HEB 1330: Primate Social Behavior

September 22^{h} 2020
Male competition

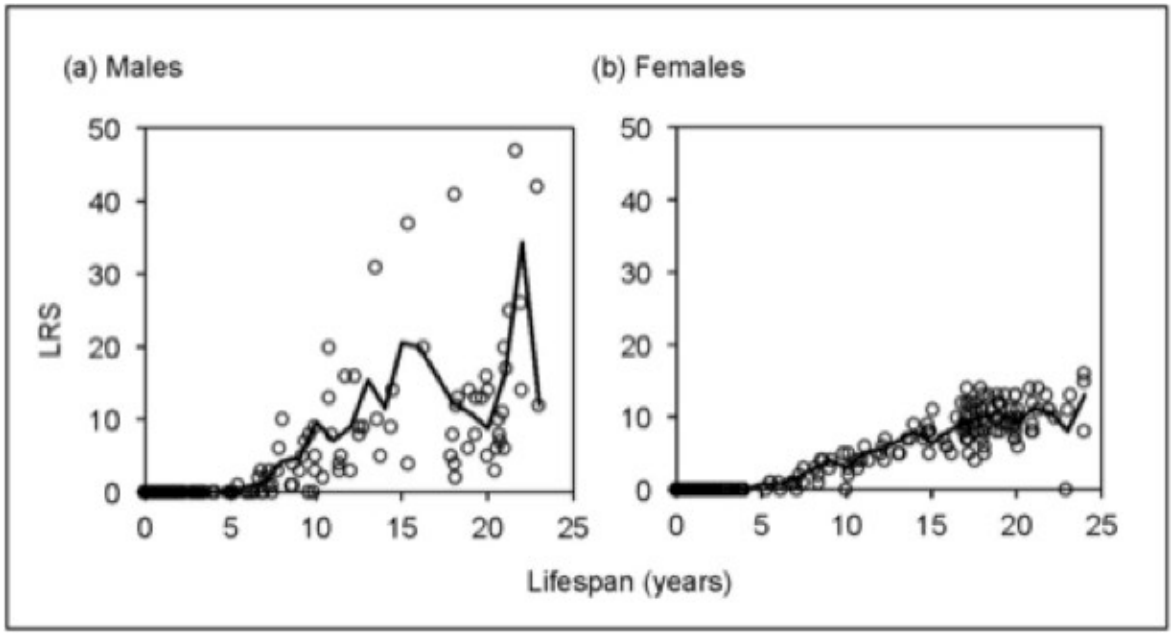
Quiz 2

1) What is special about the life history of primates? How does it differ based on expectations about body size? *(2 points)*

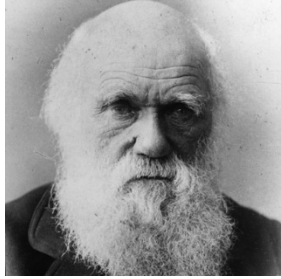
2) a) Which mating systems do you expect to result in larger than expected (based on body size) testes size? Why? *(3 points)*

b) What mating system(s) might lead to strong sexual dimorphism in a species? *(3 points)*

3) This graph shows the lifetime reproductive success and the age of death of male and female macaques at the Cayo Santiago Research Station. What are the two most important differences between patterns of male and female reproductive success? *(2 points)*



Darwin's Theory of Sexual Selection



Variation in reproductive success due to access to other sex

Intrasexual selection

competition of individuals within a sex for access to the other sex

eg. male-male competition

Intersexual selection

differential preferences that one sex has of members of the other sex

eg. female choice…sexual coercion

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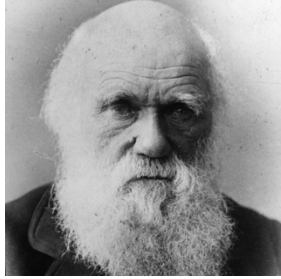

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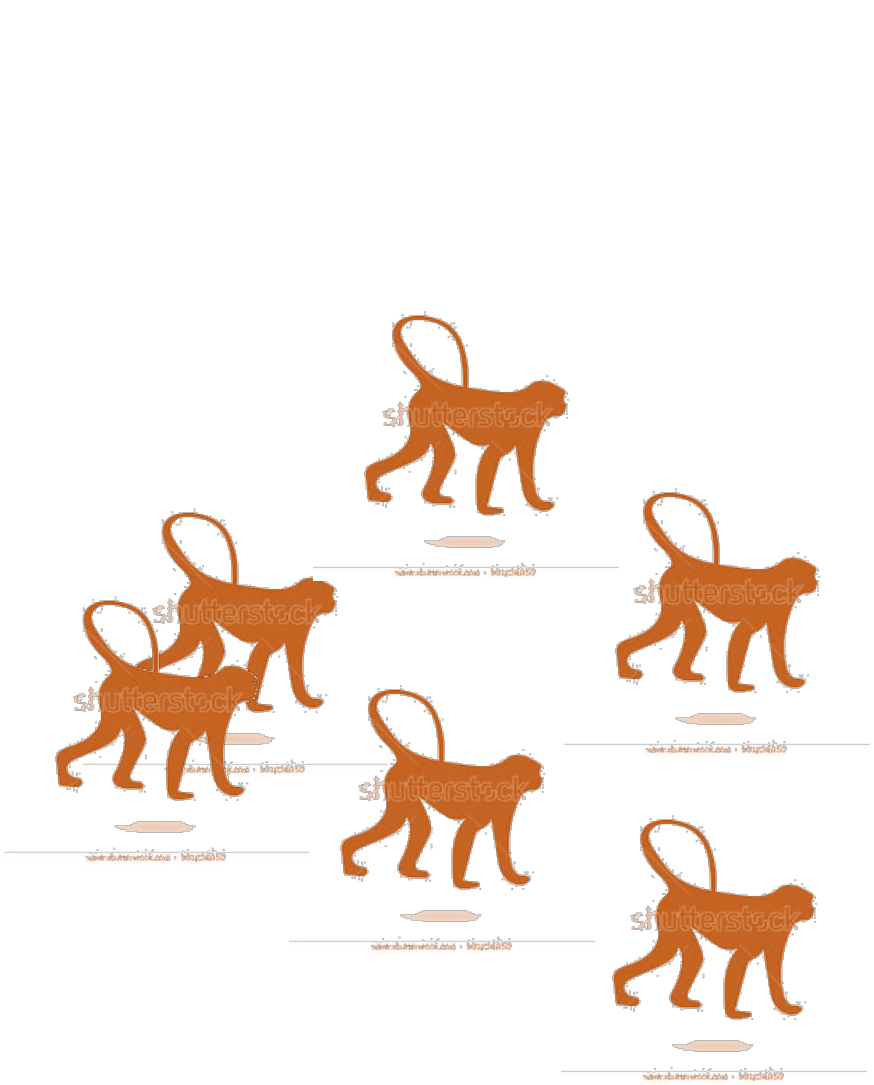
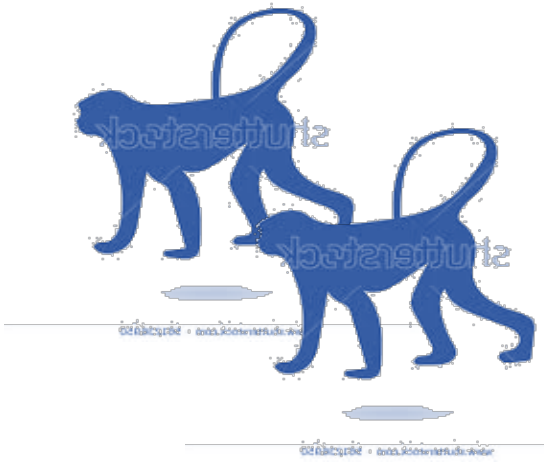
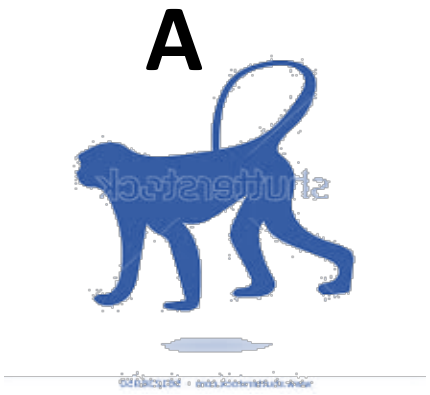
Overview

1) Why do males tolerate other males in group
2) Male dominance and reproductive success
3) The Challenge hypothesis
4) Coalitions

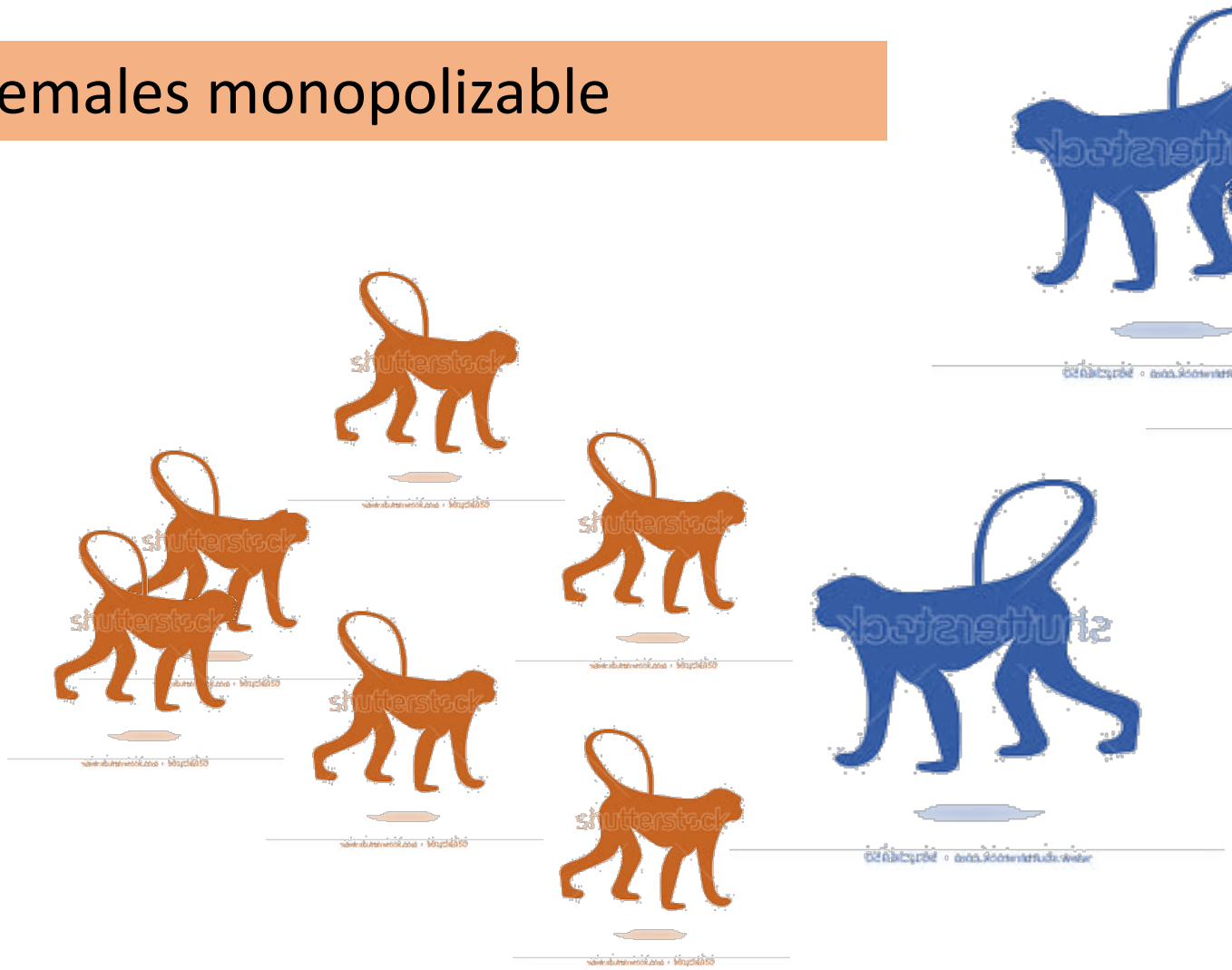
What influences whether male A can monopolize reproduction with orange females?



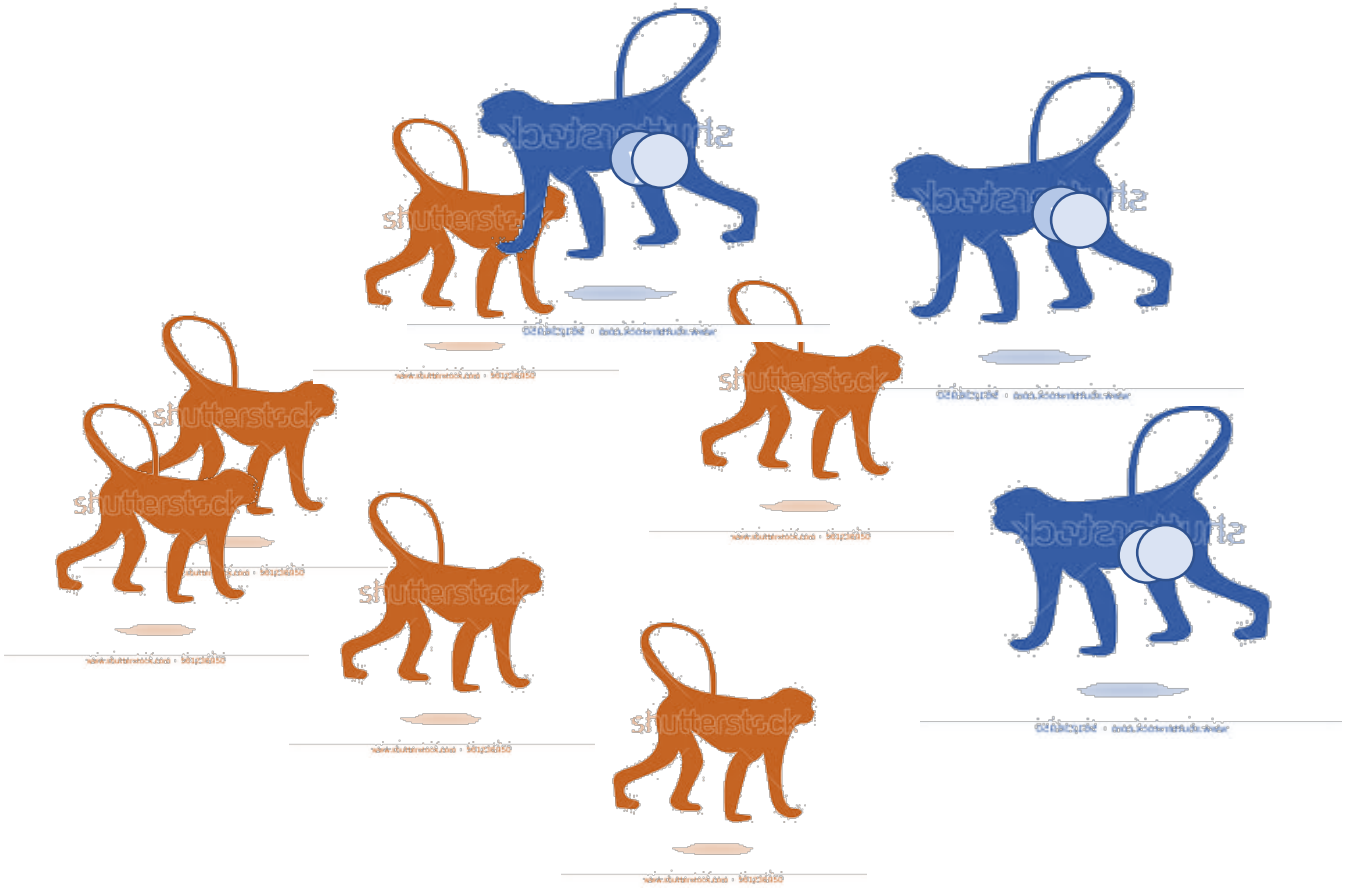




Females monopolizable

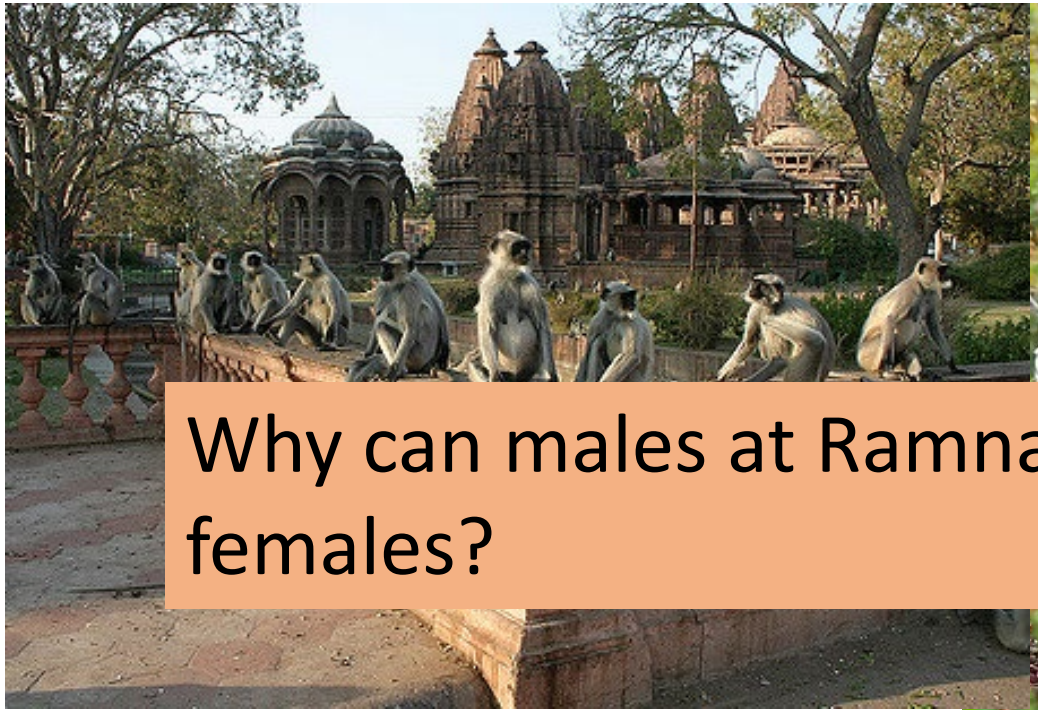


Females not monopolizable



	Jodpur	Ramnagar
	Semi-desert but provisioning	Hill forest
number females	5-73	1-15
birth months/year	12	3-5
birth interval	1.4 y	2.4 y
multi-male groups	0%	72% ?
menstruation	visible	not visible

Schuelke et al (2006), Sommer et al. 1994, Borries et al. 2004



Why can males at Ramnagar not monopolize females?

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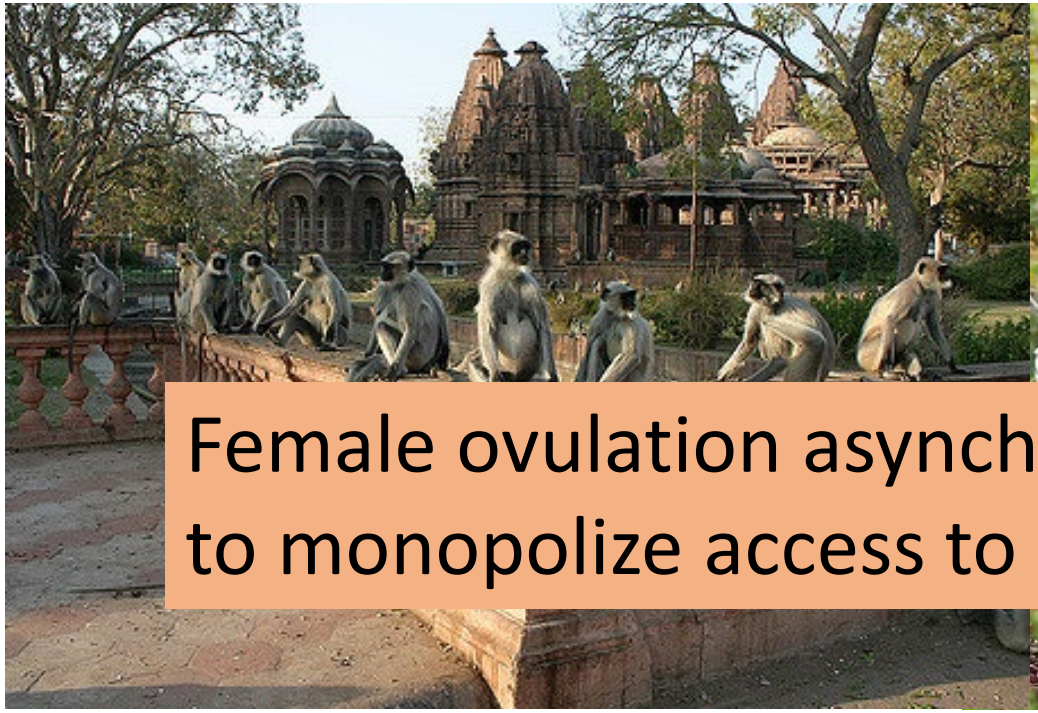

Female ovulation asynchrony can help males to monopolize access to them

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Seasonal breeders

Problem if all females ovulate at the same time!!

→influx males/sperm competition/mate choice

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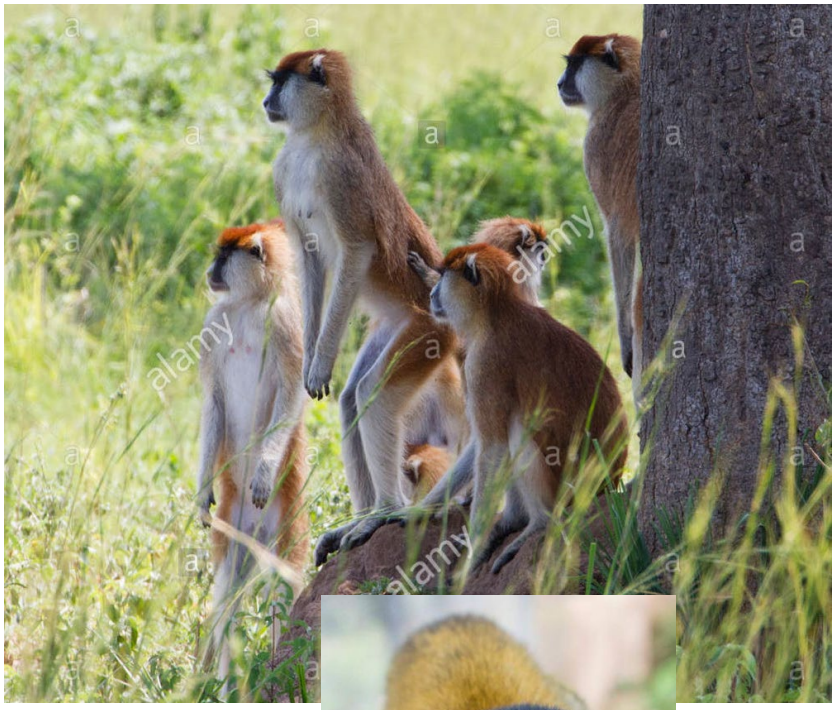
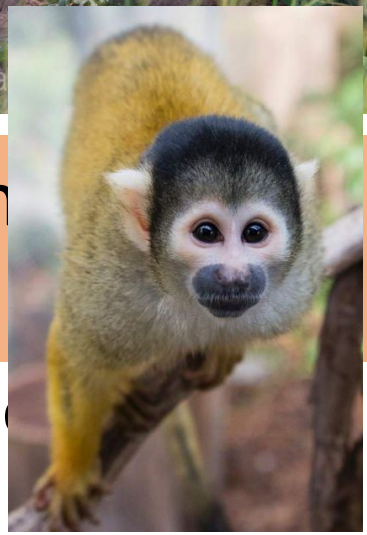
Get ready!!

Seasonal breeders





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→influx males/sperm competition/mat

Get ready!!

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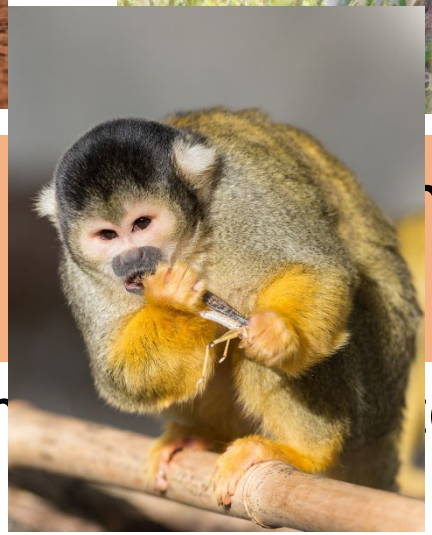

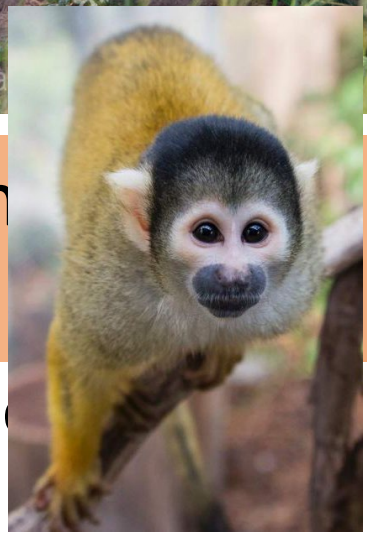

Problem if all females
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Get ready!!

Why accept other males?

limited control model

alpha male is unable to exclude other males

concession model

alpha tolerates other male and shares mating

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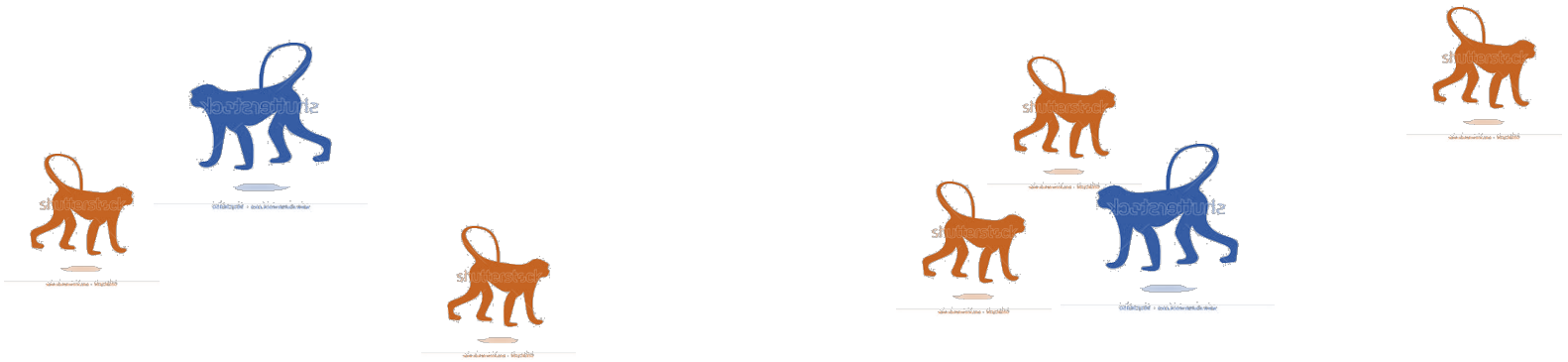
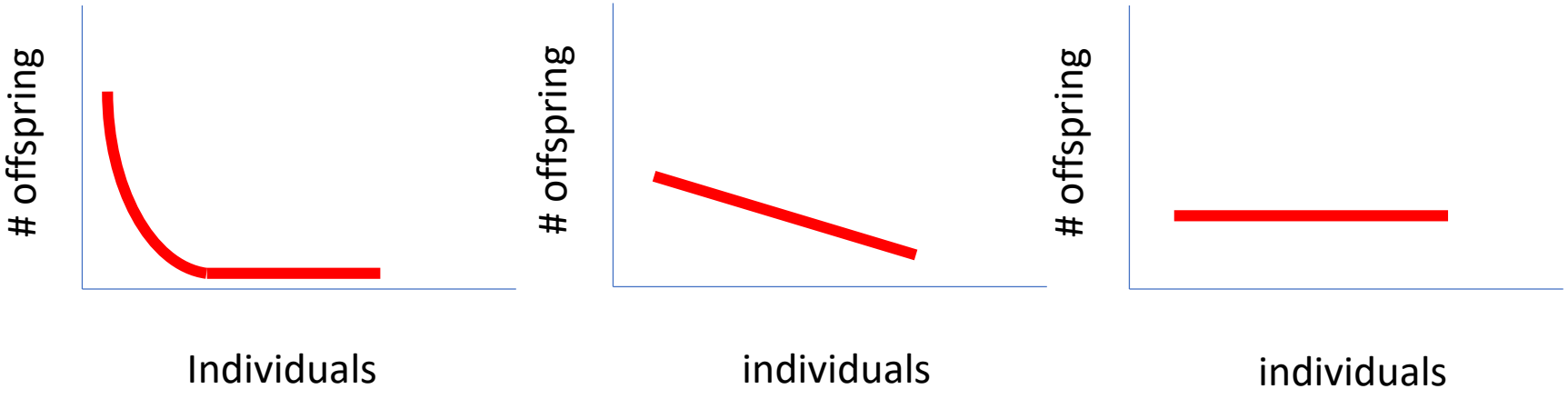


How to measure sharing of reproduction

Reproductive skew: disparity in the amount of reproduction each individual receives



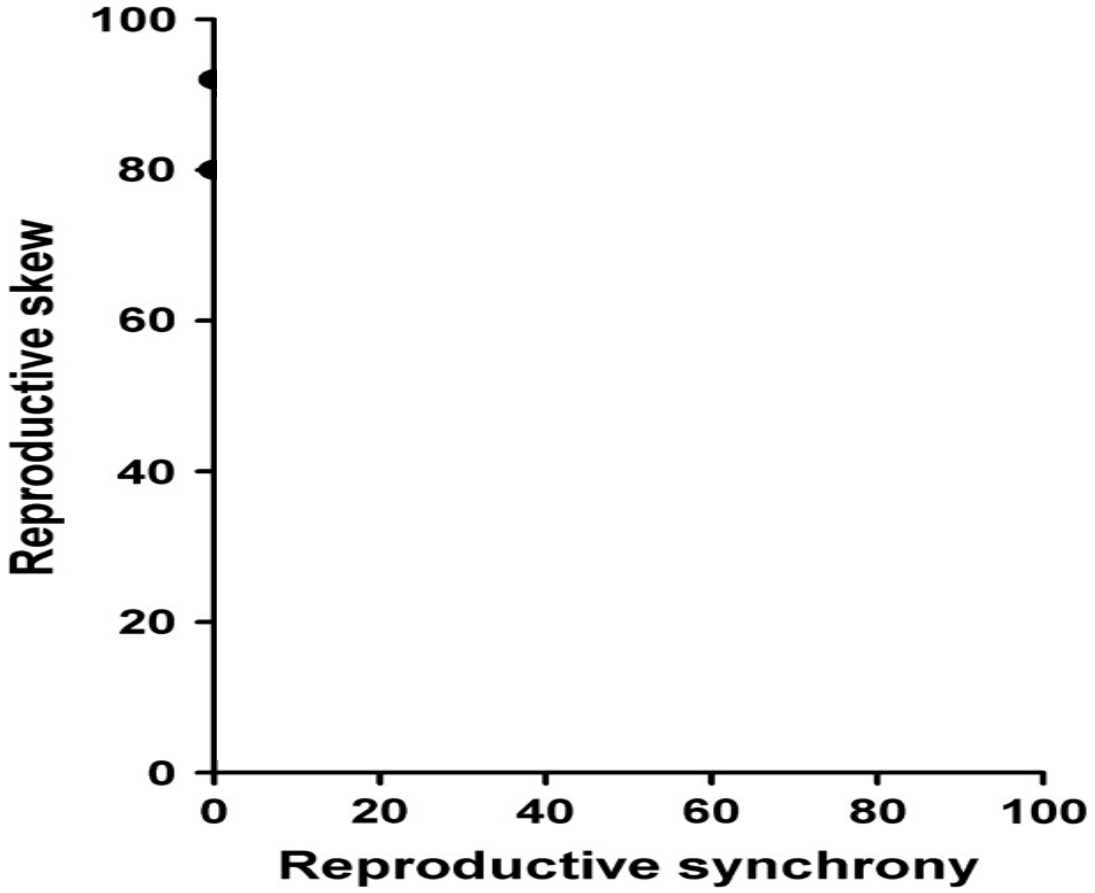
Large skew

Moderate skew

No skew

Why accept other males?

What pattern would you expect if males do NOT have control over how many males are in the group and reproduce?



(Ostner et al 2012)

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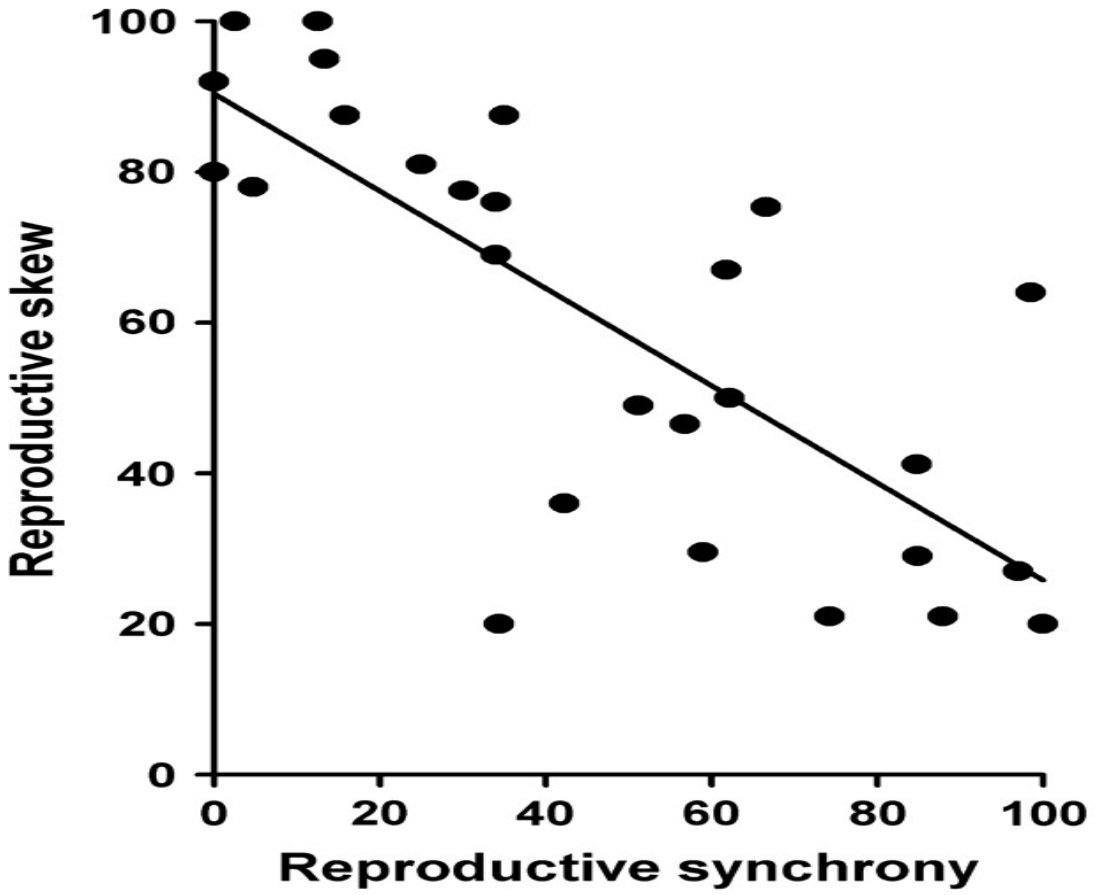

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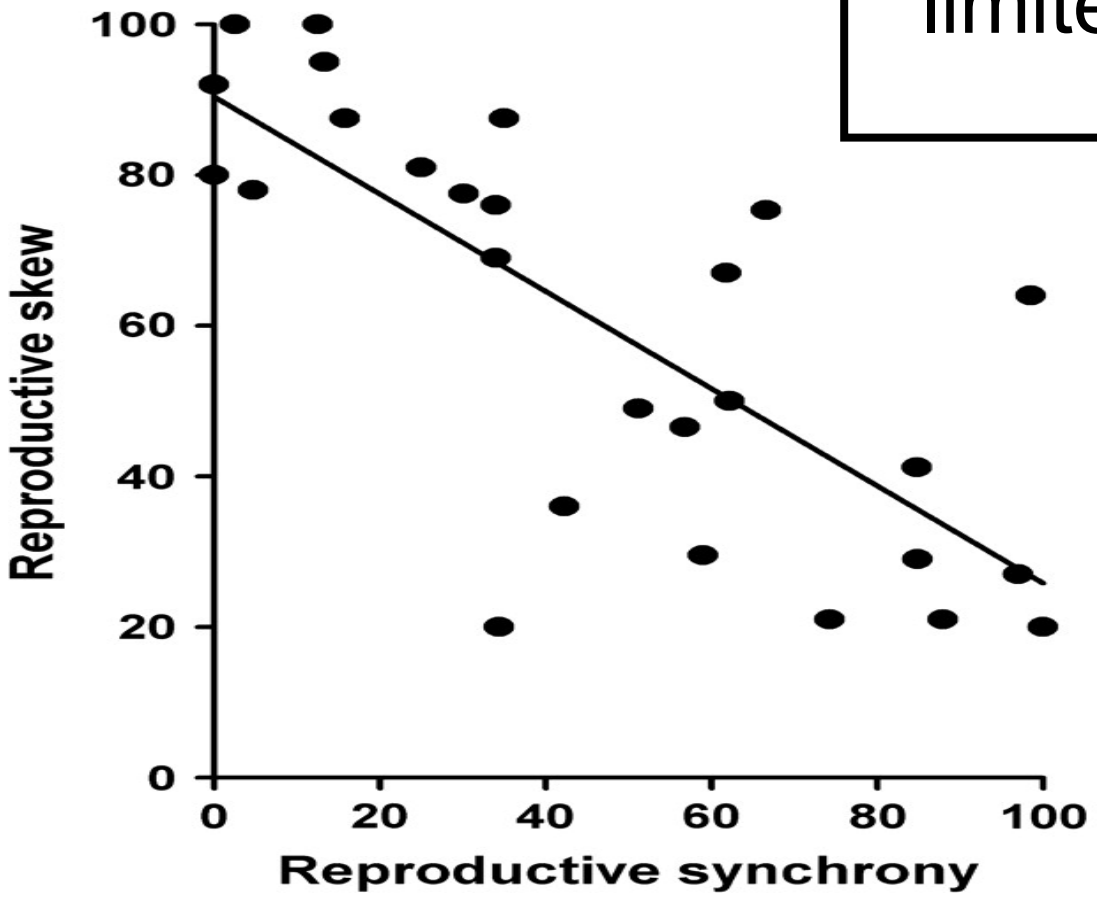

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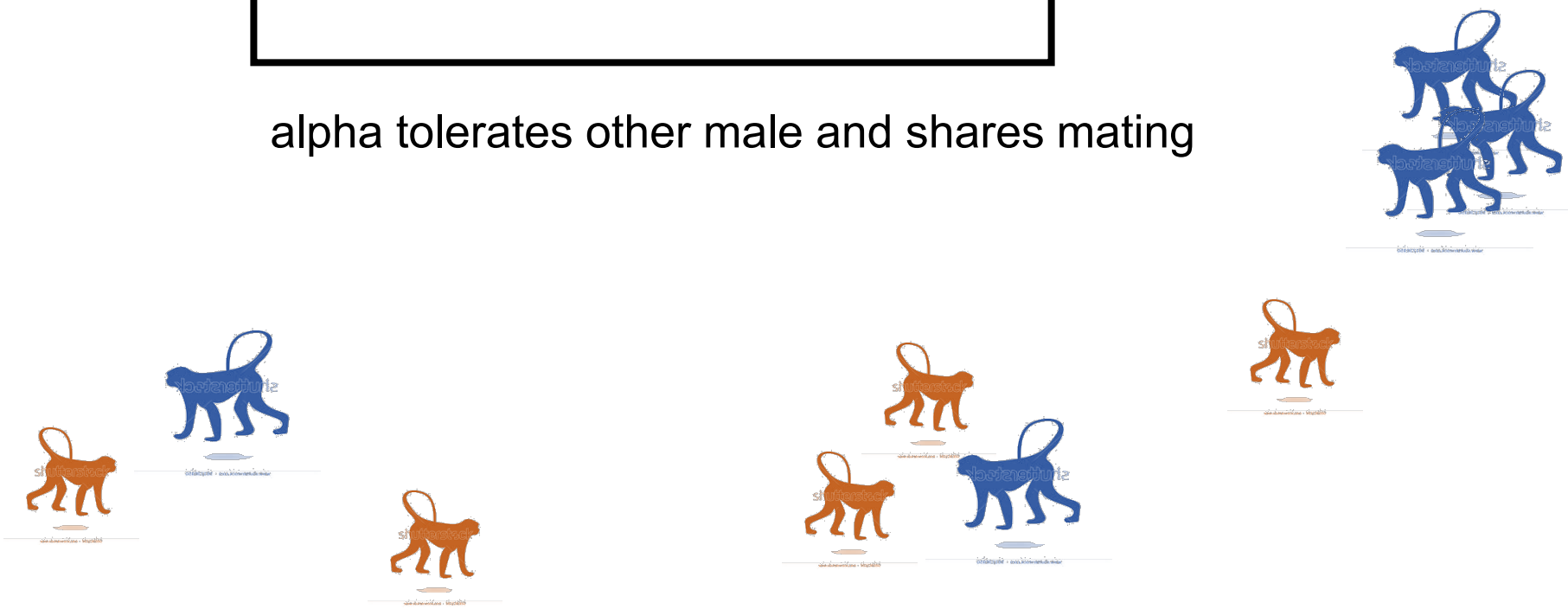
Why accept other males?

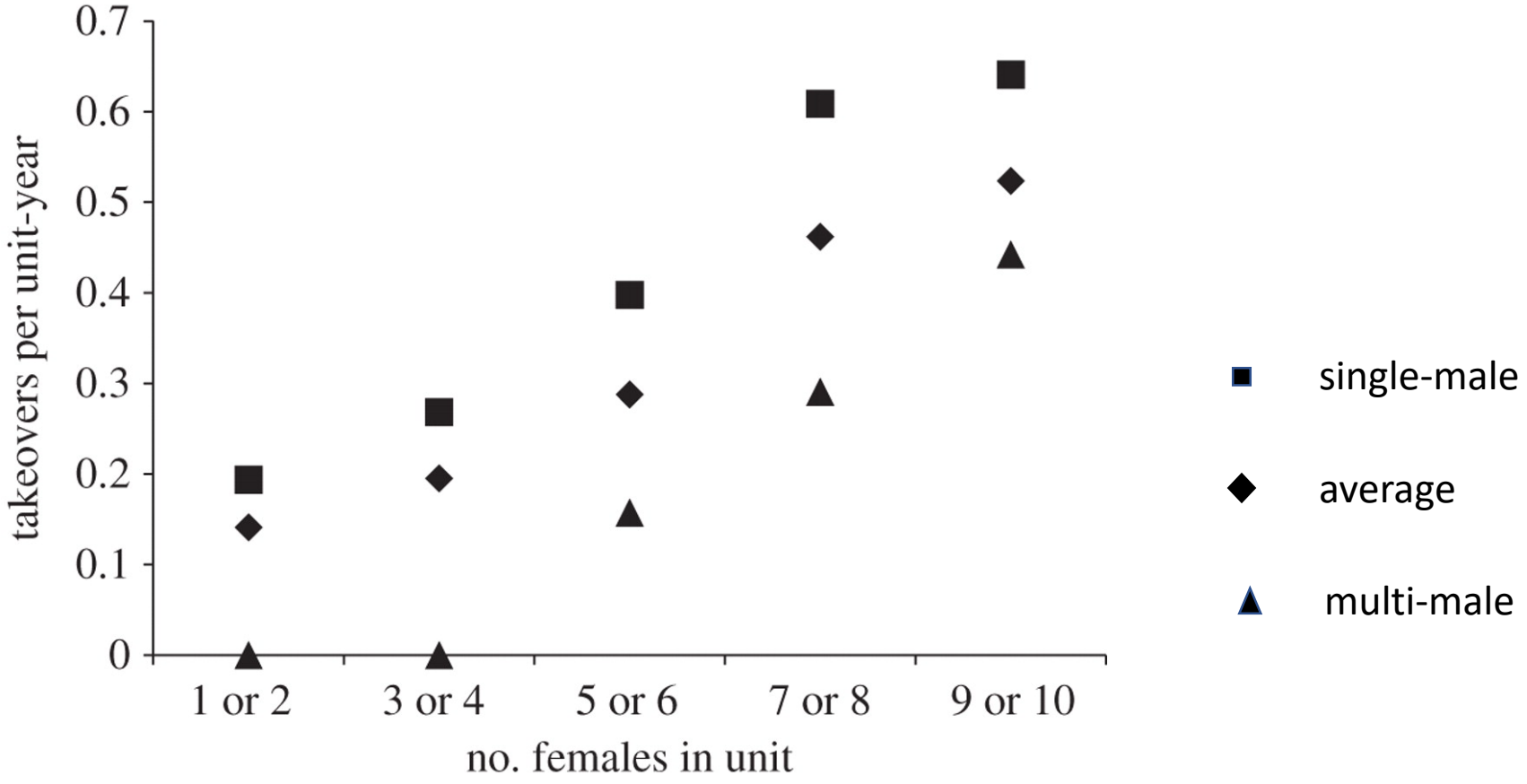
concession model

alpha tolerates other male and shares mating



Why tolerate other males?

Please explain the graph



(Snyder-Mackler et al 2012)

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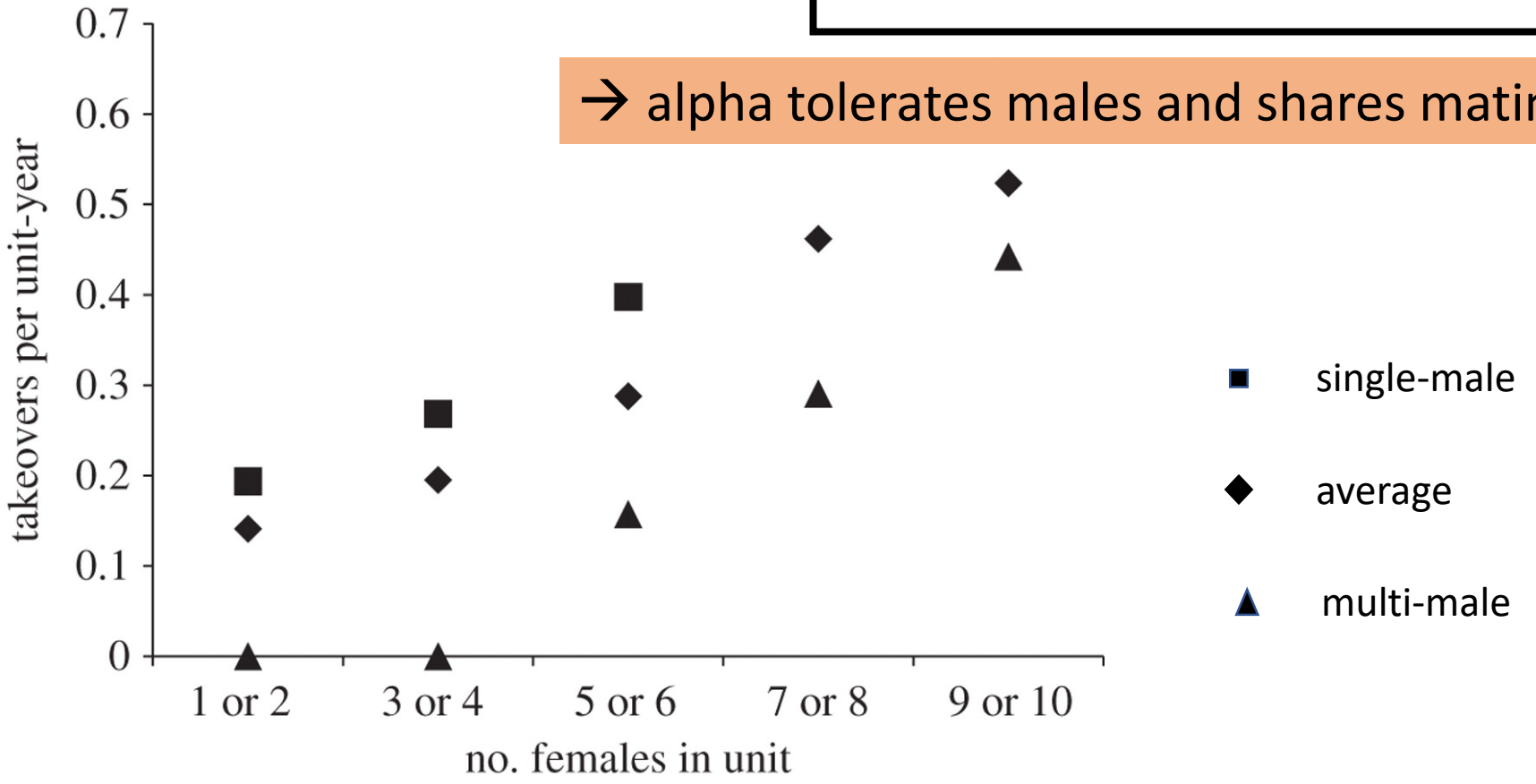
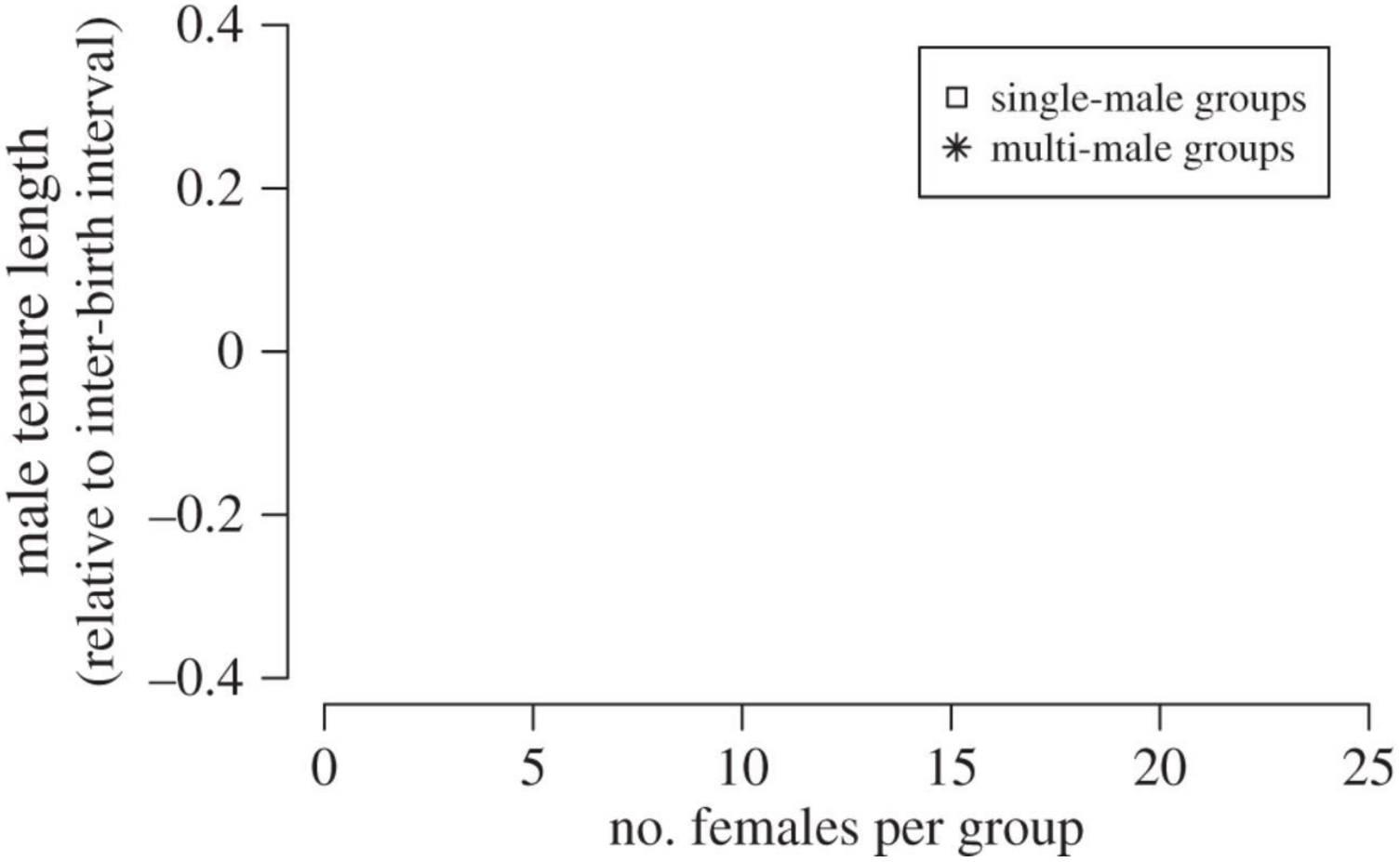


(Snyder-Mackler et al 2012)

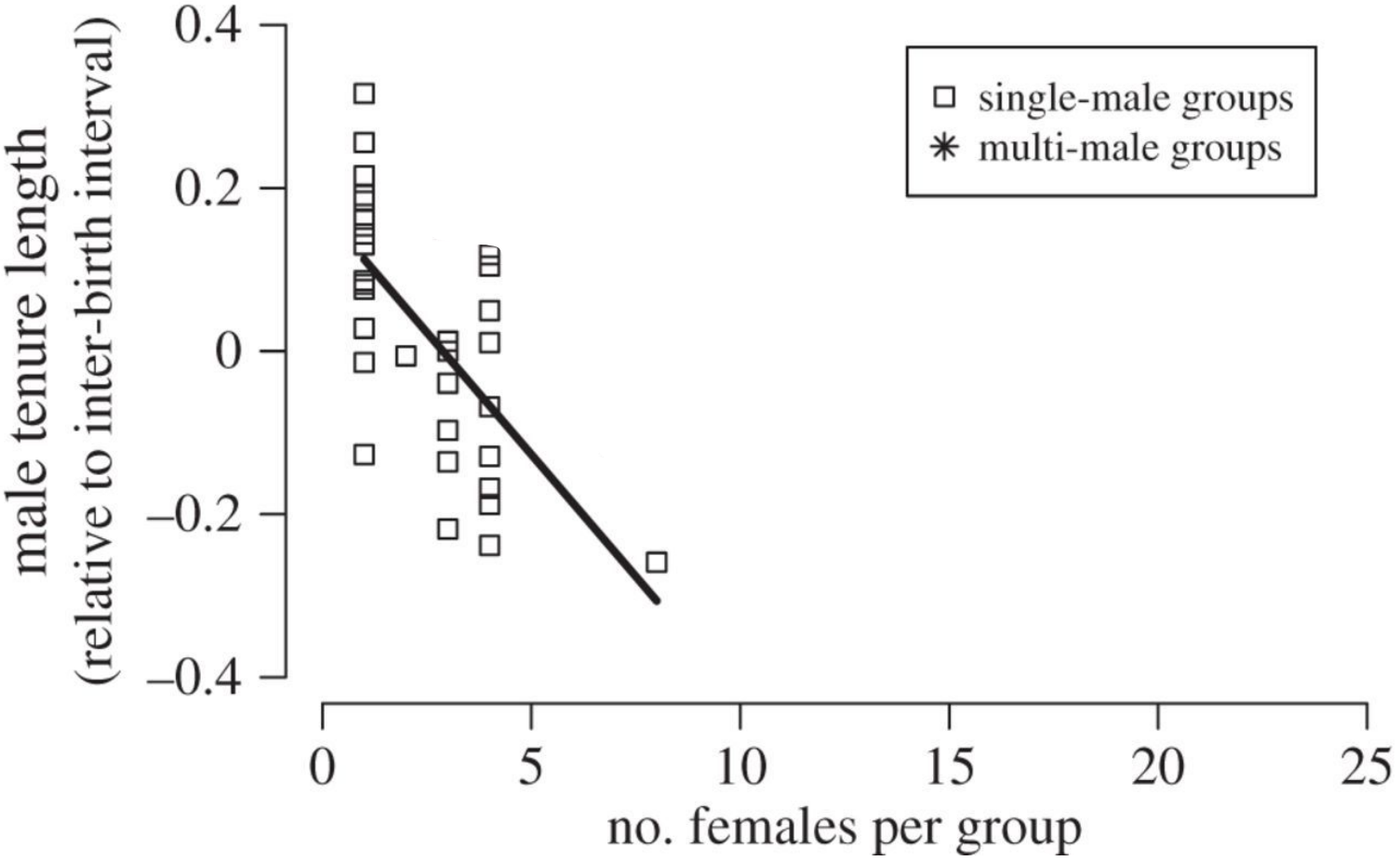
Relationship tenure and skew

What pattern do you expect based on your reading?



Lukas and Clutton Brock (2014)

Relationship tenure and skew



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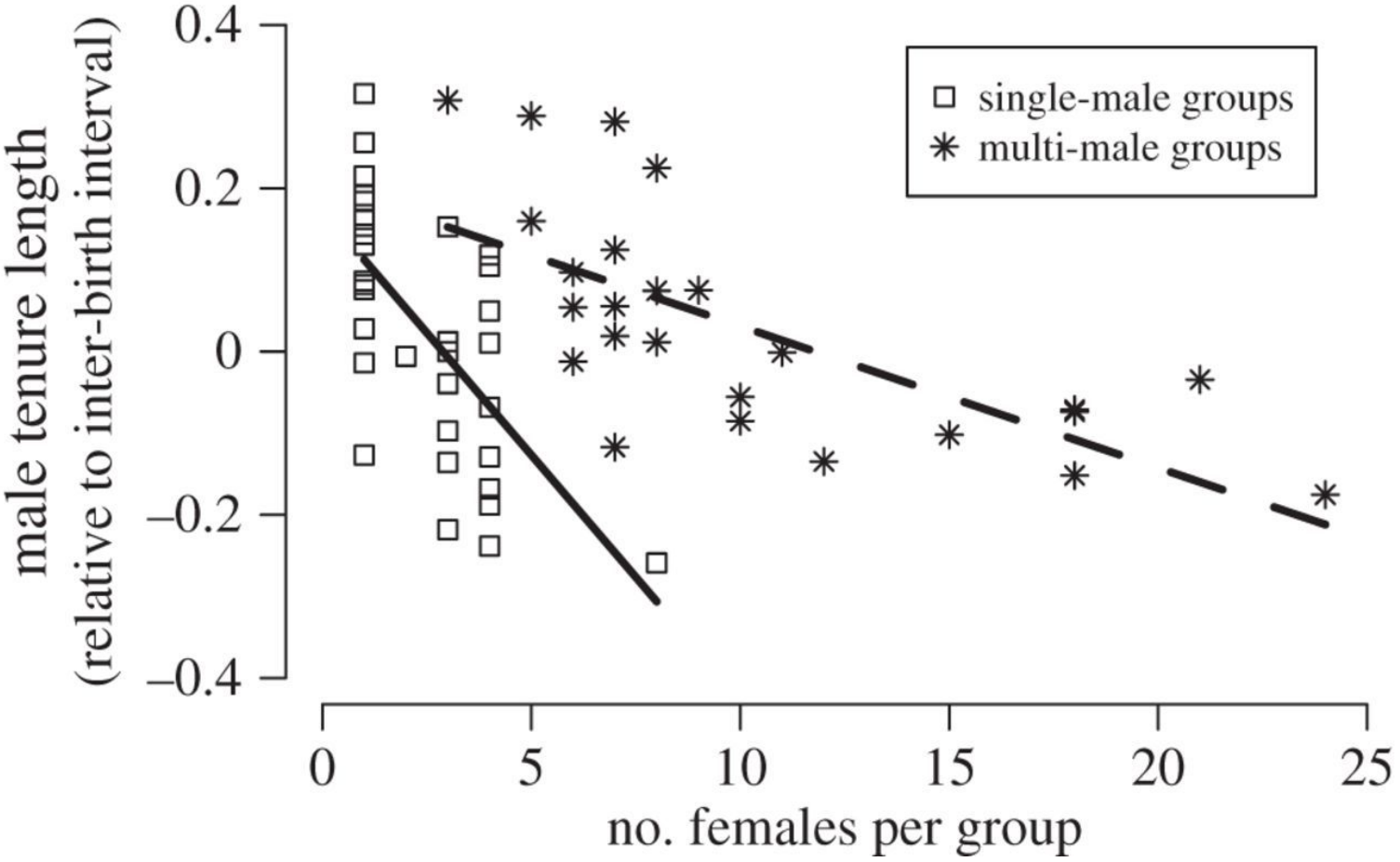

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Overview

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2)Male dominance and reproductive success

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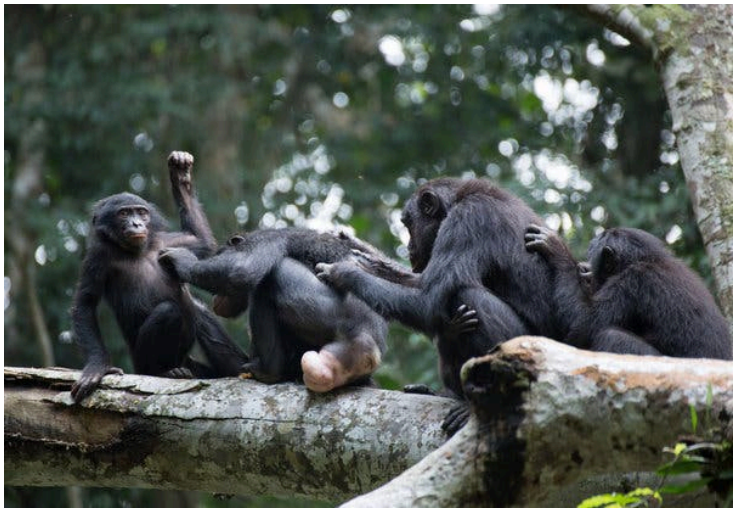
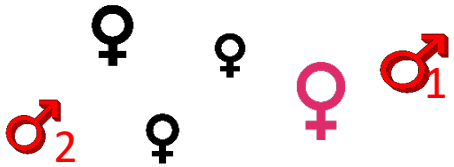
Priority of access



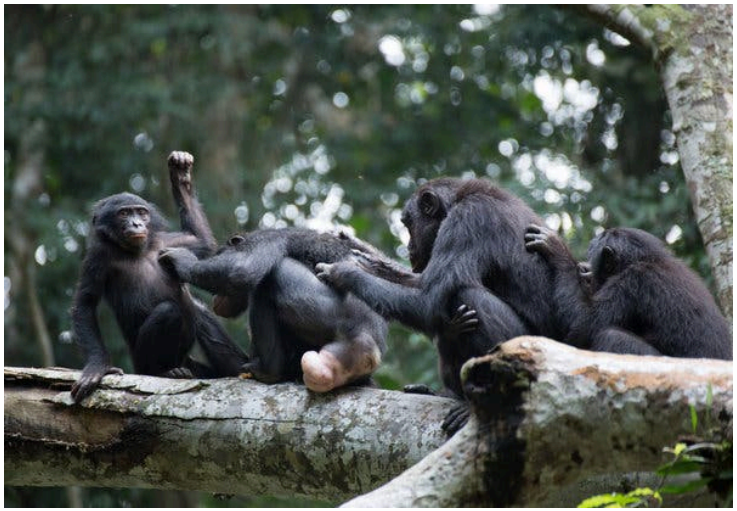
priority of access model:



100% paternity of offspring

(Altmann 1962)

Priority of access



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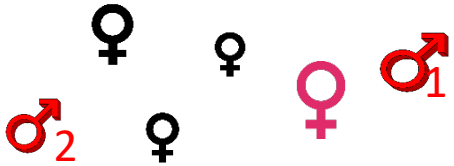
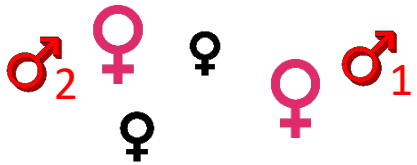


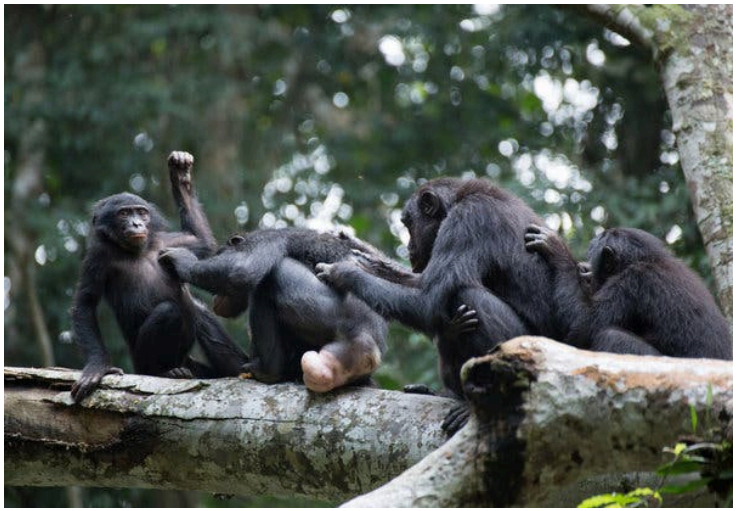


♂1 100% paternity of offspring

♂1 50% paternity of offspring

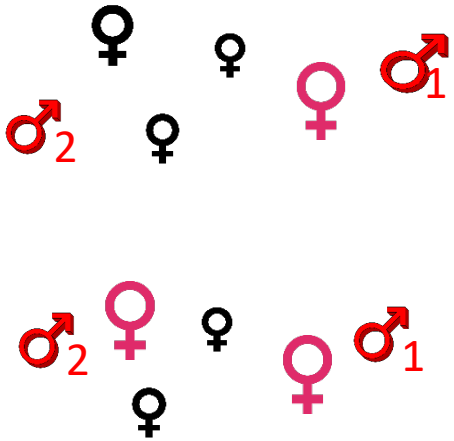
♂2 50% paternity of offspring

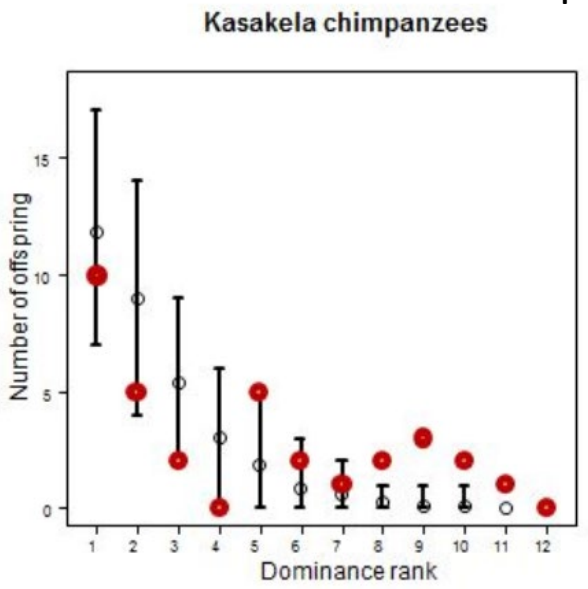
Priority of access



Chimpanzees

priority of access model:





(Surbeck et al 2017)

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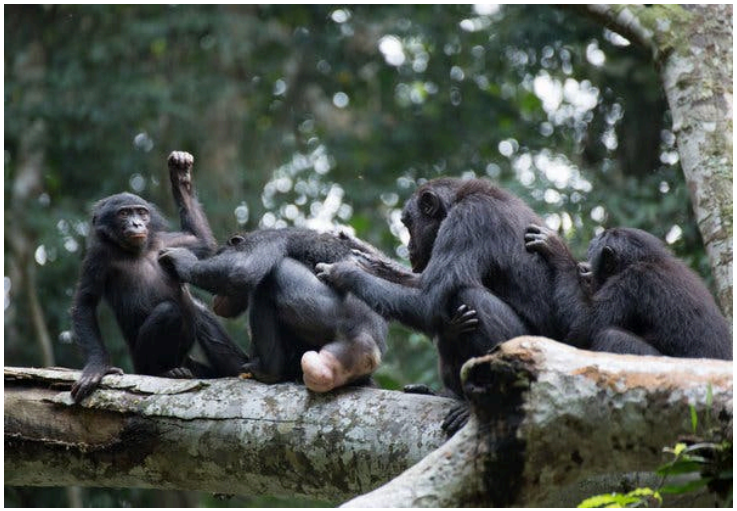
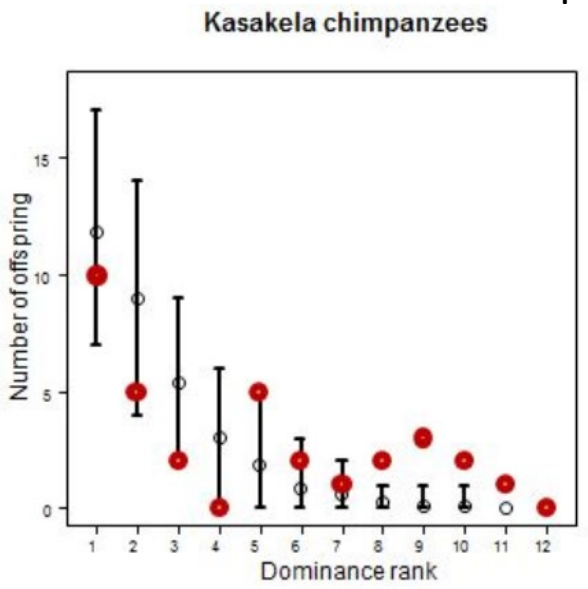


Chimpanzees



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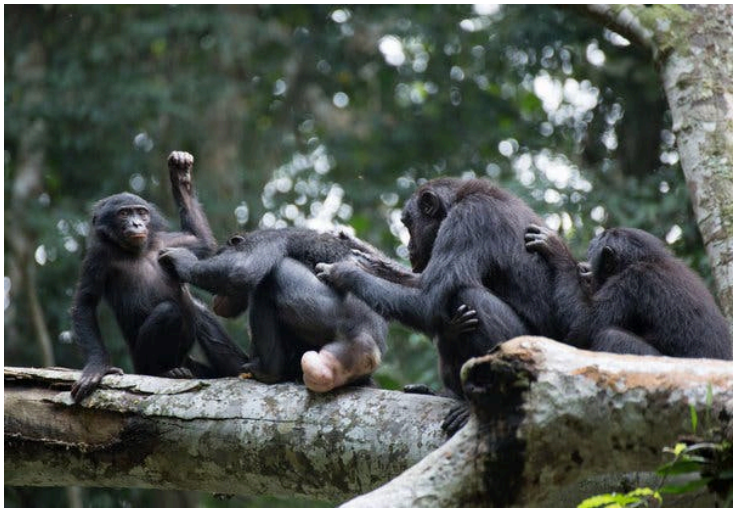
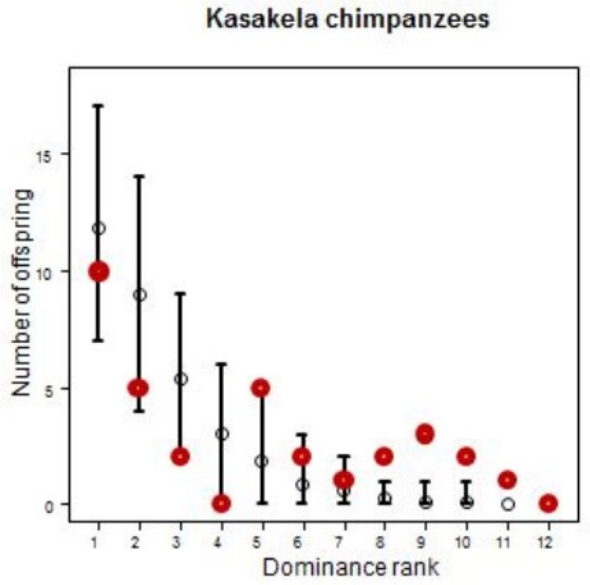


Bonobos

Chimpanzees

More female at same time in estrous



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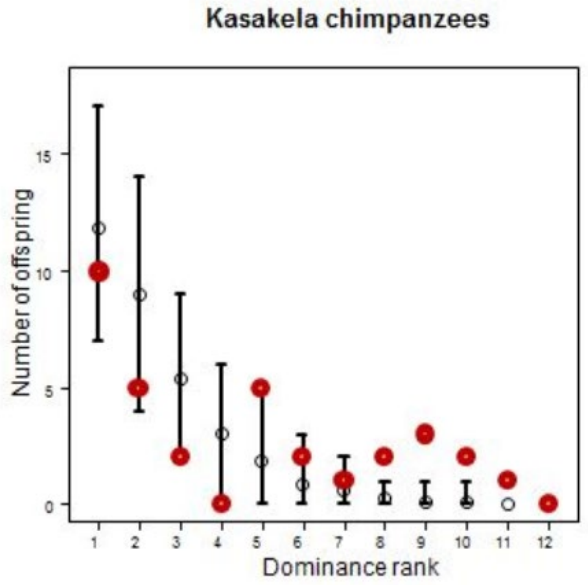
Priority of access

Bonobos

Chimpanzees

How would you expect the expected curve to change?

More female at same time in estrous



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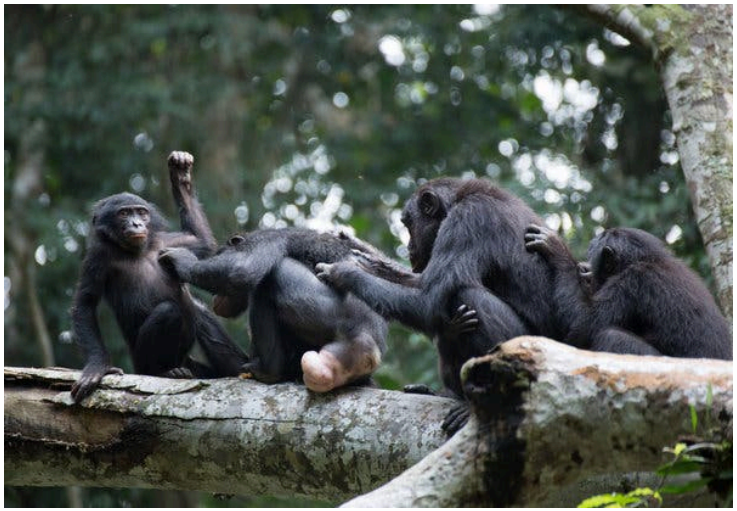

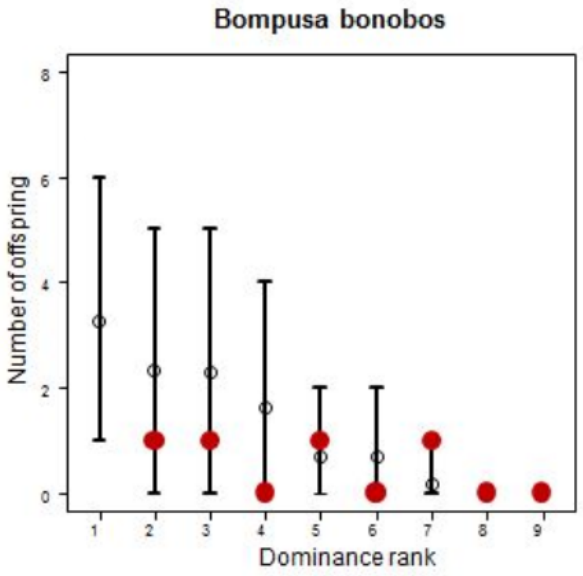

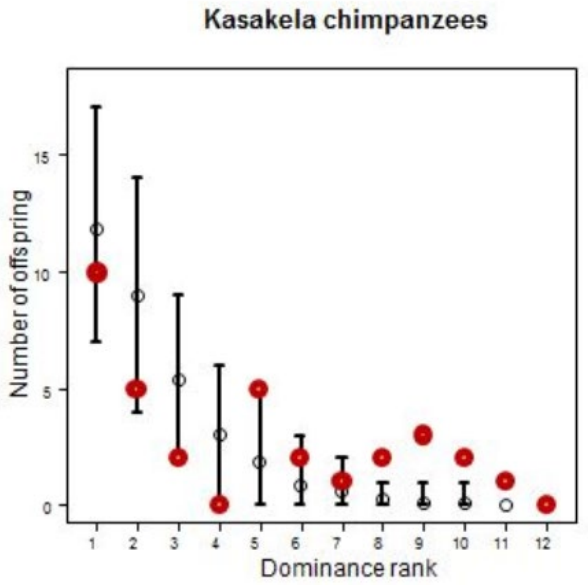

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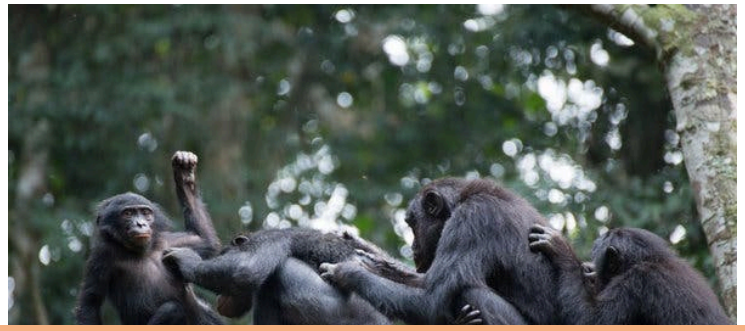
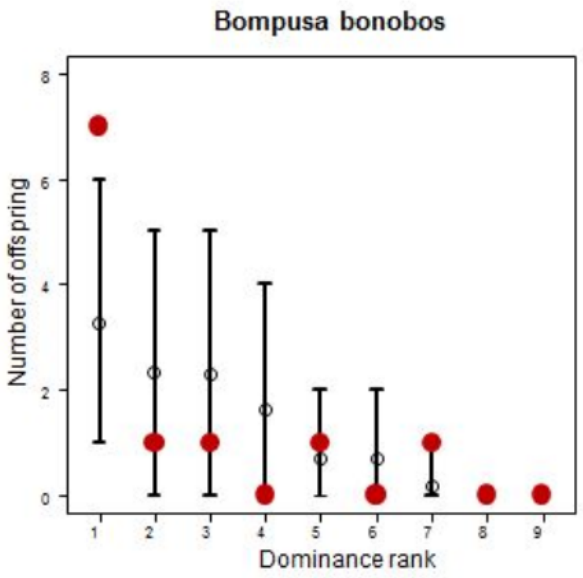
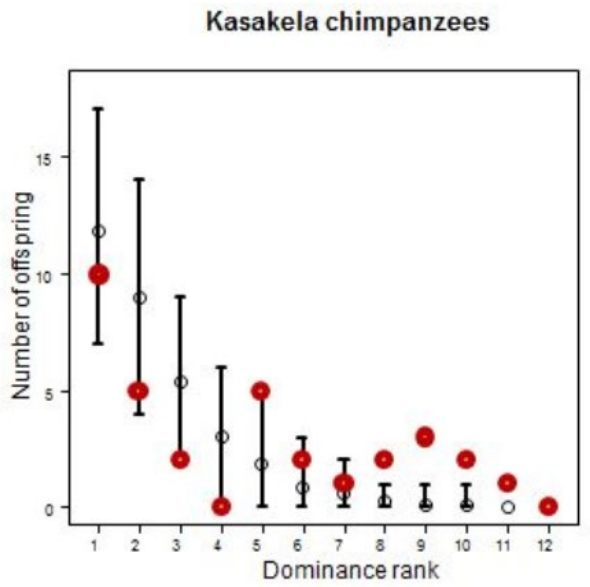


Why is bonobo alpha males more successful than expected by PoA?





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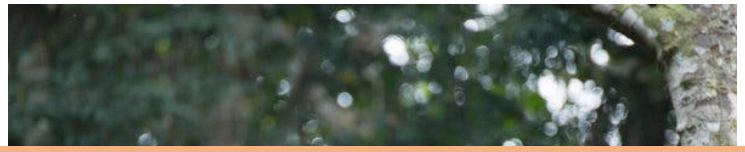
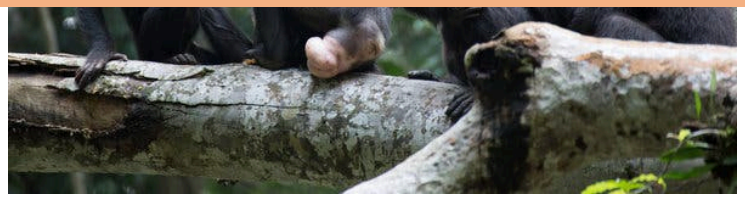
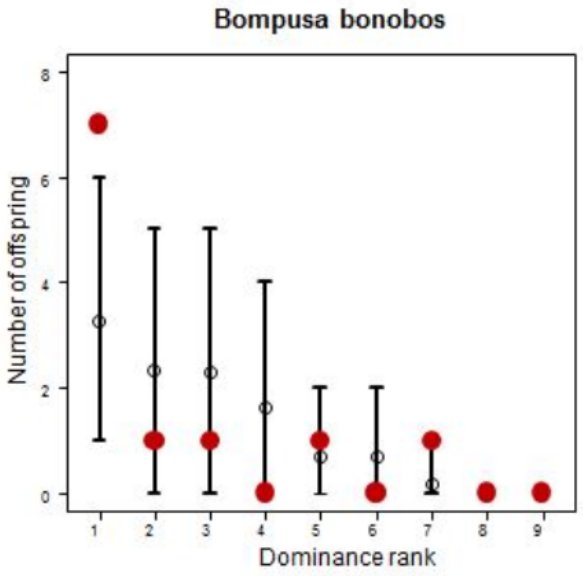
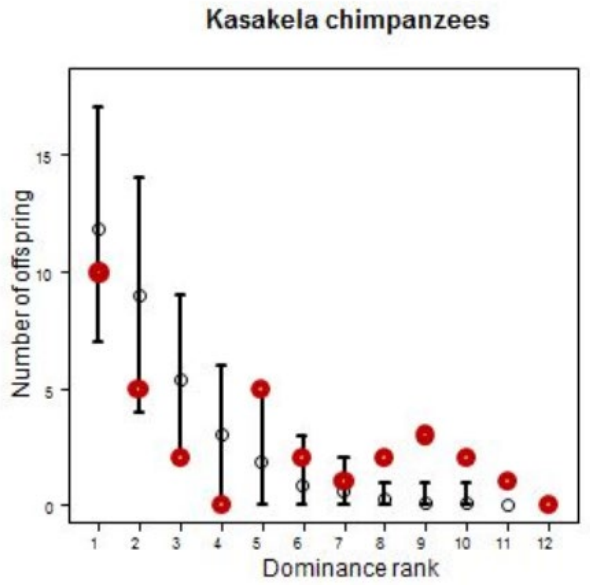



Deviation of PoA expectation due to:

- Female choice





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Overview

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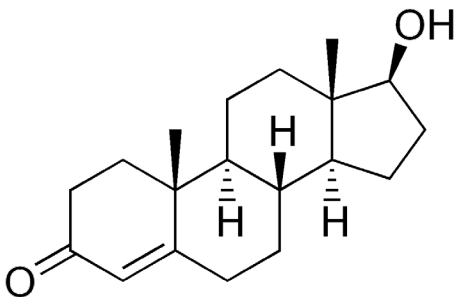
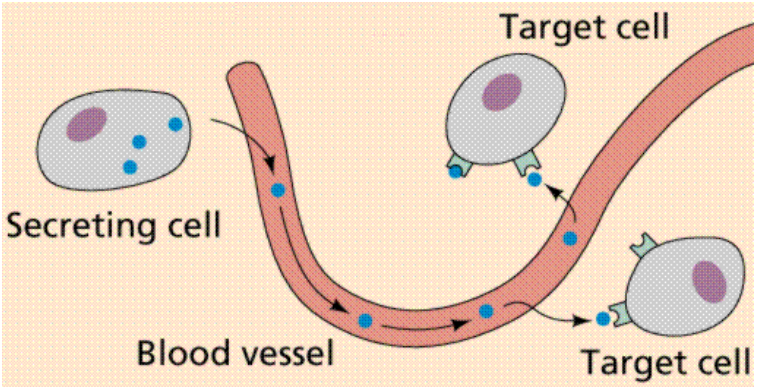
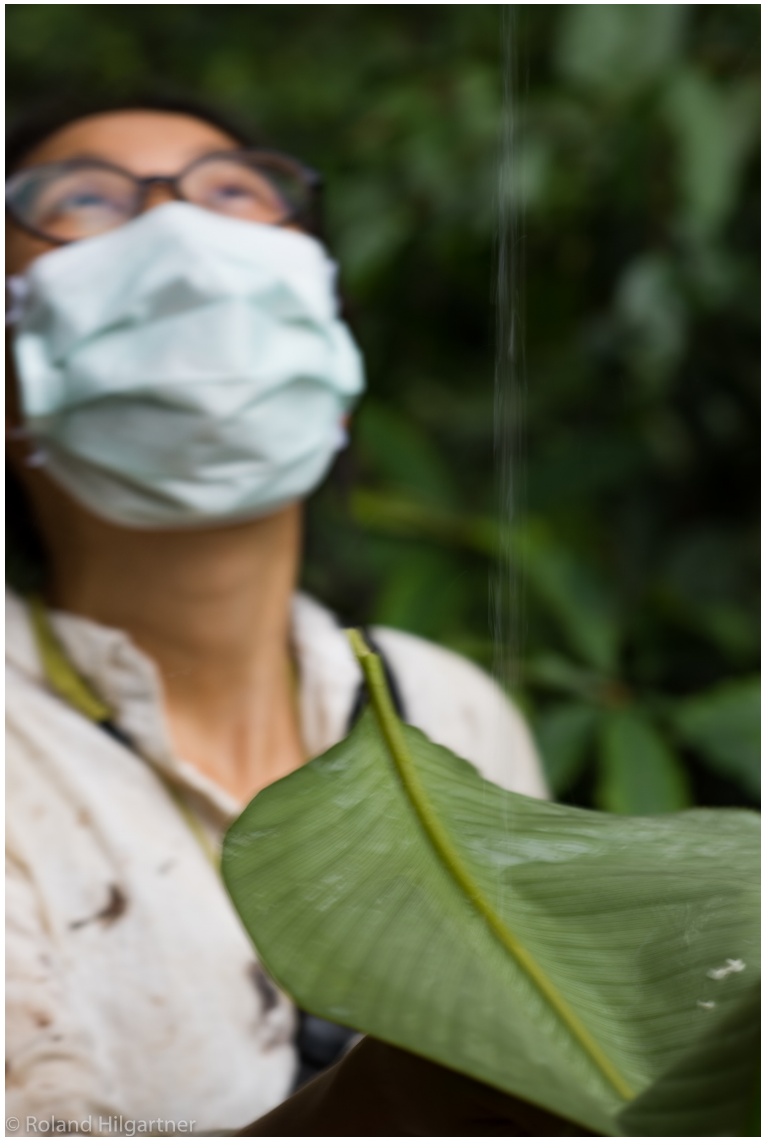
Hormones

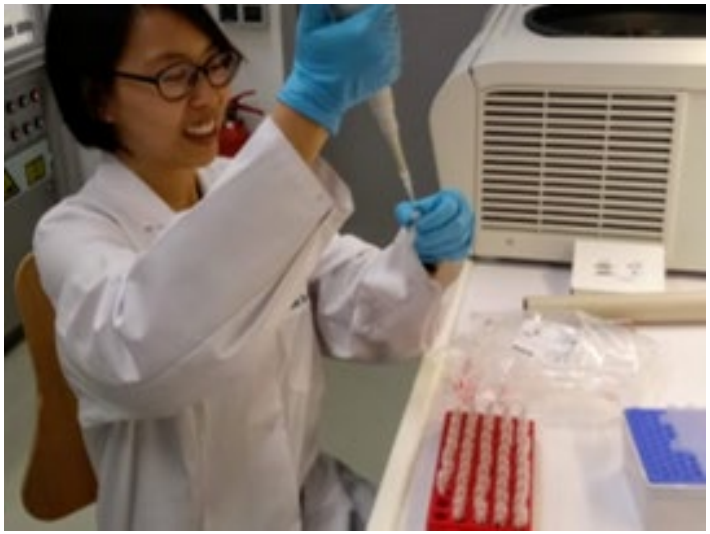




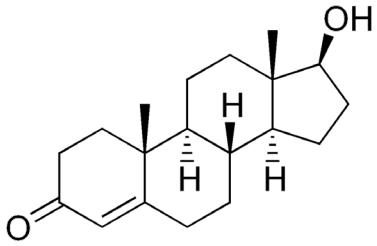
- Hormones are chemical messengers (protein or steroid)
- Activational vs. Organizational effects
- Secreted by organs of the endocrine system directly into the bloodstream
- Circulating levels in blood and saliva
- Excreted in urine and feces

Non-invasive sampling

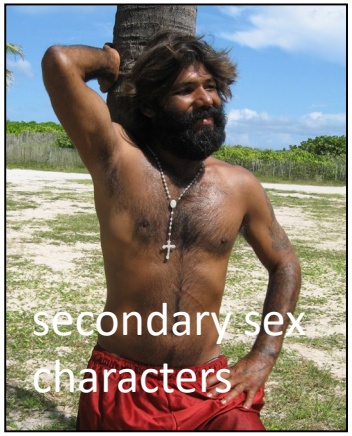


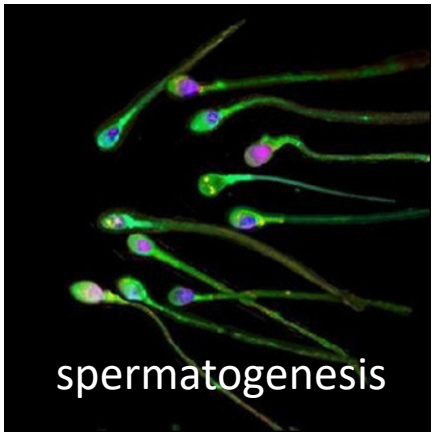


Testosterone

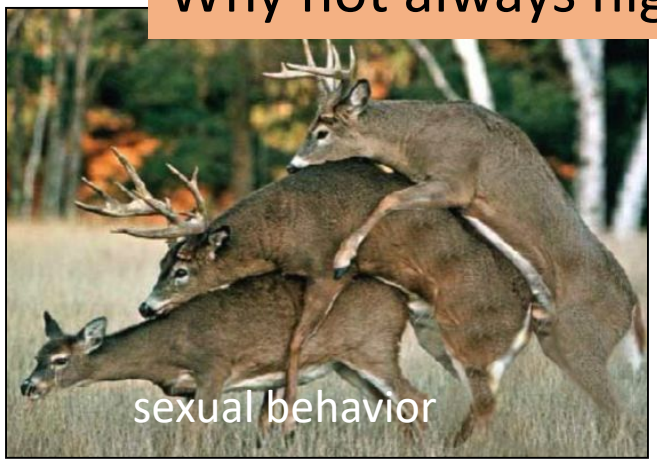


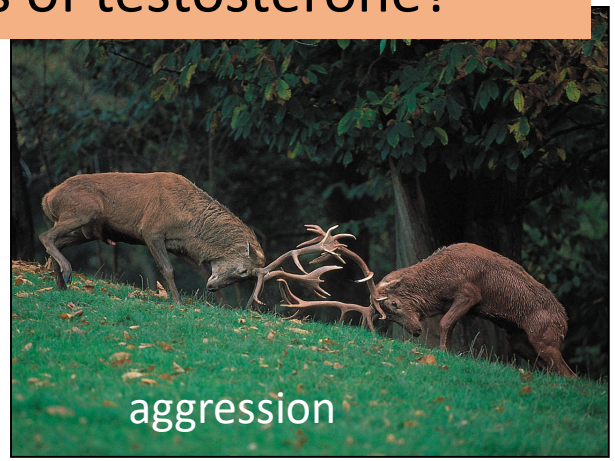
Morphological effects:



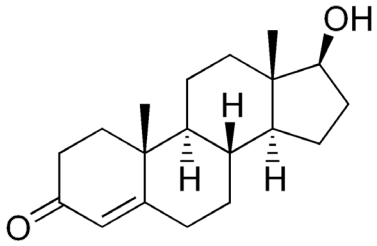


Why not always high levels of testosterone?

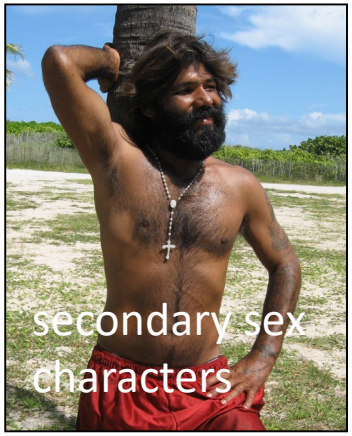


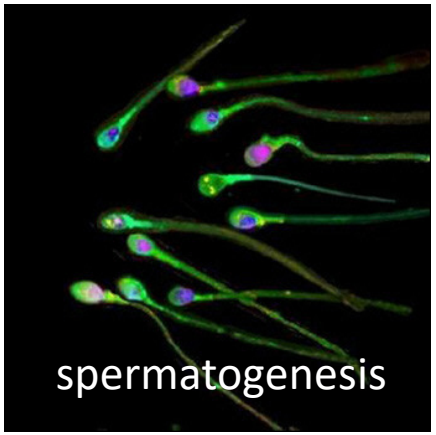


Testosterone

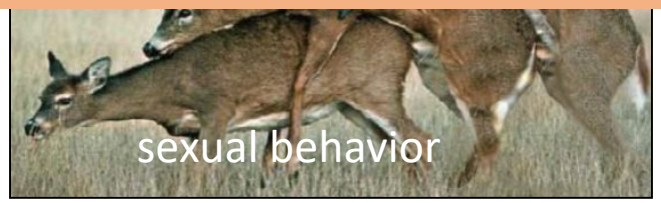


Morphological effects:



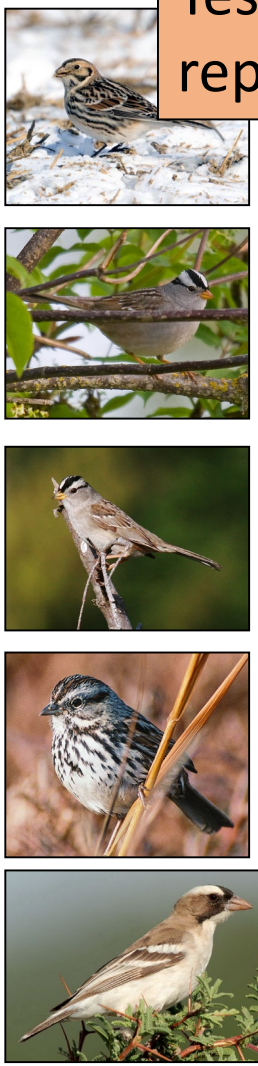


Cost: ↓fat storage
↑risk of injury
↓immunocompetence
↓ parental care



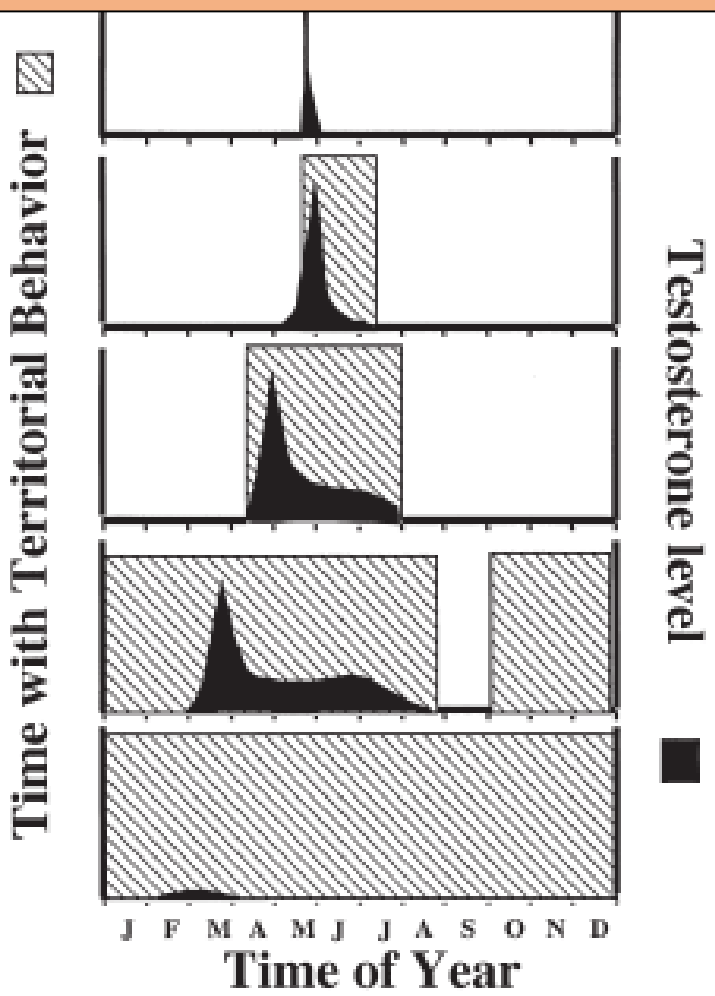
Challenge hypothesis

Testosterone is associated with aggression if it benefits reproductive success



arctic

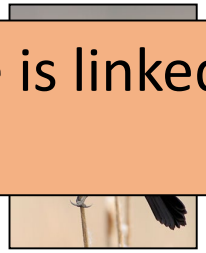
tropics



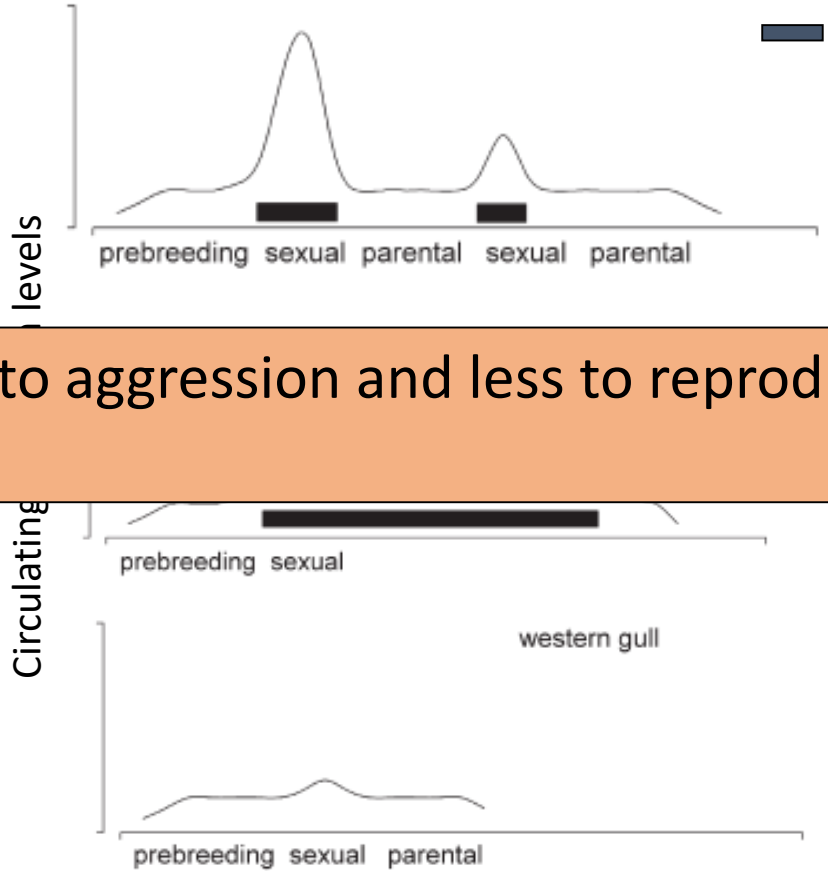
from Wingfield et al 2001

Challenge hypothesis

Short periods of ♂-♂ interactions



No ♂-♂ competition



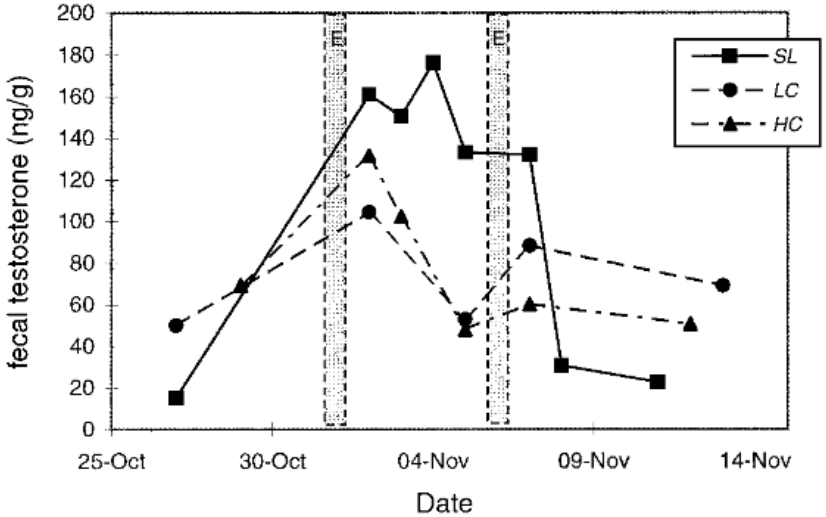
from Goymann et al 2007

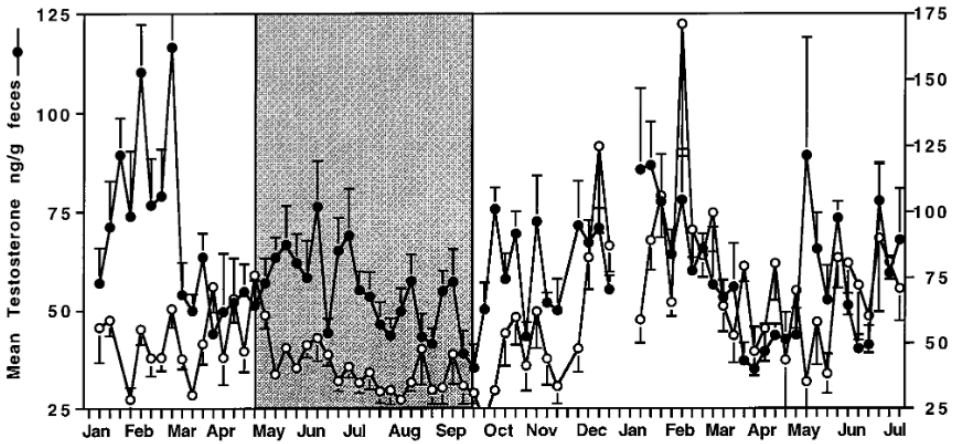
→ Testosterone is linked to aggression and less to reproductive physiology

→ Male-male aggression over **status** and **access to receptive females** that is associated with increased testosterone

Challenge hypothesis

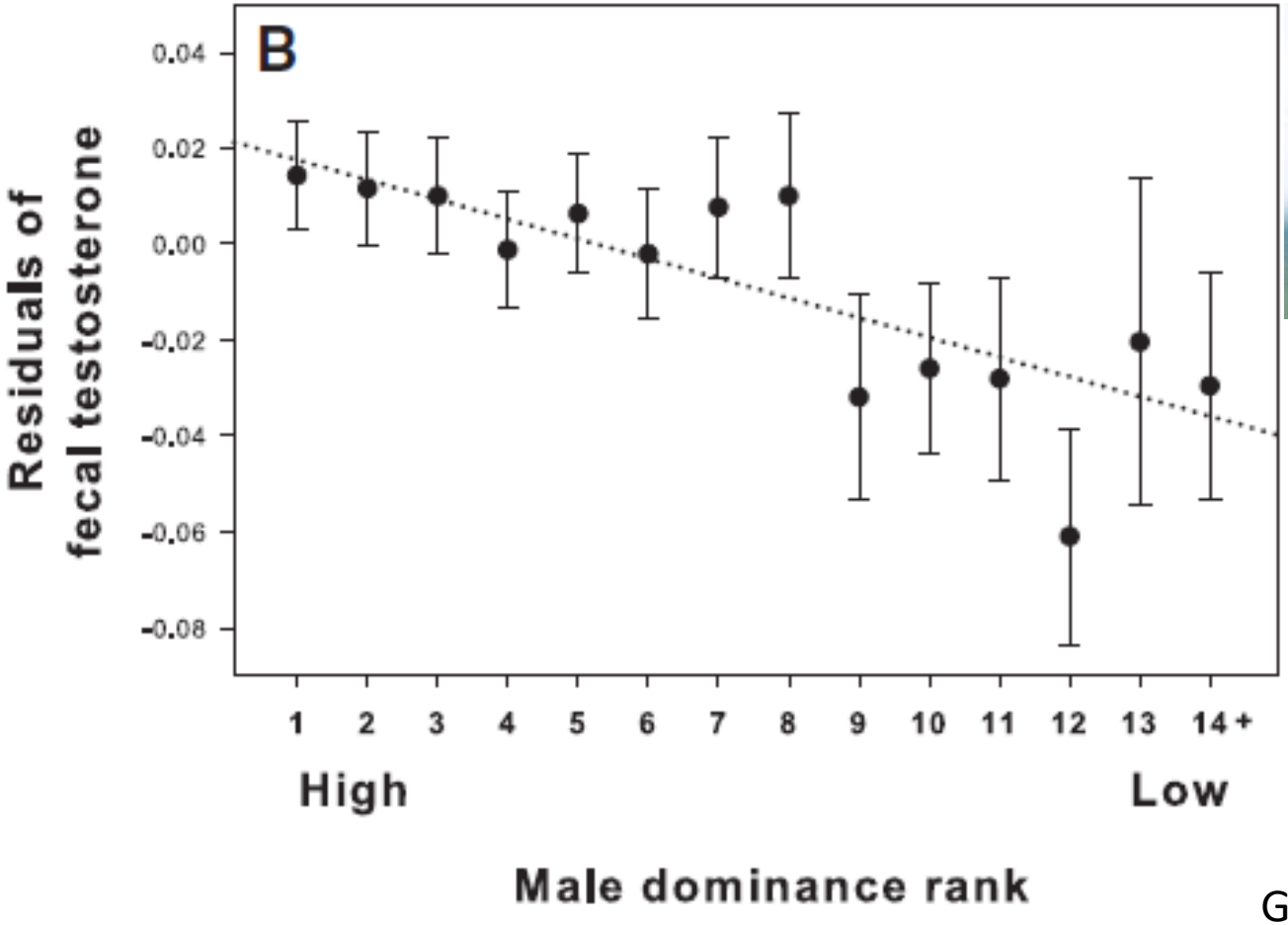
P1: Testosterone is higher during breeding season (if males compete over access to estrous females)





Challenge hypothesis

P2: Dominant males have higher testosterone levels (if males compete aggressively for high rank)



Olive Baboon

Gesquiere et al. 2011

Costs of dominance

High ranking individuals have higher parasite loads

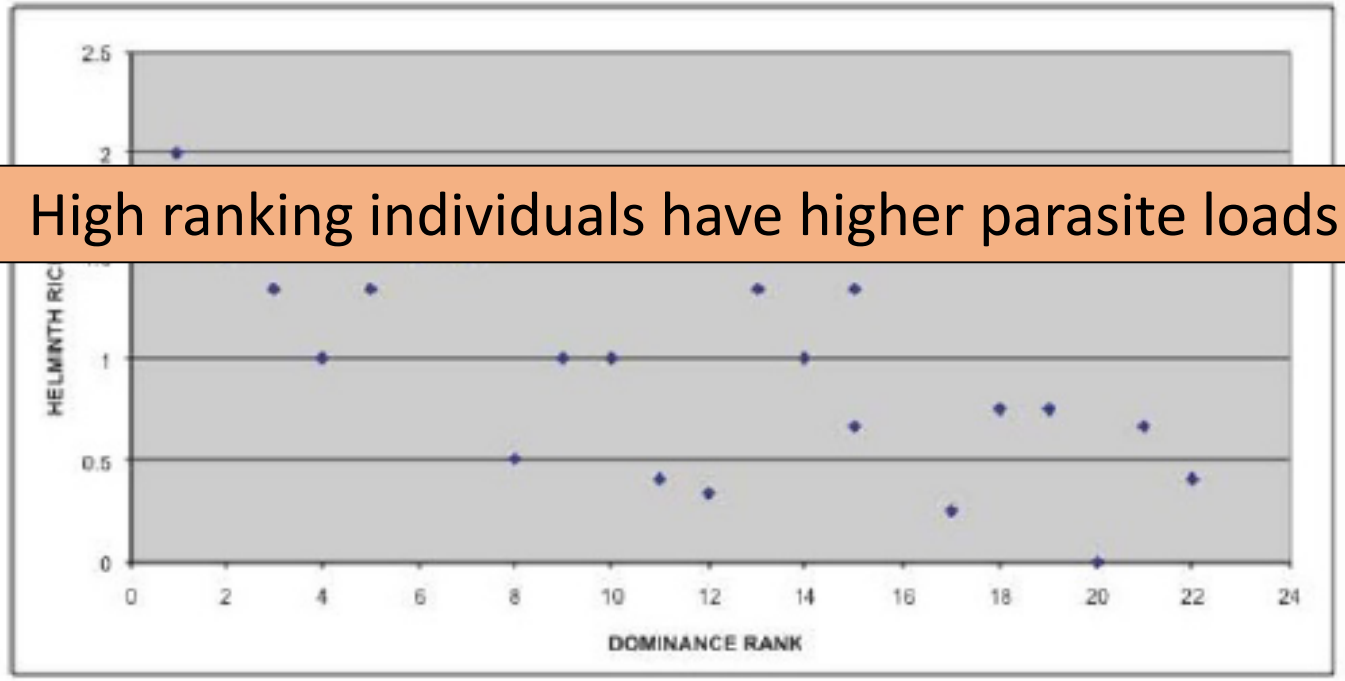


Figure 2 Dominance rank by helminth and protozoan richness for each animal. For graphic representation, parasite richness was summed across samples from each animal, and was subsequently divided by number of samples obtained from that particular animal.

Muehlenbein and Watts 2010

Challenge hypothesis in humans



P1 Men respond to competition with increased testosterone

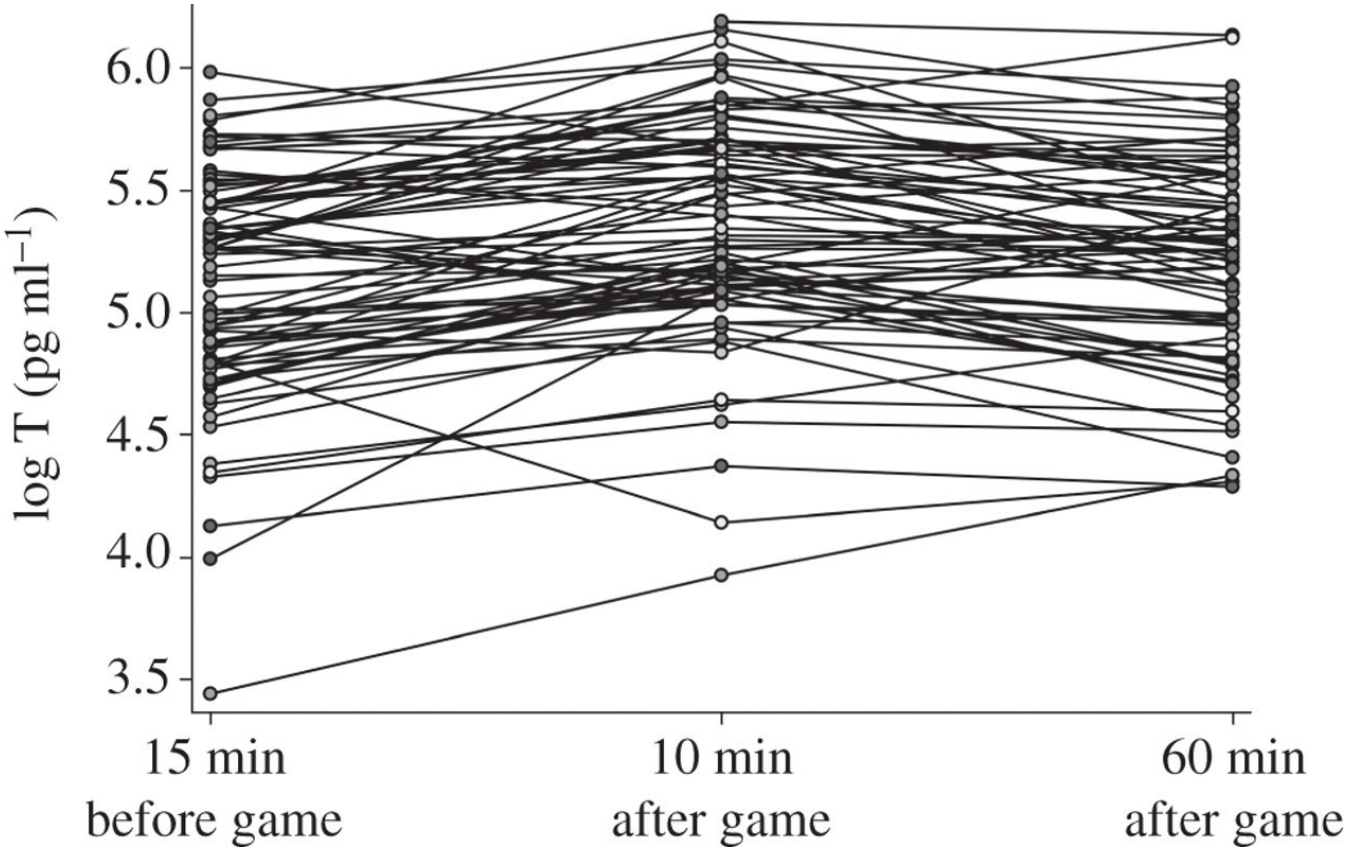
P2 The testosterone response to challenge increases aggression

P3 Men involved in parenting have lower testosterone

Archer 2005

P1 Men respond to competition with increased testosterone

Challenge hypothesis in humans



Trumble et al 2012

P1 Men respond to competition with increased testosterone

Challenge hypothesis in humans

How do you expect American to react?

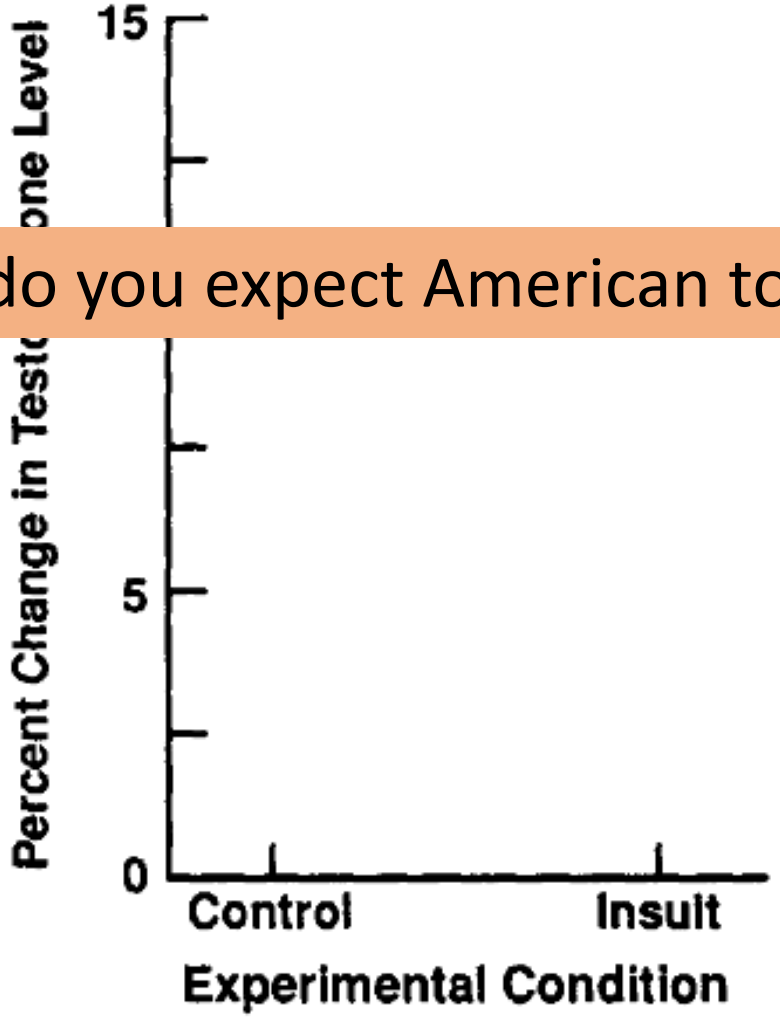


Figure 2. Changes in testosterone level for insulted and noninsulted southerners and northerners.

Cohen et al 1996

Challenge hypothesis in humans

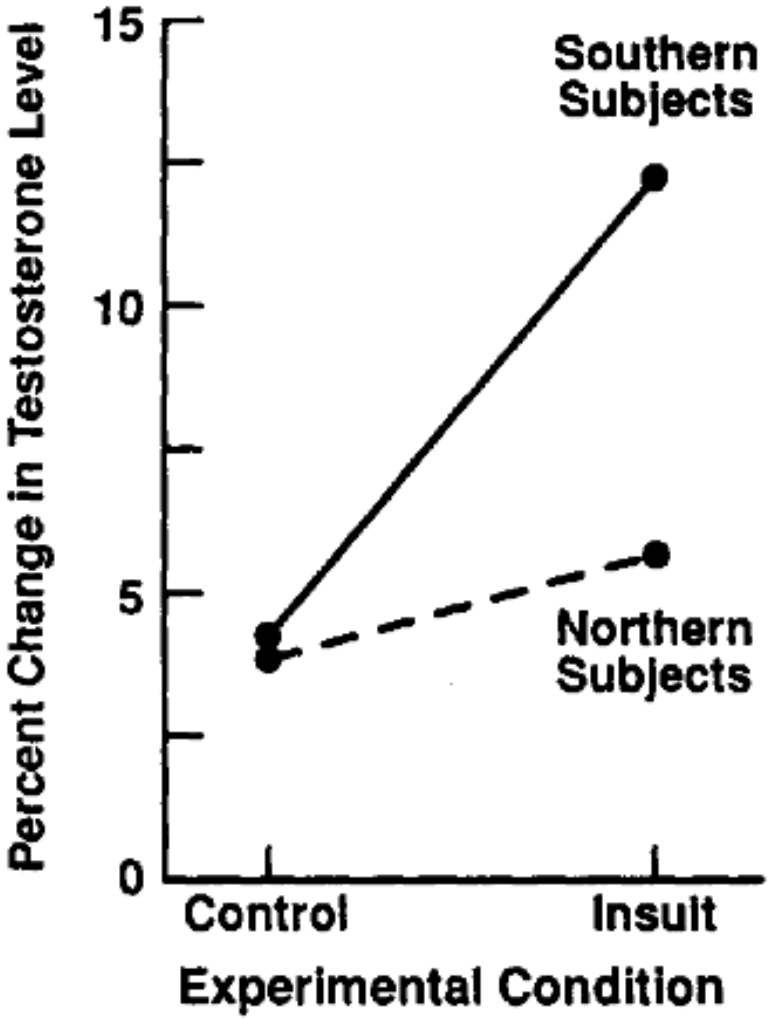


Figure 2. Changes in testosterone level for insulted and noninsulted southerners and northerners.

Cohen et al 1996

Challenge hypothesis in humans

P2 The testosterone response to challenge increases aggression

Archer 2005

Challenge hypothesis in humans

P2 The testosterone response to challenge increases aggression

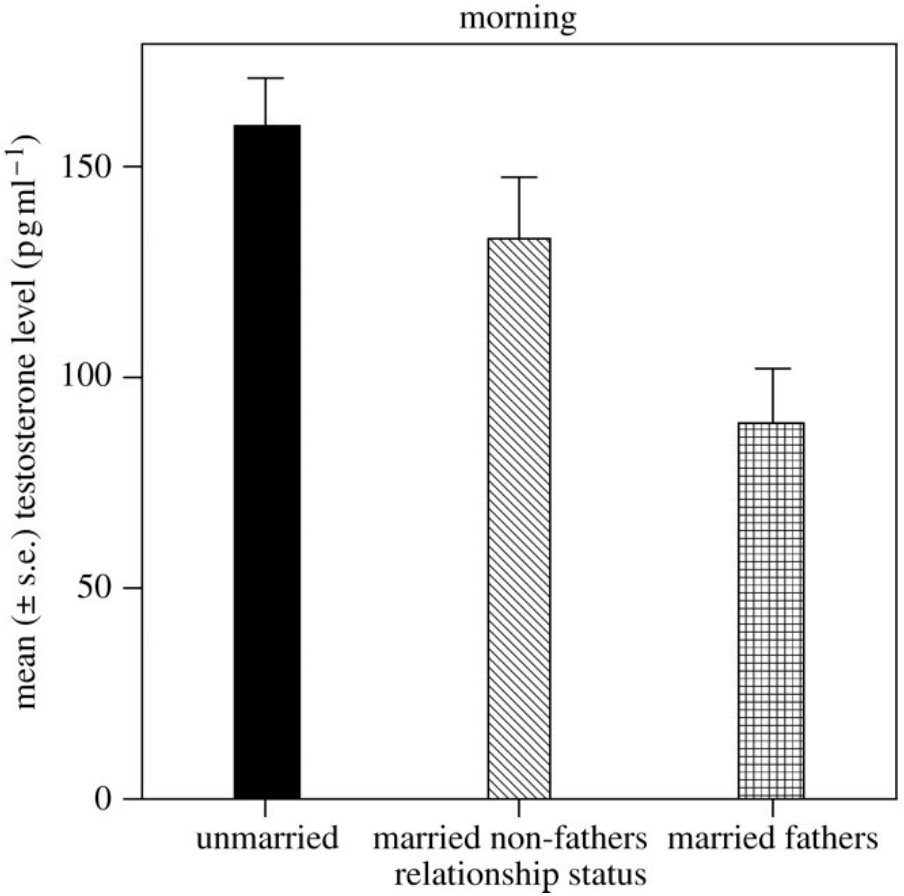
	T1
Threat	0.40*
Fighting	0.45*
Domination	0.18
Attack	0.54**
Defense	0.35

T1:Testosterone precombat levels

Archer 2005

Challenge hypothesis in humans

P3 Men involved in parenting have lower testosterone



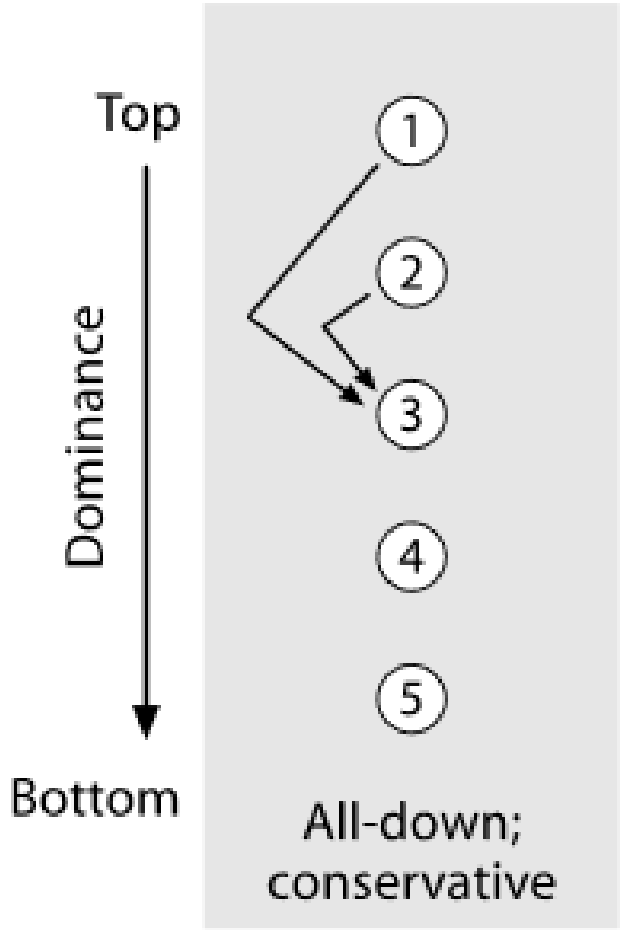
Gray et al 2006

Overview

1)Why do males tolerate other males in group
2)Male dominance and reproductive success
3)The Challenge hypothesis
4)Coalitions

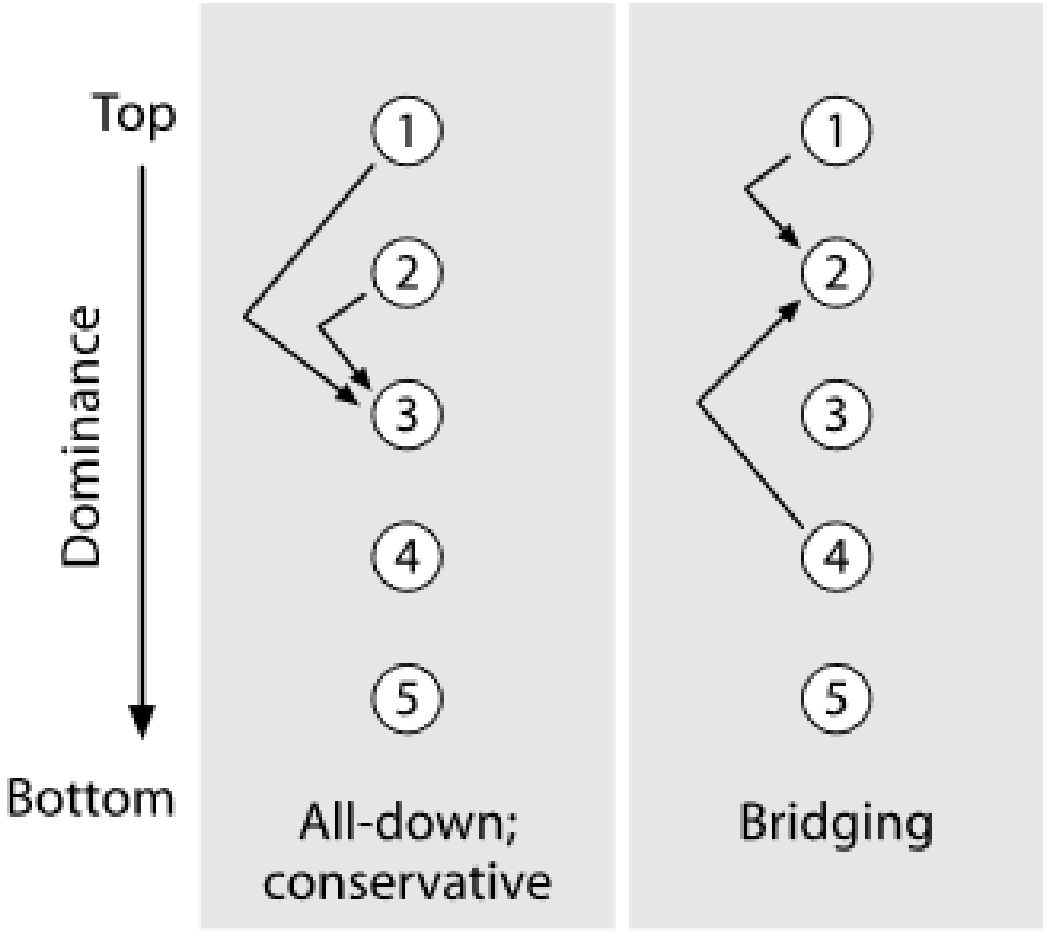
Reading: Snyder-Mackler et al. (2010)

Coalitions

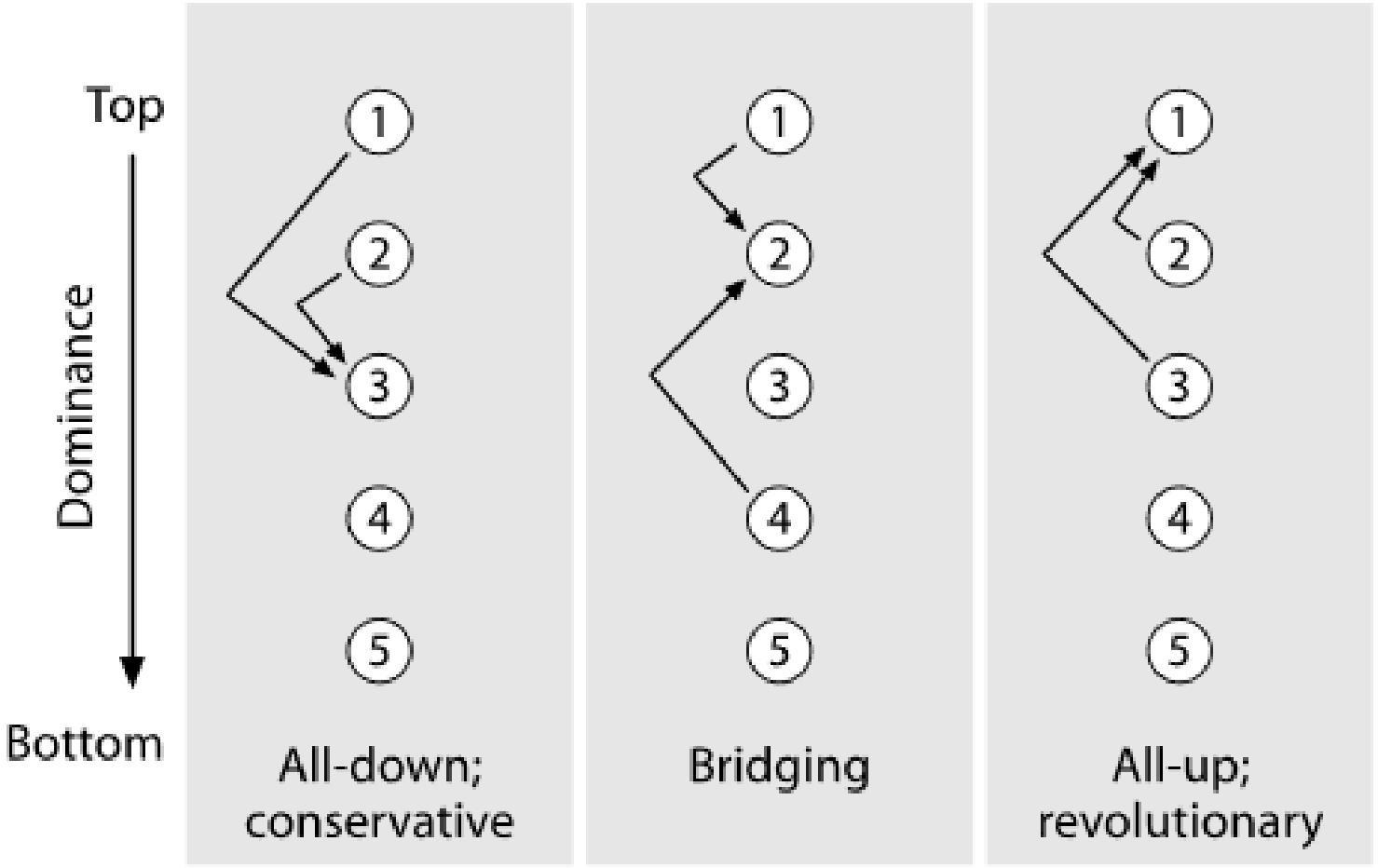


Reduce aggression
Policing
Reinforce dominance

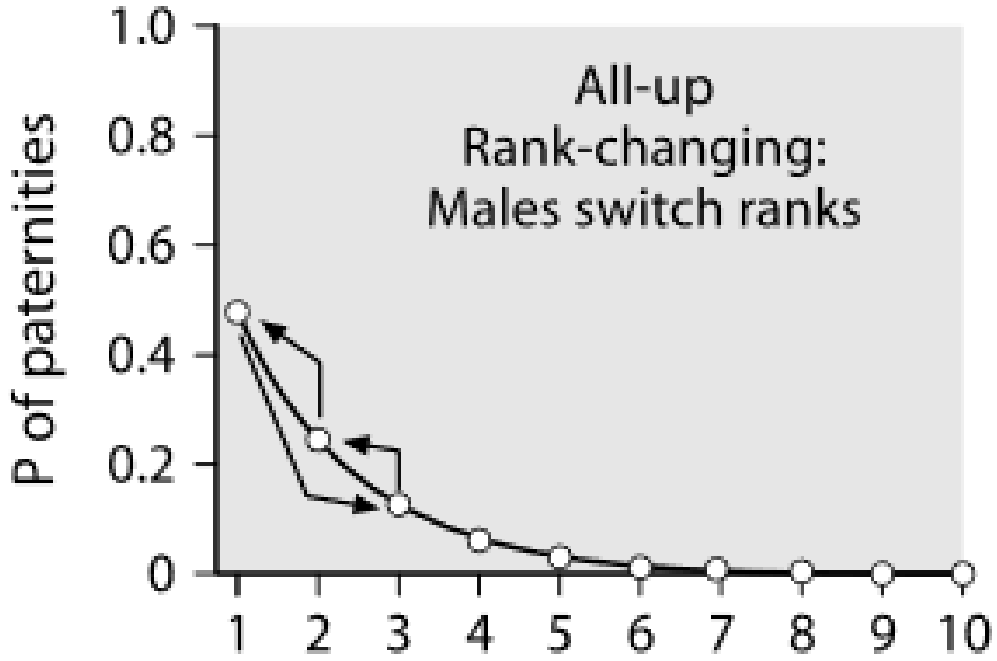
Coalitions


Top
Dominance
Bottom
1
2
3
4
5
All-down; conservative
1
2
3
4
5
Bridging

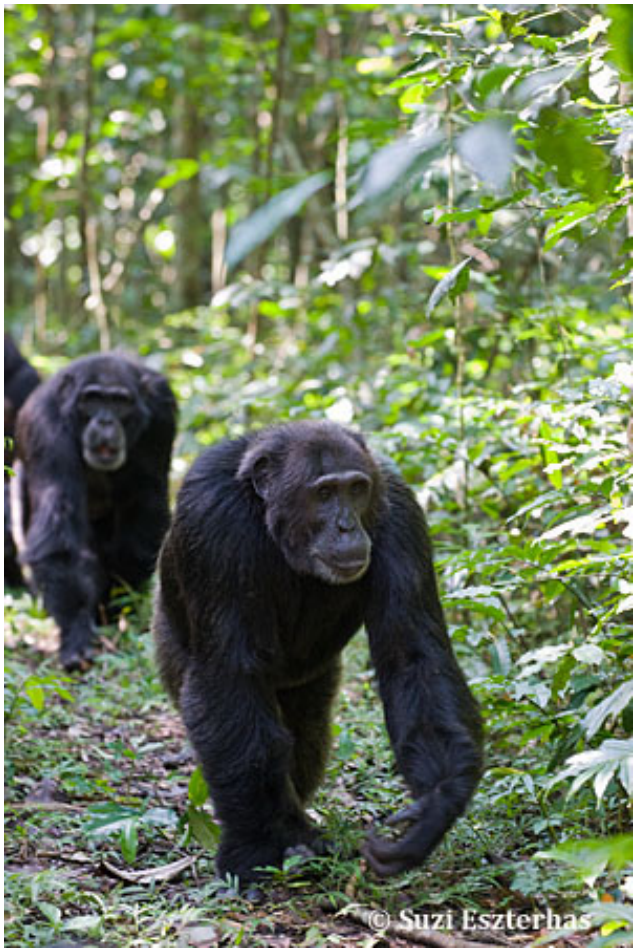
Coalitions


Top
Dominance
Bottom
1
2
3
4
5
All-down; conservative
Bridging
All-up; revolutionary

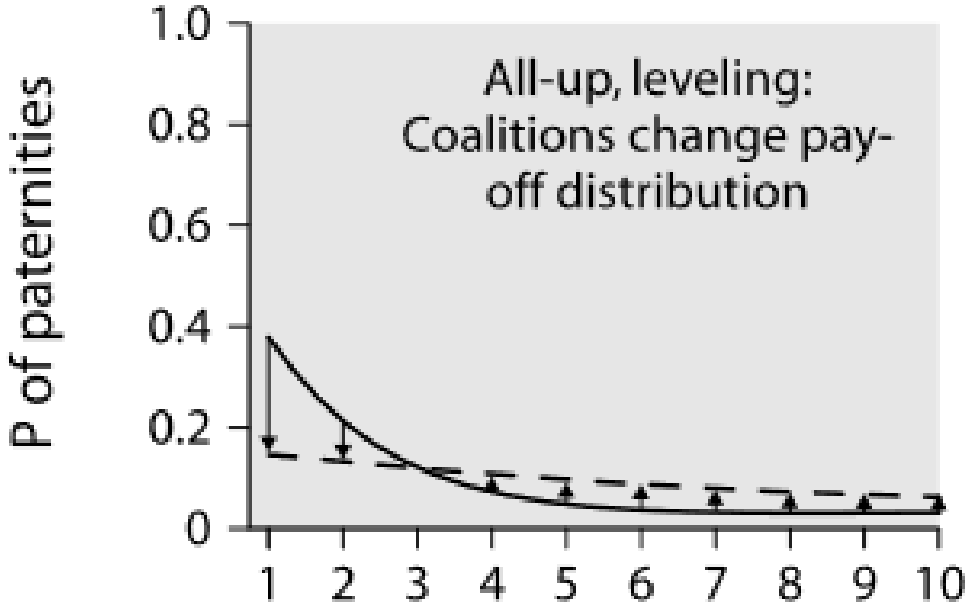
Coalitions



Rank changing

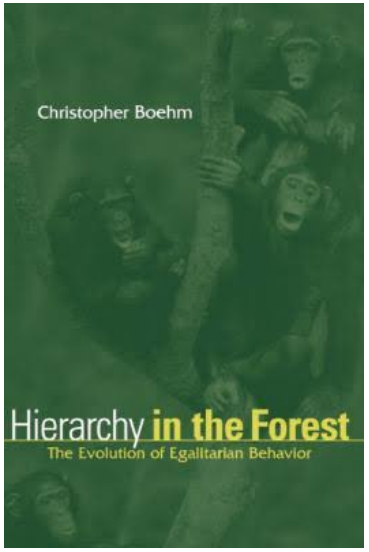


Coalitions



Change paternity distribution

Coalitions in human evolution



- Coalitions contributing to an egalitarian society

The critical issue is why there have been so many despotic political systems if altruism is part of human nature. Boehm asserts that the hierarchical aspect of human nature and of the common ancestor of humans and apes is not absent in egalitarian social systems. Rather, egalitarian social systems involve a "bizarre" type of political hierarchy in which the weak combine forces to dominate the strong. If hierarchical behavior is not absent in egalitarian societies but, rather, used by the weak to gang up on potential upstarts, despotism is not that hard to understand. One need only to postulate a scenario in which the weak are, for some reason, or reasons, not able to gang up on the strong.

Summary

- What circumstances lead to several males in one group
- Consequences on male dominance and reproduction
- Physiological aspects of competition among males
- Coalition formation

- Reading for next class: Roberts et al 2012

“What is the Bruce effect?”

“What are characteristics of a species where we expect Bruce effect?”