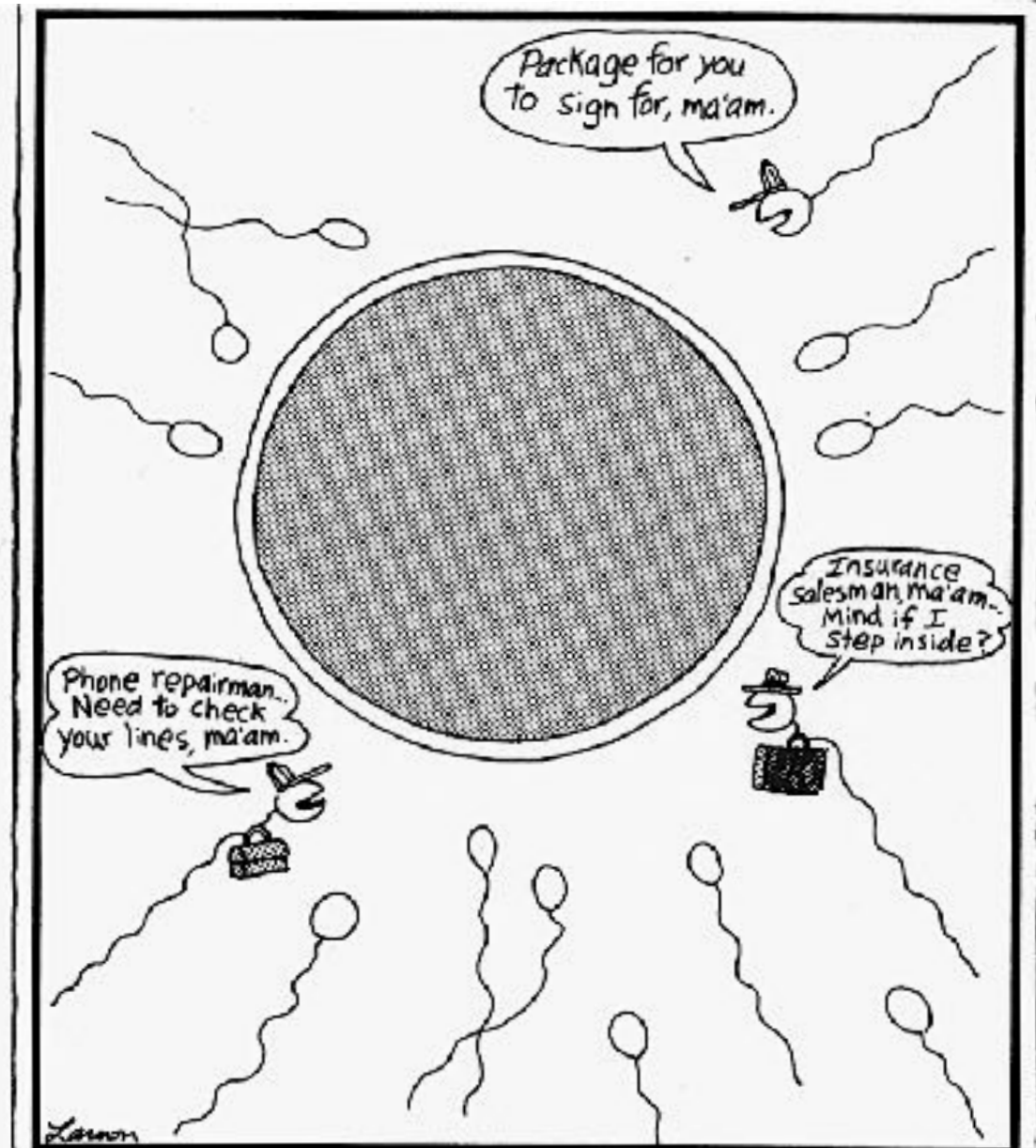


# Mating systems, Part 1



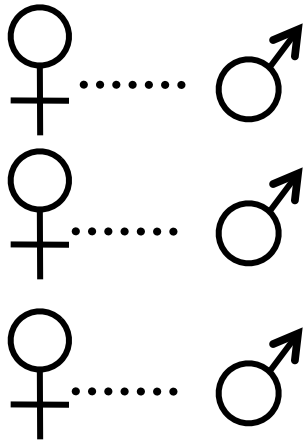
How the human egg is often deceived.

# Mating systems

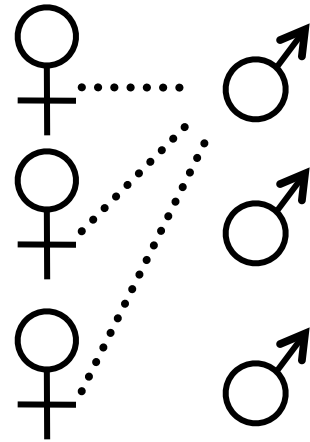
- Definitions

- Based on pairings (observable behavior)

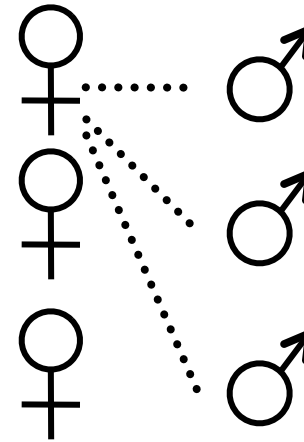
- Based on genetics



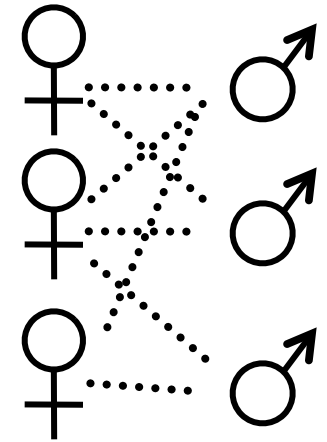
monogamy



polygyny



polyandry

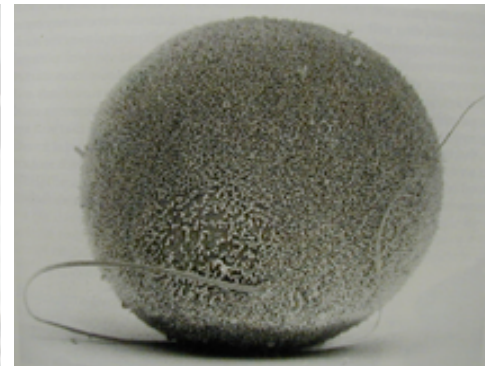
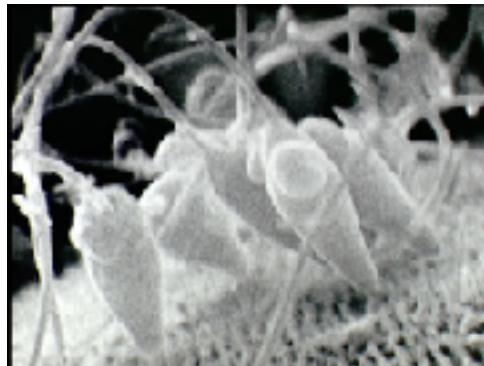


polygynandry,  
or promiscuity  
(later involves no  
mate choice)



# What shapes mating systems

- Forces responsible for shaping mating systems
  1. Differential parental investment
    - Sexual differences parental investment
      - Male RS limited by matings
      - Female RS limited by resources
    - This basic sexual difference leads to a higher potential for males to mate multiply (i.e., polygyny)



# What shapes mating systems

- Forces responsible for shaping mating systems
  2. Needs of young & potential role to help by male
    - Varying degrees of parental care needed (altricial vs precocial young)
      - Determines the degree to which males and females can maximize RS
        - » either spend a lot on care, or a lot on extra mating

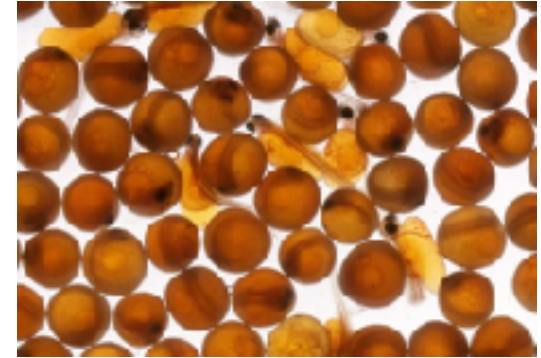


# What shapes mating systems

- Forces responsible for shaping mating systems

## 3. Certainty of paternity

- Males certain of paternity are more likely to stay and help
  - External vs. Internal Fertilization
    - » External = synchronization of egg-laying and mating
    - » Internal = separation in time of egg-laying and mating
  - Ex. fish parental care
    - » External = majority (70%) male parental care
    - » Internal = majority (86%) female parental care



# What shapes mating systems

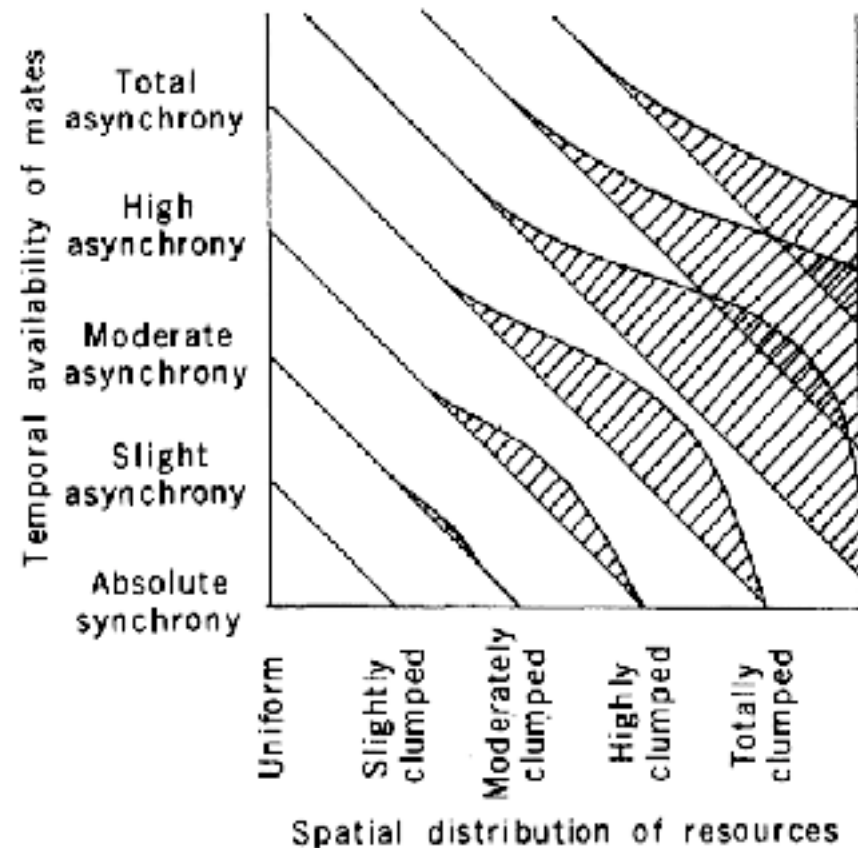
- Forces responsible for shaping mating systems

- 4. Environmental potential for polygamy\*

- Degree to which one sex can monopolize access to the other

- Extent of monopolization dependent on social and ecological factors that affect distribution of females

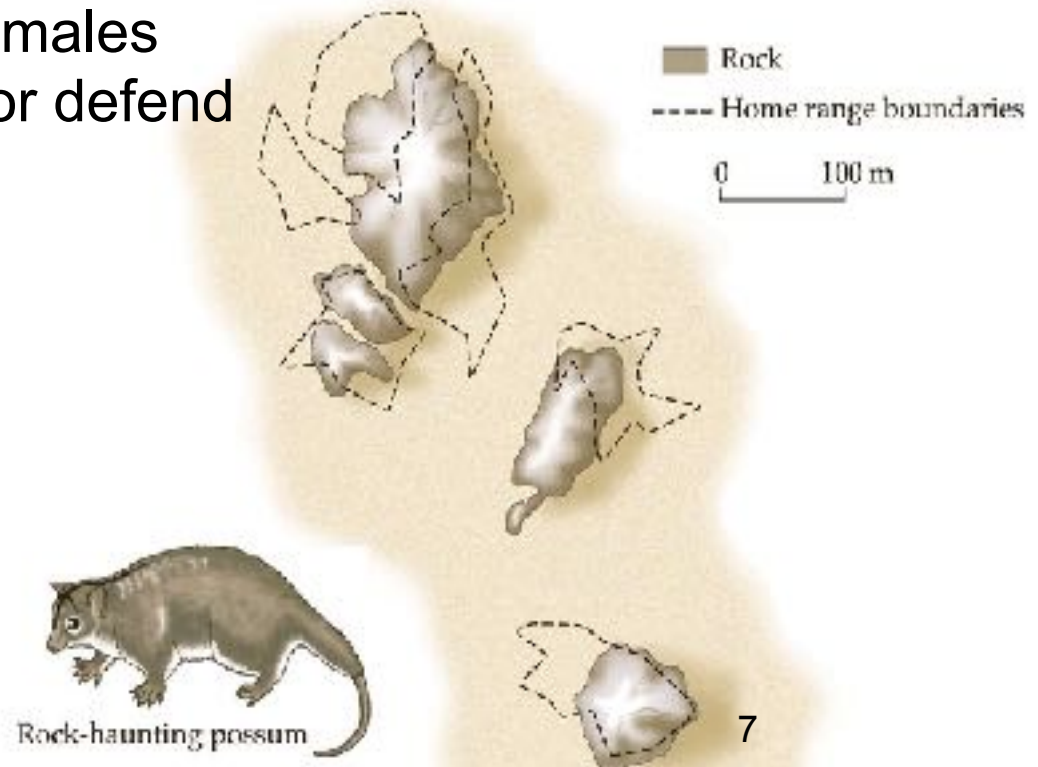
- **1) Spatial distribution**  
(uniform/clumped)
- **2) Temporal distribution**  
(asynchronous/synchronous)



\*very important force

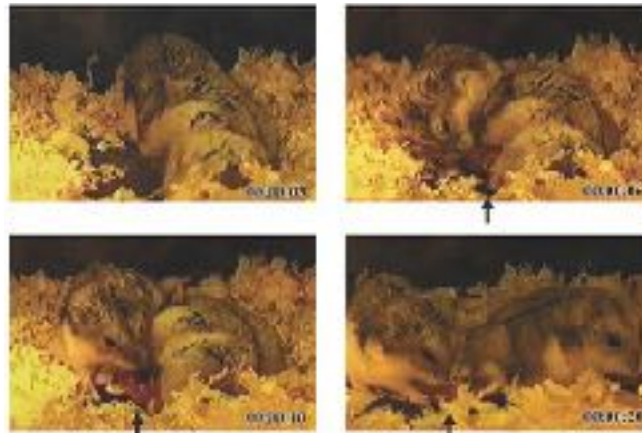
# Why monogamy: 1) Female dispersions

- Given that males often try to maximize the number of females they mate with, why does monogamy evolve?
  - Female dispersion one of best predictors of monogamy
    - When females live singly and widely dispersed, males cannot dominate or defend more than one



# Why monogamy: 2) Mate-assistance monogamy

- If involvement of both parents needed to raise baby, expect monogamy (needs of the young)
  - Paternal care sometimes **essential** for offspring survival
    - Emperor Penguins
      - » parents take turns going to sea for fish
    - Djungarian hamsters
      - » male pulls offspring out of birth canal!



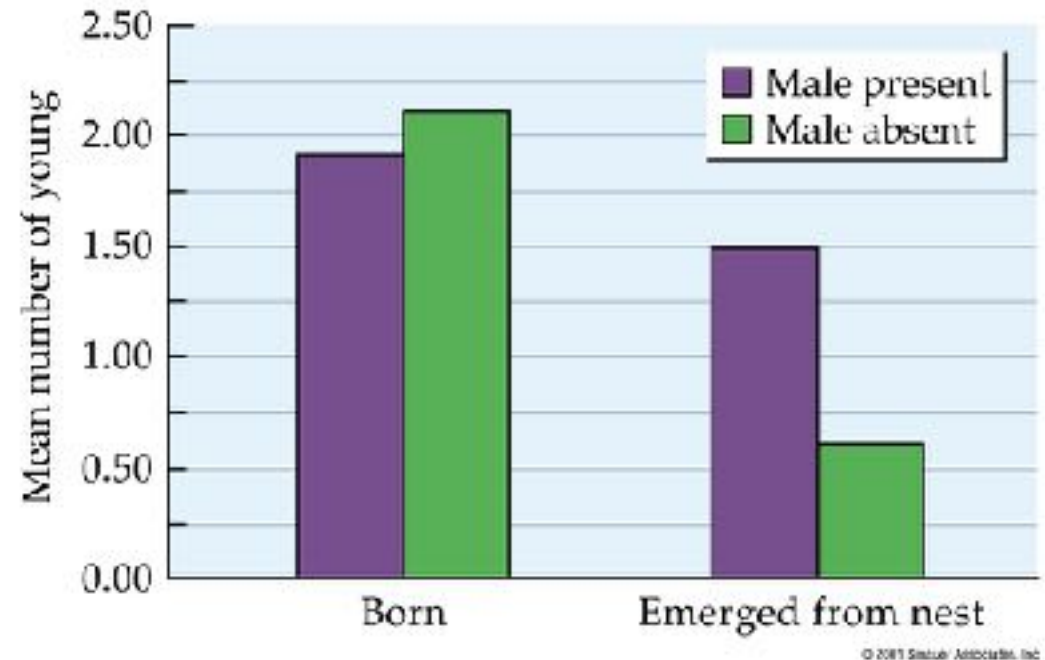


# Why monogamy: 2) Mate-assistance monogamy

- Paternal care sometimes ***significantly increases*** offspring survival



California mice



No effect of male presence at birth

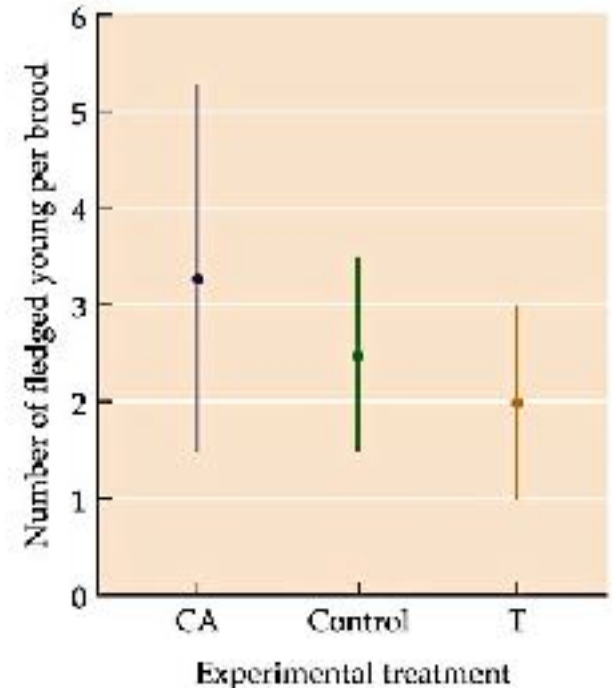
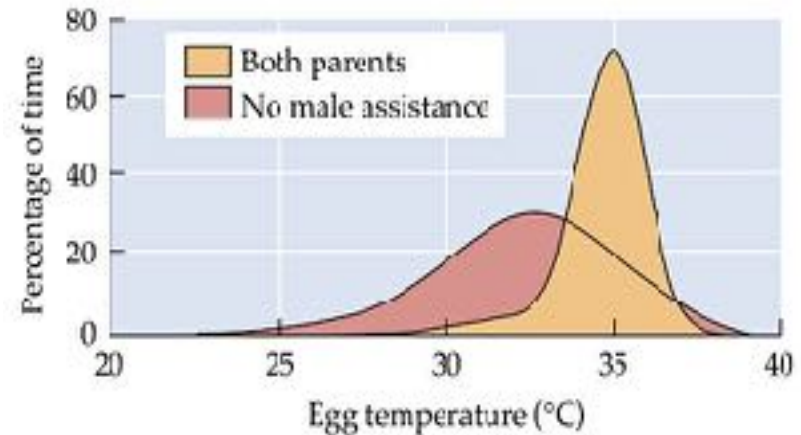
Large effect of male care after birth

# Why monogamy: 2) Mate-assistance monogamy

- Paternal care **significantly increases** offspring survival
  - Incubating by males keeps temperature high and stable
  - Males treated with anti-androgen (CA) provided more food; males treated with T provided less food
    - Less feeding by male results in lower chick survival

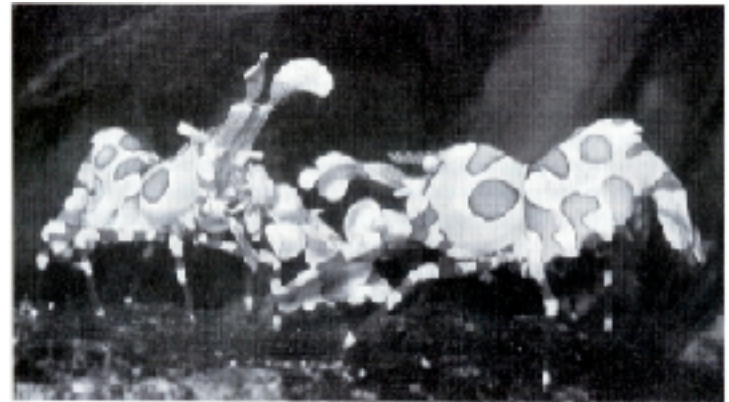


Spotless starling



# Why monogamy: 3) Mate-guarding monogamy

- Males keep females close via mate-guarding
  - Prevent female from mating with others
    - If females are:
      - Receptive after mating,
      - Hard to encounter
        - » Males can stick around and mate guard, which can lead to monogamy, especially if all females receptive at once.



clown shrimp

# Why is monogamy rare in mammals (< 10%)?

- **Delayed fertilization**

- Males have low confidence of paternity

- **Female biased parental care**

- Internal gestation

- Only females can care for young during early egg stage

- Female only feeding

- Female cares for newborns in a way that male cannot

- However:

- » in species where males can bring food to brood (e.g., carnivores, especially Canidae: wolves and allies), this can favor male parental care

- » in species where general care just as important as nutrition (e.g., primates, where carrying/protecting/teaching kids critical), can favor male parental care



# Why is monogamy common in birds (> 90%)?

^ social

- **Delayed fertilization**
  - Males have low confidence of paternity, but....
- **Both sex parental care**
  - External gestation
    - Once eggs laid, male can care for them as well as female
      - Both sexes can incubate (although usually female-biased)
  - Both sexes feed
    - Males can care for newborns in same way as females

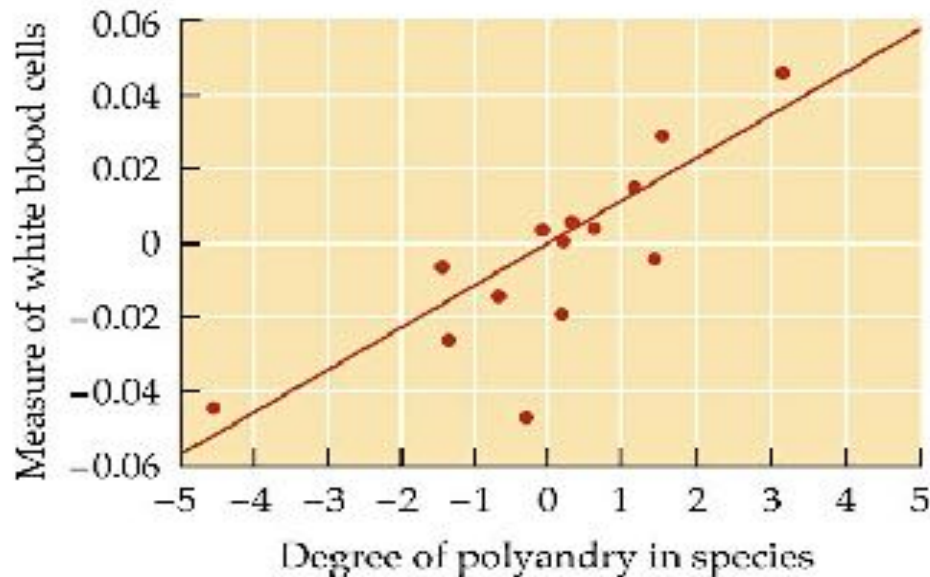


# Why do females engage in multiple matings?



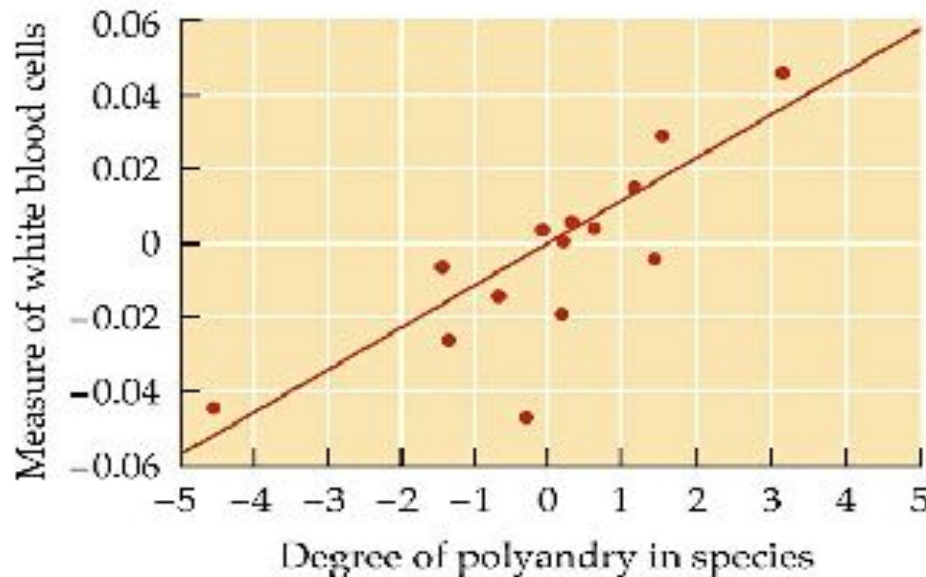
# Multiple mating: The costs

- Primates (41 species in zoos)
  - Number of mates typical of species positively correlated with white blood cells (measure of immune system's readiness)



# Multiple mating: The costs

- Primates (41 species in zoos)
  - Number of mates typical of species positively correlated with white blood cells (measure of immune system's readiness)



**What benefits could counter the costs of mating multiply?**



# Multiple mating: The benefits

- Why do females mate multiply?

## 1. Fertility Insurance\*

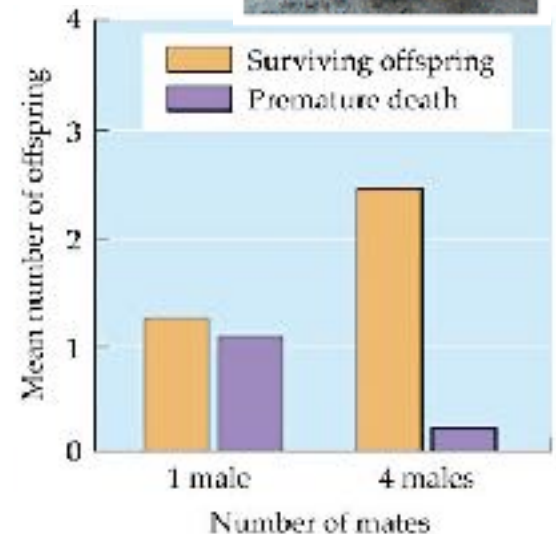
- Increasing the chance of having all eggs fertilized
  - ↑ hatching of eggs in multiply-mated red-winged blackbirds
  - Higher pregnancy rate in polyandrous prairie dogs



\* not typically thought to be strong force

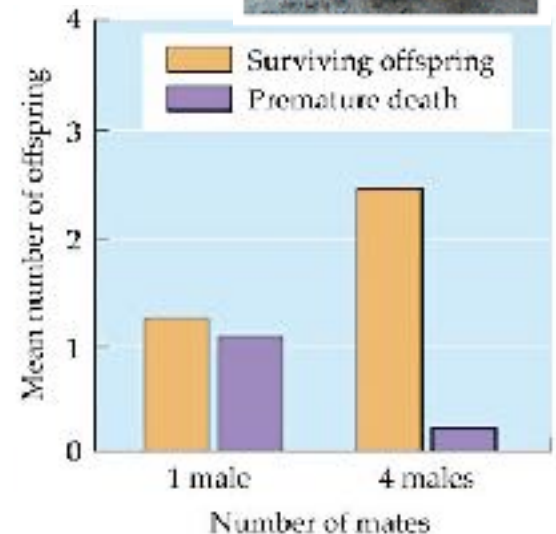
# Multiple mating: The benefits

- Why do females mate multiply?
  2. Good genes
    - “Trading up”; mating with genetically superior males
      - Blue Tit females solicit EPCs only from higher-quality males
      - Yellow-toothed cavy females have  $\uparrow$  offspring survival when mating multiply



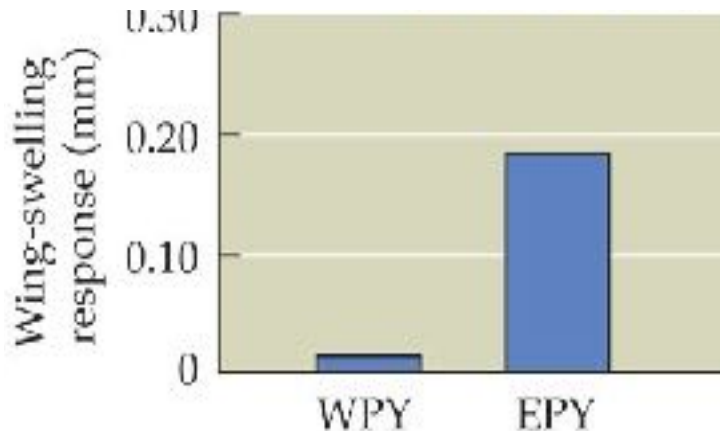
# Multiple mating: The benefits

- Why do females mate multiply?
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    - “Trading up”; mating with genetically superior males
      - Blue Tit females solicit EPCs only from higher-quality males
      - Yellow-toothed cavy females have  $\uparrow$  offspring survival when mating multiply
    - What are male options? Why stick around and care for young that might not be yours?
      - It is good for males if they are the ones to get EPCs
      - Can be best-of-bad-situation (conditional mating strategy) if they are the ones that get cuckolded



# Multiple mating: The benefits

- Why do females mate multiply?
  3. Genetic compatibility: genotype matching
    - Females prefer males with dissimilar immune systems
      - Bluethroat EPY (EPyoung) have stronger immune response than within-pair young - when placed into the focal male's (the philandering male's) nest



# Multiple mating: The benefits

- Why do females mate multiply?
  4. Infanticide reduction
    - Confuse males about paternity, so infanticide less likely

