Sexual Conflict

or

Historical views on mating

1) Harmony in sexual interactions

2) Monogamy

High potential for intersexual conflict

1990s- today:

- 1) Harmony in sexual interactions
- 2) GENETIC Monogamy = RARE

A co-evolutionary “arms race”, full of
- Coercion
- Manipulation
- Deception
- Harm

Intersexual Conflict: Outline for Today

1) An anecdote and an experiment
2) The concept of interlocus sexual conflict
3) Grounds for intersexual conflict
   a) Fertilization efficiency
   b) Female rate of offspring production
   c) Parental effort
   d) Frequency of mating in light of costs
      i. Different weight given to cost
         - Sexually transmitted disease/parasites
      ii. Different costs
         - Female injury
         - Loss of time and energy
4) Stage of conflict
   a) Before mating
   b) During mating
   c) After mating

Special thanks to Annie Leonard for help with Parts 3 and 4.
Intersexual chemical warfare?

The desert grass spider *Agelenopsis aperta*

Males spray females with an incapacitating toxin, anesthetizing them before mating.

Is this conflict?

Do we have experimental evidence of intersexual conflict?

Yes! In *Drosophila*.

**Experiment:** Males and females bred in either dual-monogamous lineage or polygynandrous lineage.

- **Dual-monogamous lineage**
  - males and females allowed to have only one mate.

- **Polygynandrous lineage**
  - males and females mate with multiple partners. (= control)

Egg mass when mated to polygynandrous males (mg)

**Interpretation:** Males in polygynandrous lineage selected to compete in female reproductive tract, possibly even at expense of female. Perhaps a spermicide evolves that injured females. Under relaxed selection, females are injured more by the males.

Inter-locus sexual conflict

Some genes expressed in females will be in conflict with genes expressed in males.

Sexual Conflict

Conflict between the evolutionary interests of individuals of the two sexes

Why do interests differ?
Males may benefit more by mating multiply. Males may therefore be more willing to suffer costs of mating than are females.

Costs of mating common to both sexes

1. Time
2. Energy
3. Predation Risk
4. STD’s (=sexually-transmitted diseases)

E.g., Sexually-transmitted diseases
Gender-specific costs of mating

Male himself may exact special costs for females.

Costs of Mating

E.g., Energy and time

Female water striders carry males during copulation;
Carrying male takes 20% more energy
Carrying can range from 30 sec to 90 days!

Costs of Mating

E.g., Injury

Shark with mating scars

Costs of Mating

E.g., Injuries in rhesus monkeys, bison, mink, sharks, and more...

Physical injury to females (cont’d)

Female elephant seals leaving harem for sea are accosted by other males.
Injury is common, even death.
Females appear to concede copulations in order to avoid injury.

Injuries also in rhesus monkeys, bison, mink, sharks, and more...
Stage at which conflict occurs:

1. Pre-mating
2. During mating
3. After mating

Deception

- Topi antelopes
- Snorting = anti-predator function in this species
- Why do males sometimes just snort?

Audio of false snort


- Videotaped focal observations and conducted playback experiments

Males more likely to snort when female in estrus is on his territory... and about to leave.
Just-so stories... How to test?

Sensory Exploitation Hypothesis

Males evolve to emit stimuli to which females are sensitive for some reason other than mating.

Two criteria must be met:

1. Show that stimuli are important in context other than mating.
2. Show that female’s sensitivity arose prior to origin of male signal.

Sensory Exploitation in Water Mites

Water mites hunt for copepods by sensing their vibrations as they swim.
Male water mites use **trembling vibrations** in courtship that resemble copepod vibrations, and elicit **net stance** from females that is also shown when preying on copepods.

The swords on **swordtail fish** are also thought to exploit female's sensory system.

**Chase-away Model of Evolution of Male Traits**

- males exploit female sensory bias
- females evolve diminished response to exploitative signals
- males exaggerate trait further to induce females to mate

Exaggeration continues until natural selection against male trait balances sexual selection for male trait.

Do males exploit sensory biases in females?

**YES!** The longer the sword, the more time a Priapella female attends male swordtail fish, even though female belongs to species that lacks swords!
Worthless donations: male deception and female counter play in a nuptial gift-giving spider

Males give females a gift of prey wrapped in silk.
But... 38% of gifts are worthless, sucked-out prey.

THE AMAZING CASE OF THE BALLOON FLIES

Male flies in Family Empididae offer a nuptial gift of prey to females. In some species, prey is naked...
In other species, prey is wrapped in silk.
At least one species offers a silk 'balloon'....
...BUT NO PREY! The gift is nutritionally worthless.

Sensory Exploitation: Mystery Solved?

Rhamphomyia sulcata males normally offer insect prey (photo left),
But females can be deceived by 'token' of cotton (photo right).

Stage at which conflict occurs:

1. Pre-mating
2. During mating
3. After mating

1) Adaptations for grasping

Male water striders have long copulations, which appear to occur at expense of female.
In one species, females have evolved to conceal genitalia and force courtship signaling by males!

Nuptial pads on male frogs allow them to grip females.

Females evolve surfaces to impair attachment of suction cups.
Males then evolve strategies to re-gain suction.
Key to conflict may be adverse effects of hypoxia (oxygen debt) on females.

2) Creative copulation
Stage at which conflict occurs:

1. Pre-mating
2. During mating
3. After mating

Infanticide

Male lion kills cubs of rival when it takes over pride.

Is this post-mating conflict?
Accessory gland proteins (Acp's) = proteins produced by accessory glands of male Drosophila and transferred to female in seminal fluid.

**Acp functions include:**
1. Turning off sexual receptivity in female
2. Stimulating ovulation and egg production
3. Facilitating sperm storage

Acp genes are evolving more rapidly than other parts of the fly genome.

*Acp’s may exploit existing receptors,* so that females respond even if not in their interests.

For example:
- Butterfly males can transfer 10-25% of their body weight in seminal substances
- Many are rich in Juvenile Hormone: increases female egg production, maturation and oviposition
- May induce a refractory period

**Drosophila melanogaster**
- After mating, females:
  - Less attractive to other males
  - Less receptive to mating again
  - Increased egg laying

**Drosophila melanogaster**
- Accessory gland proteins “Acps”:
  - 80-100 Acps
  - Acp62F
    - Boosts male fertilization success
    - Shortens females’ lives
    - Reduces females’ fecundity

12/3/2012