

Announcements

- Experiment 2 is done this week.
- Alternate assignment is due Thursday October 25th.

Mating!

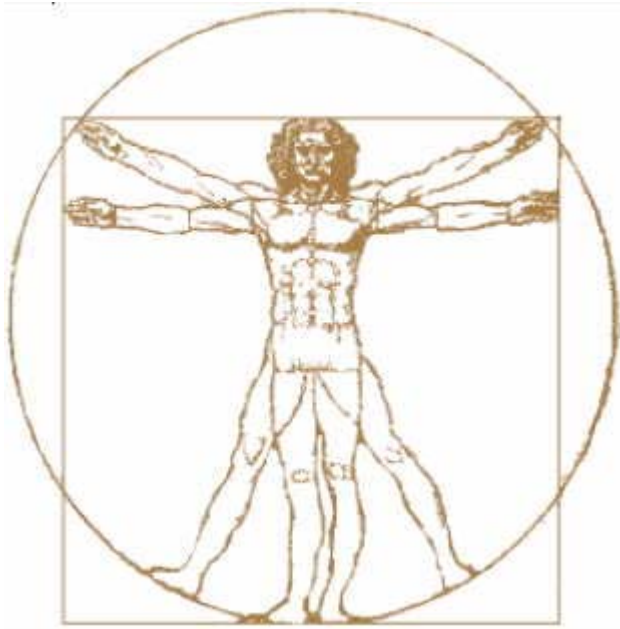
Overview of next topic

- Why sex?
- Why two sexes?
- Parental Investment
 - Minimum costs associated with rearing children
- Sexual Selection
- Mate-choice preferences in males and females

Why sex?

- Why do we reproduce sexually?
- Why not asexual reproduction?
- Why only 2 sexes? Why not 5 or 6?
- Seems as if asexual is the way to go if the name of the game is replication of genes.
- Costs of sex:

Sex and pathogens



man

versus



microbe
(pathogens)

Sexual Reproduction

- Two different sexes
 - But why do we see 2 different forms?
 - Could have been just + and –
 - Two different sized gametes resulted from competition between nuclear DNA and non-nuclear DNA (e.g., mtDNA)
- How do biologists identify the male and the female of a species?
- Difference in size affects a lot
 - Psychology and physiology

Conjugation:
E-coli mating

How many kids could each sex have?

- Guinness book of records
- Female:
- Male:
- We are going to see how this asymmetry has shaped human mating psychology.

Parental Investment

- Why is it that females have a lower reproductive ceiling?
- Costs associated with reproduction
- The sexes differ in the minimum amount of parental effort required to produce offspring
 - Differ in parental investment

Parental Investment

- Definition of parental investment (PI):
 - Any investment by the parent in an individual offspring that increases the offspring's chance of surviving at the cost of the parent's ability to invest in other offspring.
- What kind of investment does this include?

Parental Investment

- Time & energy invested in 1 offspring precludes investing time & energy in others.
- We can talk about PI in terms of the negative effect it has on RS:
 - A large PI decreases the parent's ability to invest in and produce other offspring.



Parental Investment

- Do the sexes contribute equally to producing and rearing offspring?
- In the short term?
 - What are the minimum investments required?
 - Are they the same?
- In the long run?
 - Disparity in contributions grows smaller with time.

Minimum Parental Investments

- What is the minimum investment of:
- Females:
 - 9 mths gestation
 - 2-3 yrs lactation
 - Production of eggs
- Males:

High parental investors

- Females, who are higher PI, are the limiting resource in producing offspring.
 - Having an egg fertilized by one male precludes having another child with a second male in the near future.
- Males are not a limiting resource.
 - Mating with a female does not preclude mating other females.
- Different costs and benefits for each sex
- Affects the selection and competition for mates: sexual selection

Sexual Selection

- Two components of SS:
 - Intra-sexual competition:
 - competition within one sex for access to members of the opposite sex
 - Inter-sexual competition:
 - differential choice by members of one sex of members of the opposite sex
- Who competes and who chooses?

How does PI influence SS?

- In humans,
 - Which sex is the limiting resource?
 - Which sex is going to compete for sexual access?
 - Which sex is going to be choosy regarding the acceptability of a particular mate?
- In general:
 - The lower PI sex competes; The higher PI sex chooses
- For humans SS translates into:
 - Intra-sexual competition: males (low PI) competing with other males for sexual access to females (the high PI)
 - Inter-sexual competition: females (high PI) choosing some males (low PI) based on particular characteristics but not others.

How do you study sexual selection?

- To see what characteristics are being chosen, you need to measure the reproductive success of each sex.
- Reproductive success = number of children
- But, in humans, this presents a problem.
 - Male certainty versus female certainty
 - Kalahari Bushmen -- 2% of males are duped.

Studying sexual selection

- Studying sexual selection in a population that is easily controlled and maintained.
 - *Drosophila melanogaster* (fruit flies)
 - Mark chromosomes to measure RS of specific individuals.
 - Bateman (1948) Five males and five virgin females.

Bateman's findings

3 sex differences

- Variation in Reproductive Success
- Ability to attract mates
- Relationship between RS and matings

How to explain these findings

- All relates back to the differential investments in production of sex cells by males and females
 - Males tend to invest very little energy in the production of a given sex cell whereas females invest a great amount into each of theirs.
 - A male's RS is not limited by his ability to produce sex cells but his **ability to fertilize eggs** with his sex cells.
 - In contrast, a female's RS is limited by her **ability to produce sex cells** and not having them fertilized.
 - Again, we see this asymmetry

- Since a male's RS success can increase with increased mating opportunities, should expect males to be eager to mate even after they have just done so.
- But not indiscriminately!
 - they identify and reject those that they have already had sex with!

Summary: Parental Investment and Sexual Selection

- Individuals of the sex that invests less (male) will compete among themselves to breed with members of the sex investing more (female).
- This is because the sex that invests less (males) can increase its reproductive success (RS) by investing in the offspring of *several members* of the limiting sex (females).

Questions

- In which species would you expect to see more fierce competition?
 - In one where PI was from females only?
 - Or in one where males helped with PI?
- What kinds of adaptations would you expect to see in males of a species where they did not contribute greatly?
 - Morphology?
 - Psychology?

Parental Investment and Sexual Selection

Male PI < Female PI

- PI patterns influence sexual selection
- Could be the case that:

Male PI > Female PI

Male PI = Female PI

Predictions about mating behavior

- Females should be more choosy
- Males should be more receptive to sexual offers.
 - Number of partners
 - Likelihood to engage in sex after a given amount of time
 - Courtship!!
 - Willingness to engage in sex

Next time...

- Based on PI and SS, what preferences should men desire in a mate?
- How about women?