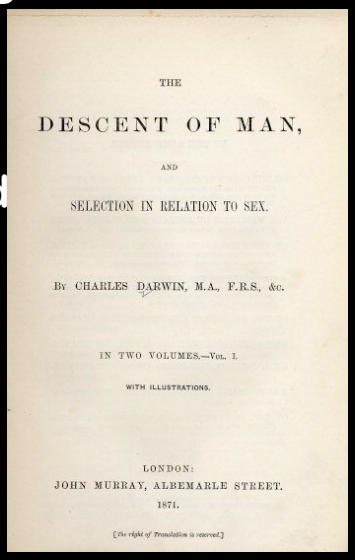
"When we behold two males fighting for the possession of the female, or several male birds displaying their gorgeous plumage, and performing strange antics before an assembled body of females, we cannot doubt that, though led by instinct, they know what they are about, and consciously exert their mental and bodily powers."

--Darwin 1871 'The Descent of Man'



THE

DESCENT OF MAN,

AND

SELECTION IN RELATION TO SEX.

By CHARLES DARWIN, M.A., F.R.S, &c.

IN TWO VOLUMES.—Vol. I.

WITH ILLUSTRATIONS.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1871.

[The right of Translation is reserved.]

Lecture 15

Sexual Selection and Mate Choice

Upcoming Presentation Schedule

On Thursday April 23:

__Crickets (Shawn, Ariana and Harry)
__Crickets (Kyle and Sean)
__Ducks (Kattie, Rachel and Kim)
__Giraffes (Dexter, Chrissy, Paul, and Gina)
__Gulls (Ashley, Kira and Michaela)
__Harlequins (Wendy and Stefanie)
__Lambs (Kirsten, Jon, Kaelin)

On Tuesday April 28:

__Mallards (Ben, Charleve, Brittany, Will)
__Mantis (Rod)
__Penguins (Ashley, Jonathan, Meghan, Ashley)
__Roach (Brittany)
__Sheep (Jamie, Rebecca, Nicole)
__Squirrels (Nick, Peter, Christa, Jenna)
__Triops (Danielle, Kaitlyn, Amber, James)

Review -
2 fold cost of Males

Review -
2 fold cost of Males

Possible Benefits?

Take Home
Assignment -

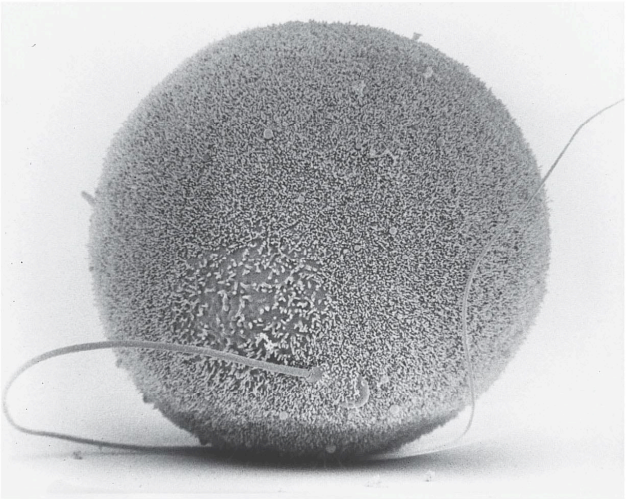
Why are there two
kinds of gametes?

Unequal Investment and Unequal Rewards

Based on gamete cost alone…

Females should carefully select a mate

Males should mate as often as possible



ANIMAL BEHAVIOR, Eighth Edition, Figure 10.6 © 2005 Sinauer Associates, Inc.

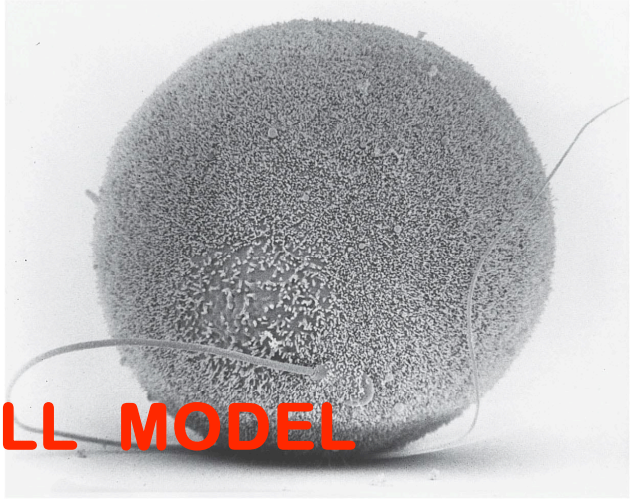
Unequal Investment and Unequal Rewards

Based on gamete cost alone…

Females should carefully select a mate

Males should mate as often as possible

A NULL MODEL



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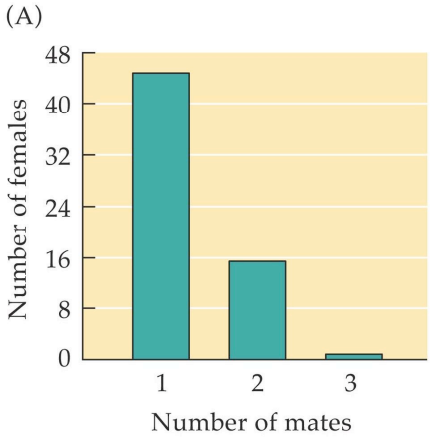
Borgia Bowerbird lab: http://www.life.umd.edu/biology/borgialab/

http://www.fritzhaeg.com/webpic/4N1M4-pic/animals/birds/bower04.jpg

If females are choosy, and males are not…



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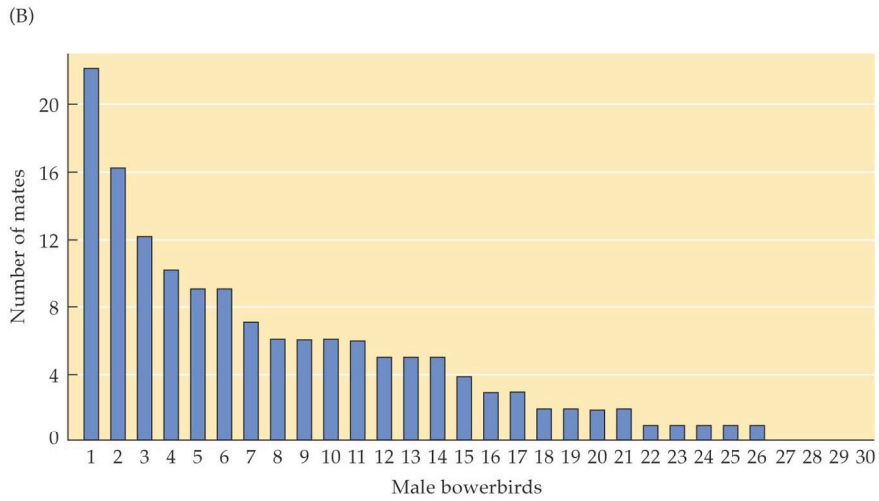
If females are choosy, and males are not…



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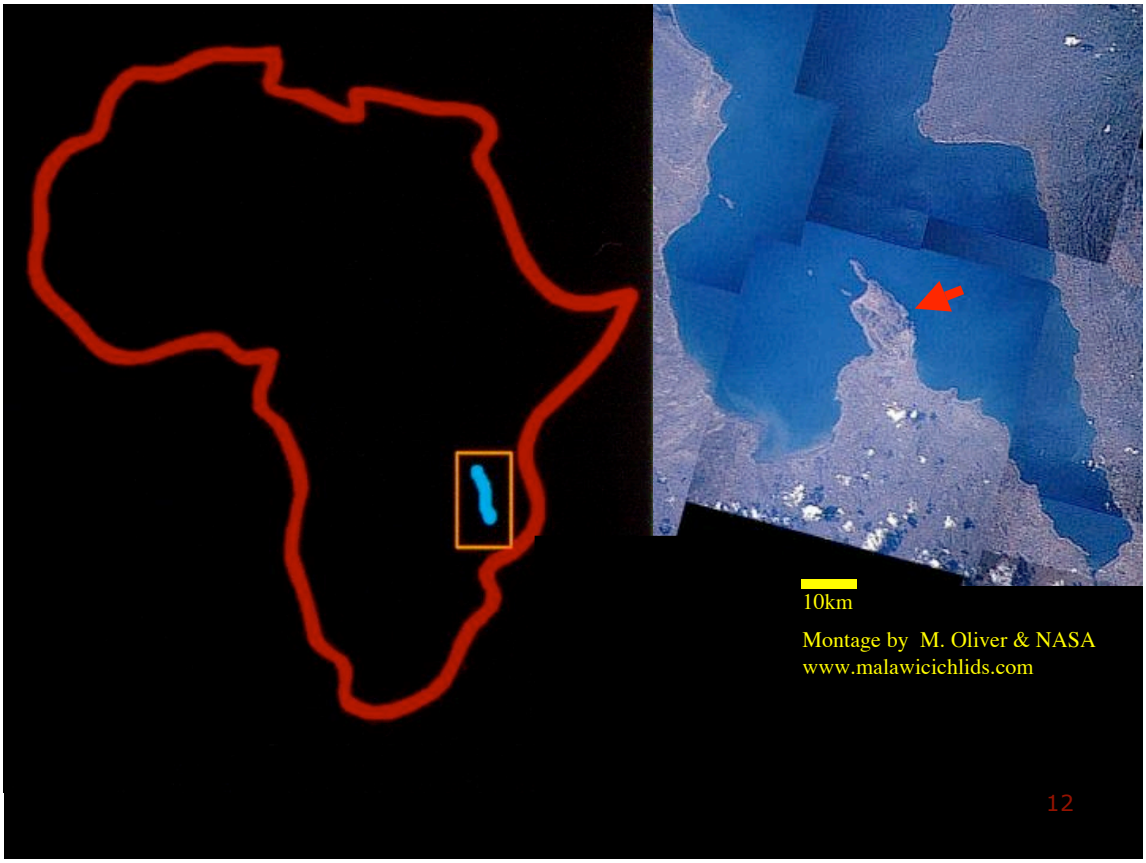
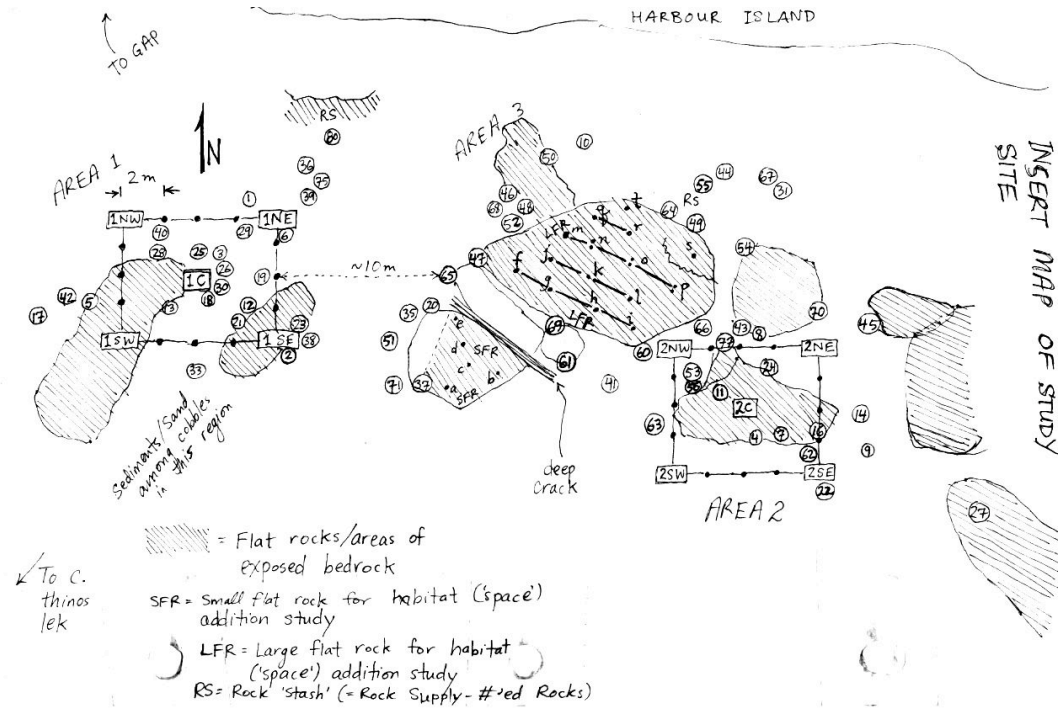
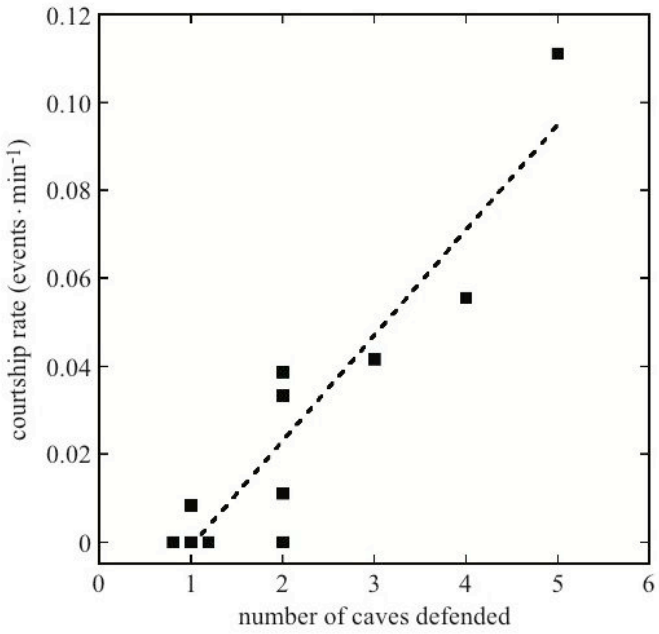


Tropheops tropheops
Harbour Island - Lake Malawi





Mormyrops anguilloides

As seen in Arnegard and Carlson, 2005

Conclusions -

Only the largest male fish control territories with caves

The number of caves on a territory influences attention from females

Showing off or Resource Control?

Are caves an honest signal of fitness??

Darwin puzzled by traits that didn't contribute to survival - often manifest as sexual dimorphism

http://images.encarta.msn.com/xrefmedia/sharemed/targets/images/pho/t241/T241034A.jpg
http://farm2.static.flickr.com/1180/528846220_d6607e8b18.jpg?v=0

Sexual Selection - (Darwin *via* Alcock)

"The advantage which certain individuals have over others of the same sex and species, in exclusive relation to reproduction"

Usually involves intra-male competition

and/or selective females

Sexual Selection -

http://billi-jean.com/images/lj/0605/peacock2.jpg
http://www.bettafish.name/Betta_Fish.jpg
http://pikaia.files.wordpress.com/2007/11/irish_elk.jpg

http://www.nature.com/hdy/journal/v97/n3/images/6800868f1.jpg

Two aspects of Sexual Selection

Female Choice

Intra-Male Competition

Female Choice

TABLE 10.4 *Four theories on why extreme male ornamentation and striking courtship displays have evolved in species in which males provide no material benefits to their mates*

Theory	Females prefer trait that is	Primary adaptive value to choosy females
Healthy mate	Indicative of male health	Females (and offspring) avoid contagious diseases and parasites
Good genes	Indicative of male viability	Offspring may inherit the viability advantages of their father
Runaway selection	Sexually attractive	Sons inherit trait that makes them sexually attractive; daughters inherit the majority mate preference
Chase-away selection	Exploitative of preexisting sensory biases	No benefit received by female

Healthy Mate - Ornaments can only be maintained by a healthy individual

Good Genes - Individuals resist disease for genetic reasons, and may be very fit in other genetically based reasons

Related to Handicap Hypothesis

(Zahavi, A. (1975) Mate selection - a selection for a handicap. *Journal of Theoretical Biology* 53: 205-214.)

Runaway Selection - aka “Sexy Son” hypothesis

Runaway Selection

http://www.journals.uchicago.edu/doi/abs/10.1086/283379
http://www.dkimages.com/discover/previews/970/19620.JPG

Vol. 113, No. 2 The American Naturalist February 1979

OFFSPRING QUALITY AND THE POLYGYNY THRESHOLD: “THE SEXY SON HYPOTHESIS”

PATRICK J. WEATHERHEAD* AND RALEIGH J. ROBERTSON
Department of Biology, Queen's University, Kingston, Ontario, Canada

The foundation for current theories on the evolution of mating systems was laid by Darwin (1871) in his elucidation of the process of sexual selection. Darwin introduced this concept to explain the evolution of characters that were not related to an individual's ability to survive in the environment (and in fact probably reduced this ability), but enhanced its ability to obtain mates. Implicit in this concept is that individuals of each sex differ from one another with respect to characteristics which affect the fitness they will confer on another individual if chosen as a mate. Consequently, selection pressures will exist that promote the development of techniques both for advertising superior characteristics and for distinguishing good characteristics from bad.

In his review of sexual selection and the role of parental investment, Trivers (1972) concludes that when the investment of each sex in its offspring is approximately equal, then sexual selection should affect both equally. However, when, for example, females invest more heavily than males, then competition among males to increase their frequency of mating will be high and, consequently, sexual selection among males will be strong. As Trivers (1972) points out, females initially have a much higher investment in terms of the energy supplied to each ovum relative to the very small amount of energy devoted by the male to each sperm. In highly polygynous mating systems the role played by the male in rearing young becomes extremely limited and thus the difference in the relative contributions of each sex increases. Consequently, in such systems sexual selection will act much more strongly on the male. A corollary to this is that selection will at the same time favor increased discrimination on the part of the female in her choice of a mate in order to protect her investment. A poor choice by the female has much greater repercussions on her fitness than a similar poor choice by a male has on his fitness (Orians 1969).

A model explaining the evolution of polygynous mating systems based on the importance of female choice is presented by Orians (1969) based on the work of Verner (1964) and Verner and Willson (1966). The foundation of the model rests on the definition of the polygyny threshold (Verner and Willson 1966) as the point at which the difference in quality of two males' territories is great enough that a female could rear as many young alone or with limited male assistance in the better territory

* Present address: Department of Renewable Resources, Macdonald Campus of McGill University, Ste. Anne de Bellevue, Quebec, H0A 1C0 Canada.

Am. Nat. 1979. Vol. 113, pp. 201–208.

Chase-away Selection - Sensory Bias/Sensory Drive

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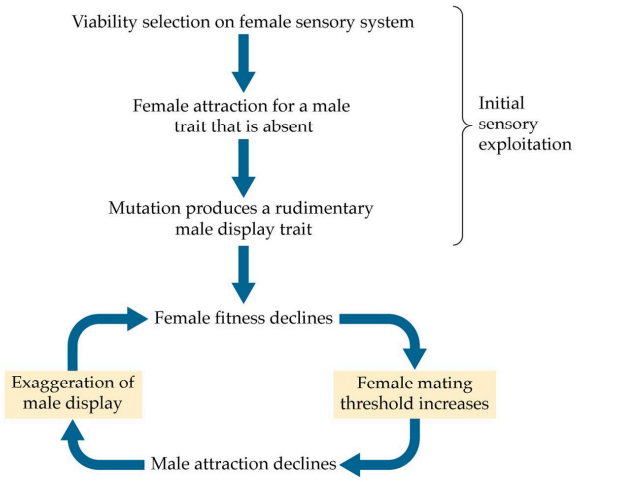
Chase-away Selection - Sensory Bias/Sensory Drive



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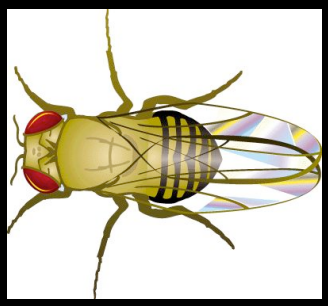
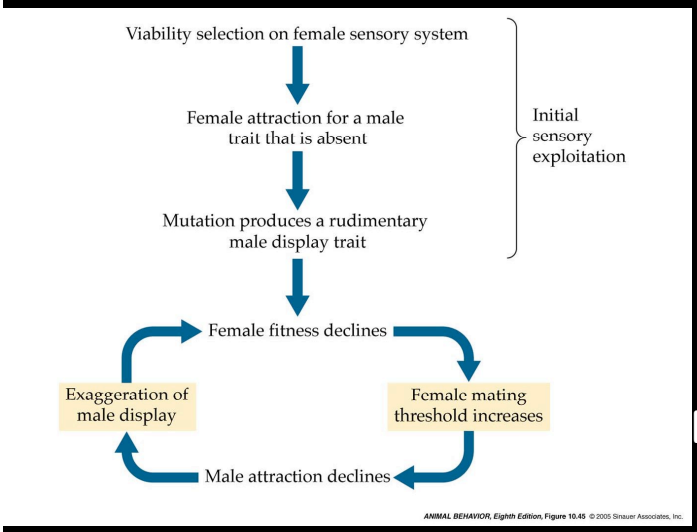
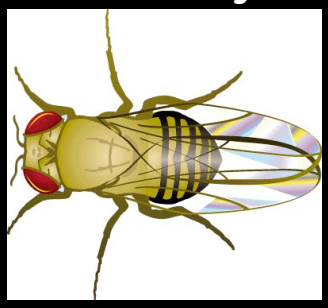


Chase-away Selection - Sensory Bias/Sensory Drive

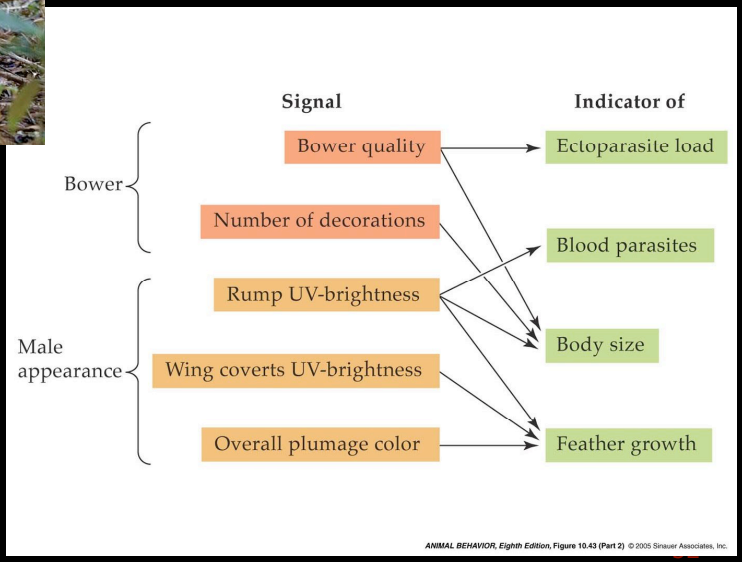




Female fruit flies prefer larger males

Drosophila sperm is toxic to females, larger males do more harm, but the female has a pre-existing preference for larger males

Many of these may operate simultaneously..



Thursday - Intra-Male Competition - Take Home Assignment - define *lek*

http://www.nhptv.org/Natureworks/bighornsheep.htm
http://www.springhillphoto.co.uk/images/