Parental Care

1. Parental investment versus parental care
2. Who cares?
3. Whether or not to care (matriphagy)
4. Current vs. future reproduction
   a. Resource availability
   b. Lifespan
3. Which sex cares
   a. Gametic investment
   b. Certainty of parentage
4. Parent-offspring conflict
   a. Weaning conflict
   b. Parental punishment
   c. Siblicide

Parental Investment
any parental trait that potentially increases fitness of an offspring at some cost to the parent.

Parental Care
parental investment in offspring in the form of behavior.
Parental Investment vs. Parental Care

**Example.** Parents help young acquire nutrients via:

- yolk-filled eggs
- body secretions (e.g., milk, mucus)
- bringing food to young
- teaching young to get food
- laying eggs at food sources

Parental Care

How parents care:

- feed young
- move young
- protect young from predators, parasites, or abiotic environment
- teach young

Who cares?

- mammals
- birds
- reptiles
- amphibians
- fish
- insects
- crustacea
- spiders

Parental care is rare.
Whether or Not to Care?

Role of Future Reproduction
species that benefit more by future reproduction should invest less in care of current offspring.

= Tradeoff between current and future offspring

Extreme Parental Care: Matriphagy in Amaurobius ferox

http://www.youtube.com/watch?v=G3R811mc8KE&feature=related

How would you determine if matriphagy benefits the young?

Matriphagy benefits spiderlings

How would you determine if matriphagy benefits the young?

How would you determine if matriphagy benefits the female?

Avg. # of spiderlings in the 1st brood = 84
Probability of successfully producing a 2nd brood if escape from matriphagy = 0.33
Avg. # of spiderlings in the 2nd brood = 43
Survival of offspring to dispersal after eating mother = 0.93

**Discuss:** In order for selection to favor matriphagy, how low must survival of offspring in the 1st brood be in the absence of matriphagy?

Assuming 2nd brood eats mom:

\[ 84(0.93) = (84)x + (0.33)(43)(0.93) \]

\[ 78 = (84)x + 13 \]

\[ 65 = (84)x \]

\[ x = \frac{65}{84} \]

\[ x = 0.77, \text{ or } 77\% \]

If survival of the first brood in the absence of matriphagy is less than 77%, then matriphagy is favored by natural selection.

Experiments showed the survival of no-matriphagy brood was...

71%

Matriphagy seemingly favored...
Whether or Not to Care?

Role of Future Reproduction
species that benefit more by future reproduction should invest less in care of current offspring.

Factors affecting this tradeoff:
• Resource availability
• Lifespan

Which Sex Cares?

Recall that we said, Because females invest more in each gamete, they should invest more in offspring care.

Why Human Males Care Less

THE 1ST WIFE OF FEDOR VASSILYEV
The largest recorded number of children born to one mother is 69, by the first of two wives of Fedor Vassilyev, a Russian peasant.

ISMAIL THE BLOODTHIRSTY The Sharifian Emperor of Morocco, Ismail the Bloodthirsty (1672–1727), is reported to have had at least 888 children. To have had 888 children, he must have sired an average of 22.2 children per year.

Maximum cost of a male dying for his first offspring = 887
Maximum cost of a female dying for her first offspring = 68

Info courtesy of J. Davis

Why Males Often Care Less...

• smaller investment per gamete
• greater uncertainty of parentage

Giant waterbugs show exclusive paternal care.
Male ensures paternity by having female lay eggs on his back immediately after mating.
When should we see biparental care?

We should see biparental care when offspring are highly unlikely to survive without both parents caring.

**Birds:**
incubation, feeding

**Carnivores:**
prevention of infanticide

Parent-Offspring Conflict

Thus far, we consider only interests of father and mother...
But what about interests of individual offspring?

Often interests of parents and offspring coincide,
but theory predicts not always.

Parent-Offspring Conflict

Trivers, 1972

Parent equally related to all offspring and should distribute resources evenly.
But... each offspring benefits more from having more resources.
Hence, each offspring should attempt to gain more from parent than parent will attempt to give.

Weaning conflict
mammalian young try to suckle longer than mother permits them to suckle

Punishment
parents discourage esp. "greedy" young hurting or threatening them
e.g., tousling in coots and moorhens

Examples of Parent-Offspring Conflict
**Siblicide**: a form of *offspring-offspring conflict* in which siblings kill other siblings

**Example**
Egret hatchlings kill siblings

**Spotted hyenas** are born to kill...
subordinate sibling is so cowed by constant attacks that it stays away from its mother, and often starves to death.

Accounts for up to 25% of mortality of young.

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If siblicide reduced parental fitness, why wouldn’t parents prevent it?

**Possible Reason**:
Young are deposited in aardvark burrows.
Young are safe from predators, but mother cannot get to them.

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A similar explanation for sharks:
**Sand tiger shark** siblings kill siblings *in the womb*. Mother is helpless.
carnivorous habit facilitates siblicide.
But why don’t parents resolve conflict by making clutches smaller? 

**Some do!**

e.g., parasitic wasps

Females lay eggs in host insect and leave. In some wasp species, larvae are cannibalistic, which could lead to siblicide. Females in those species tend to lay single eggs in hosts.

However, what seems like parent–offspring conflict might not be.

**Boobies seem to allow siblicide to occur.**

Possibly, 2nd egg in a clutch is ‘insurance.’

Letting one sibling kill other determines which chick is more fit.

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**Is variation among species in siblicide due to parent or chick?**

- Blue-footed boobies: facultative siblicide
- Masked boobies: obligate siblicide

**Parent–offspring combinations**

1. Blue-footed booby parents intervene more to prevent siblicide than masked booby parents.
2. Blue-footed booby siblings attempt siblicide less than masked booby siblings.
Is variation among species in siblicide due to parent or chick? **BOTH!**