

Foster rather than biological parental telomere length predicts offspring survival and telomere length in king penguins (*Viblanco et al., Mol. Ecol. 2020*)

The Econergy Polar Research Program, IPEV
<https://ipev119.wixsite.com/econergie119>



La Rochelle
Amphithéâtre de l'Aquarium
Quai Louis Prunier



22-23
Septembre
2020





V Viblanc



Q Schull



A Stier



S Zahn



JP Robin



P Bize



F Criscuolo



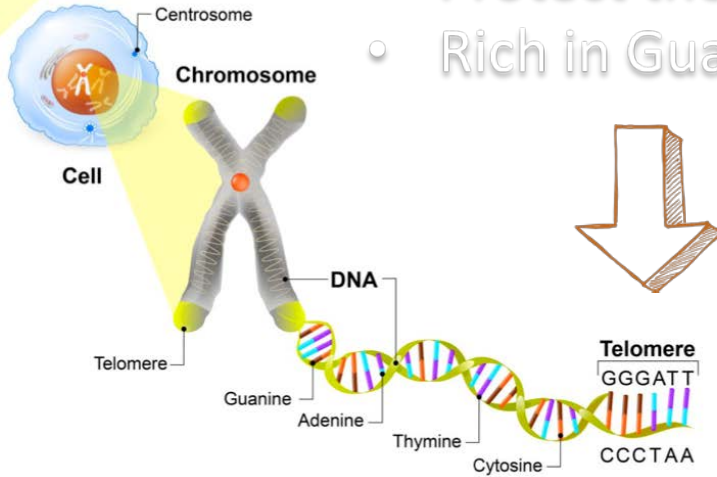
Overwintering fieldworkers:

L Durand & E Lefol

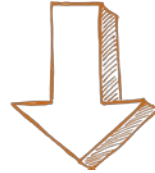


INSTITUT 
POLAIRE
FRANÇAIS
PAUL-ÉMILE VICTOR

What exactly are telomeres and why should we care ?

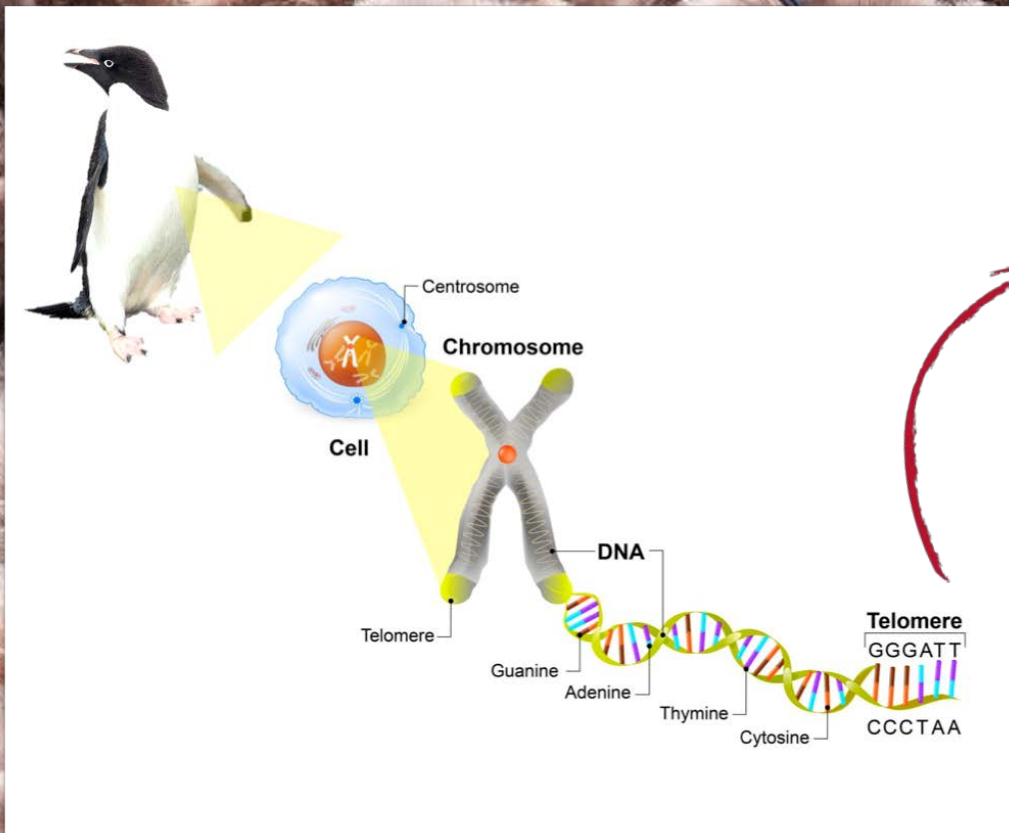


- Specialized DNA sequences
- Protect the integrity of genetic information
- Rich in Guanosine bases

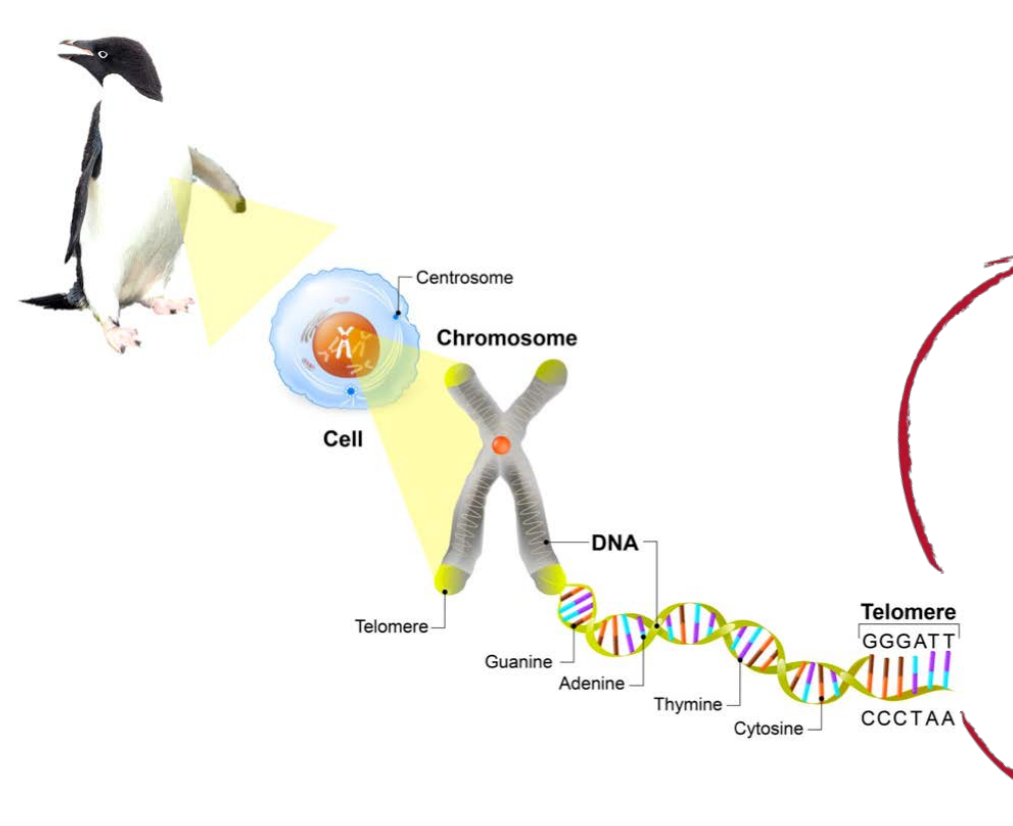


Telomere
GGGATT
CCCTAA

What exactly are telomeres and why should we care ?



What exactly are telomeres and why should we care ?



Age

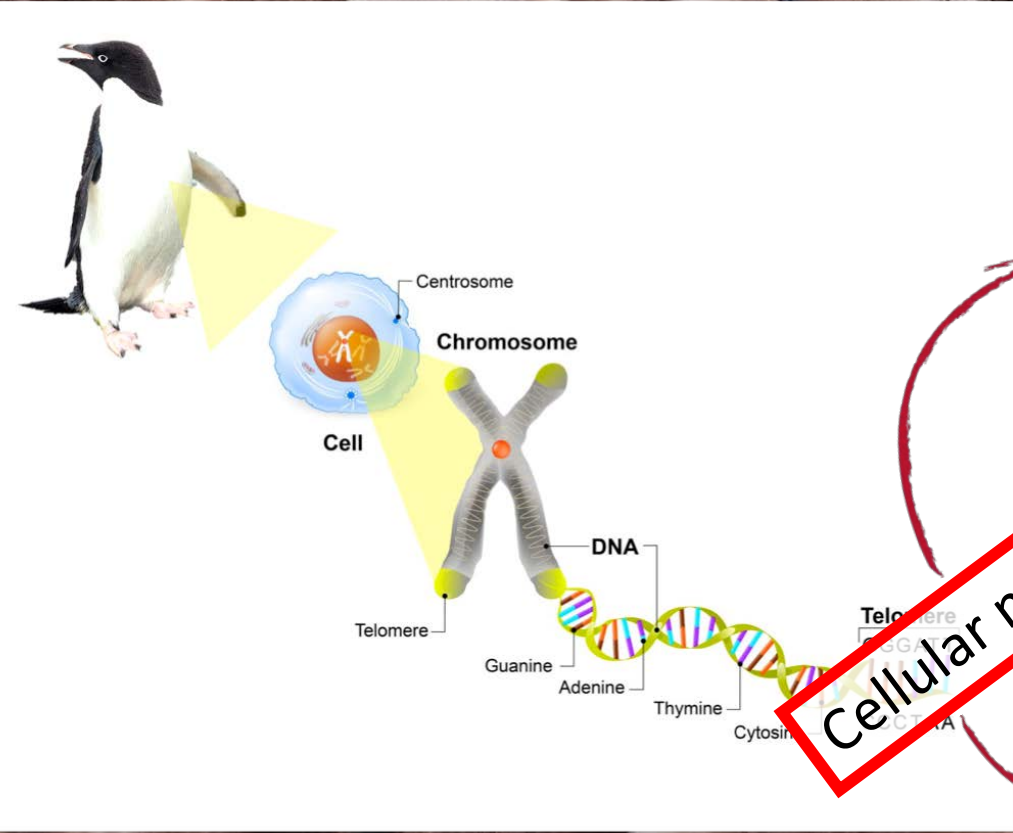
Stress exposure

free radical

- early development
- pollution
- social environment
- predation
- climate
- etc.

The illustration shows two penguins. The one on the left is young and healthy, with a purple cartoon character on its chest. The one on the right is older and appears stressed, with a purple cartoon character on its chest that looks like it's holding a cane. A large orange arrow points from the young penguin to the old one, labeled 'Age'. A red lightning bolt with a grumpy face is labeled 'Stress exposure' and 'free radical'. A list of stressors is shown to the right.

What exactly are telomeres and why should we care ?



Cellular markers of individual performance ??

Stress exposure

free radical

- early development
- pollution
- social environment
- predation
- climate
- etc.

Do telomeres actually relate to reproductive performance in the wild ?



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Collared sand martin



Dunlin



Common tern



Redstart



Alpine swift



Black-browed albatross



Great black-backed gull

King penguin



Overall good evidence in birds

- Pauliny et al. 2006, *Mol Ecol*
- Bize et al. 2009, *Proc R Soc B*
- Angelier et al. 2013, *Funct Ecol*
- Bauch et al. 2013, *Proc R Soc B*

- Salomons et al. 2009, *Proc R Soc B*
- Le Vaillant et al. 2015, *Polar Biol*
- Stier et al. 2014, *Funct Ecol*
- Angelier et al. 2019; *Funct Ecol*

- Geiger et al. 2012, *Mol Ecol*

If telomere length is a proxy of « quality » it should:

1. Relate positively to parent performance
2. Positively affect chick phenotype and performance
3. Be a target for mate choice



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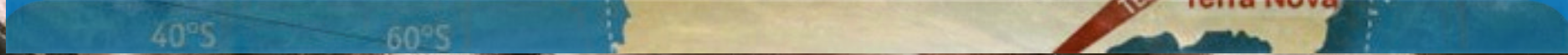
But what about the influences of genetic vs. raising environments on TL ?



Field work and location



Field work and location



X-fostering protocol

66 breeding pairs



X-fostering protocol

66 breeding pairs



X-fostering protocol

genetic foster



Hatching



Day 10



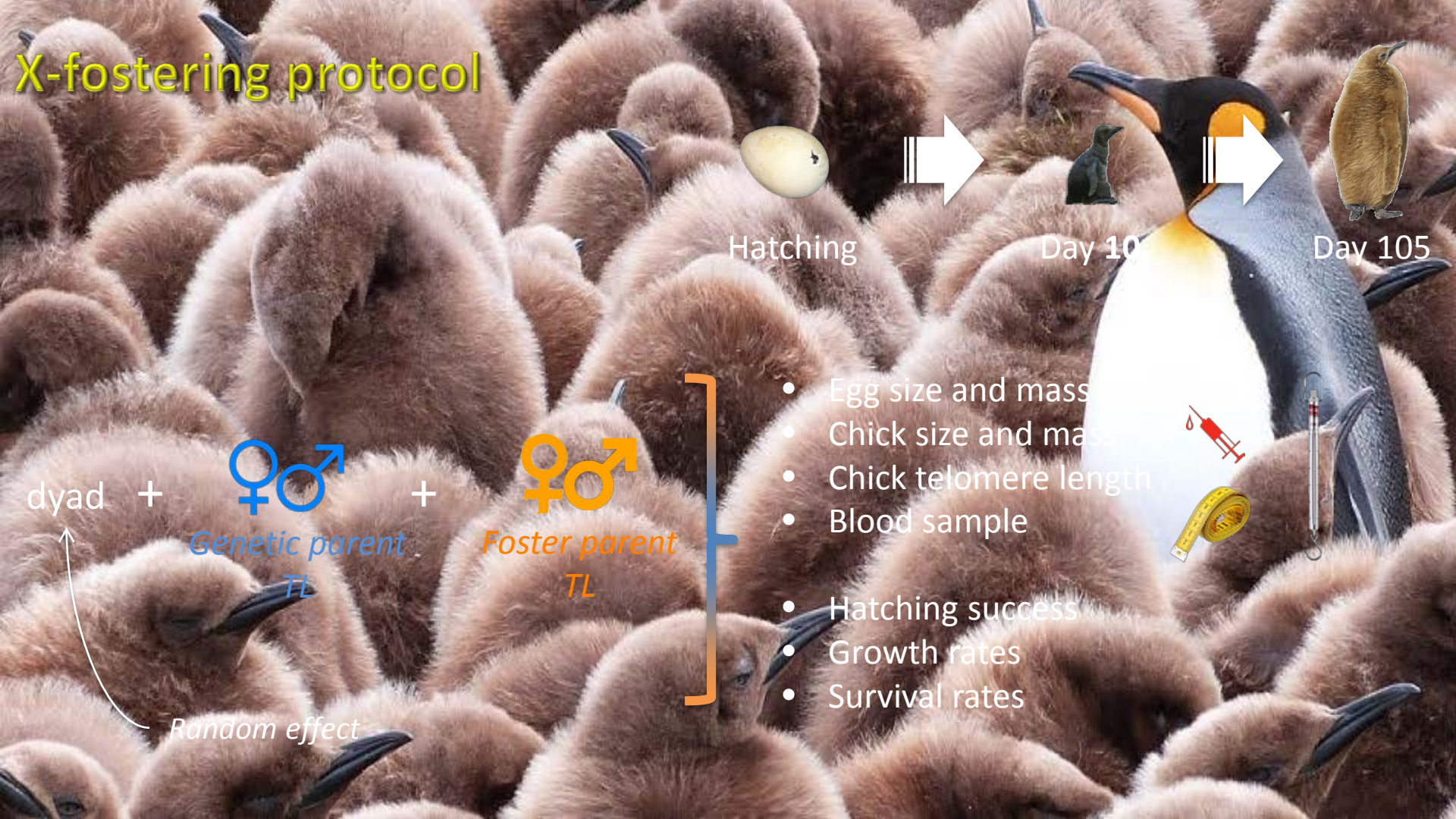
Day 105



genetic foster



X-fostering protocol



Hatching

Day 10

Day 105

dyad +



Genetic parent

TL

+



Foster parent

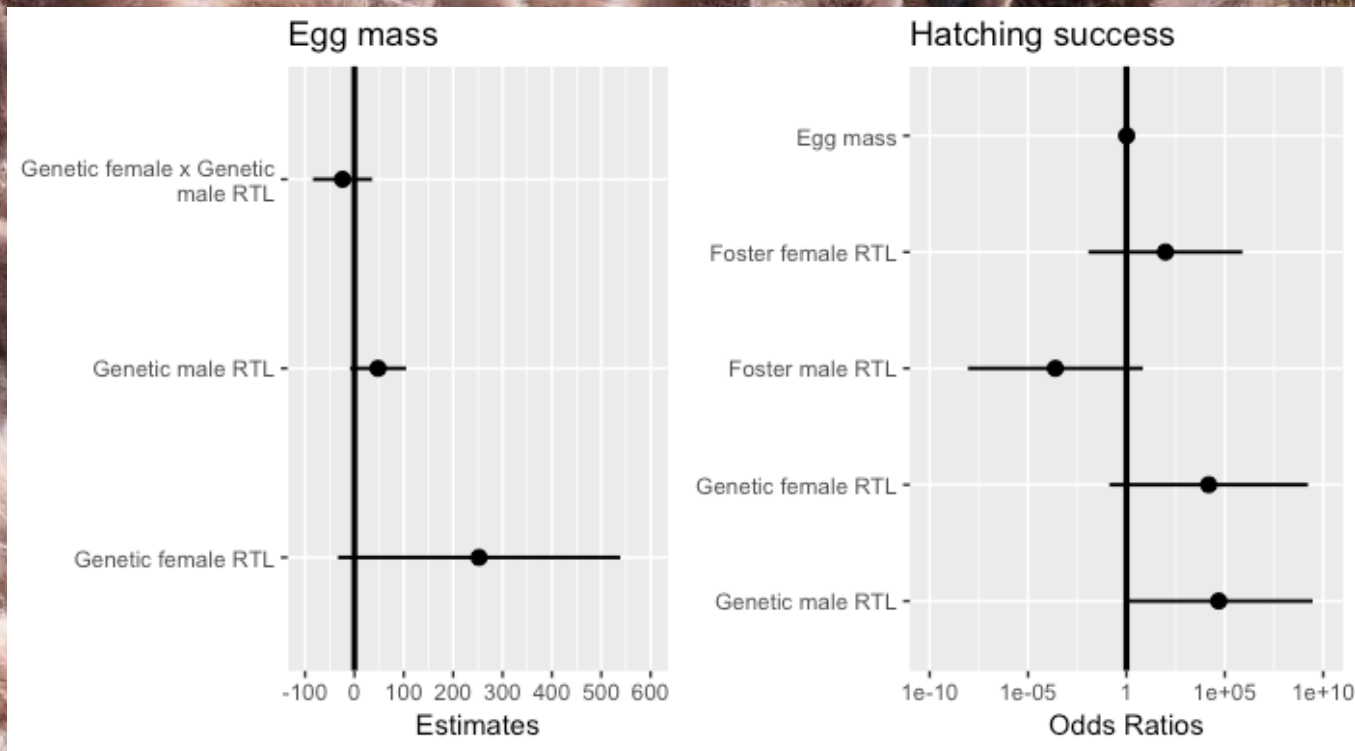
TL

Random effect

- Egg size and mass
- Chick size and mass
- Chick telomere length
- Blood sample
- Hatching success
- Growth rates
- Survival rates

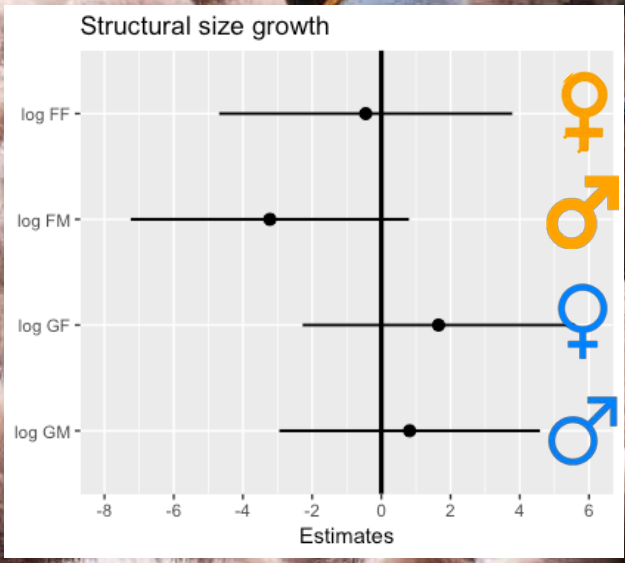
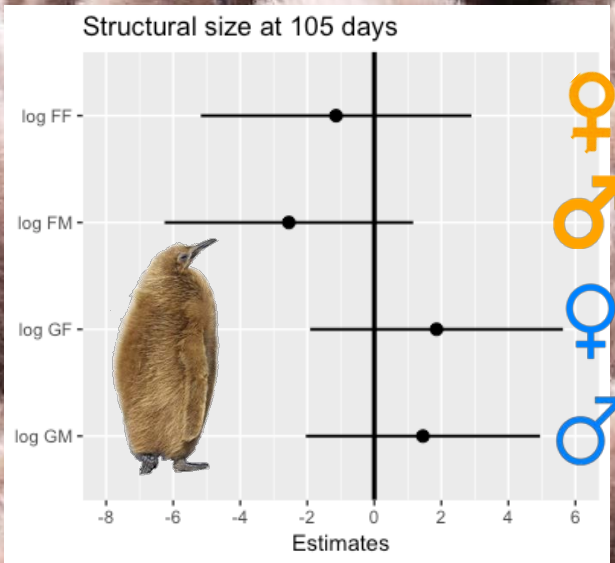
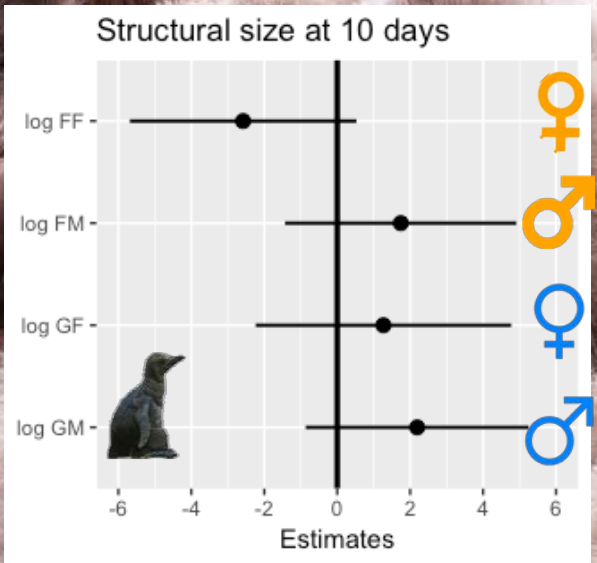


Does parental TL reflect reproductive investment?



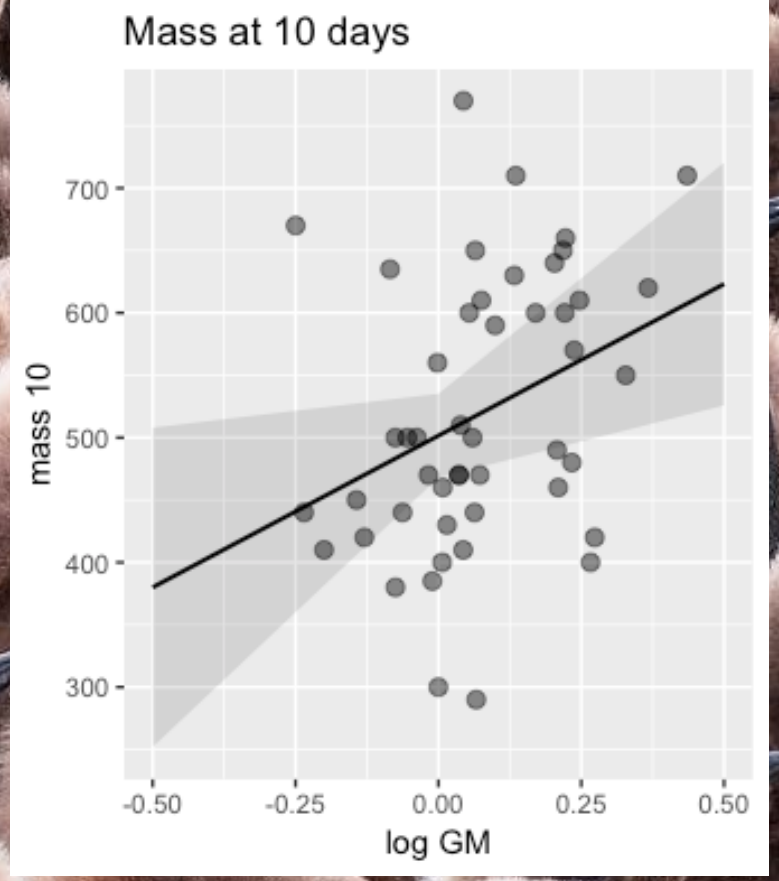
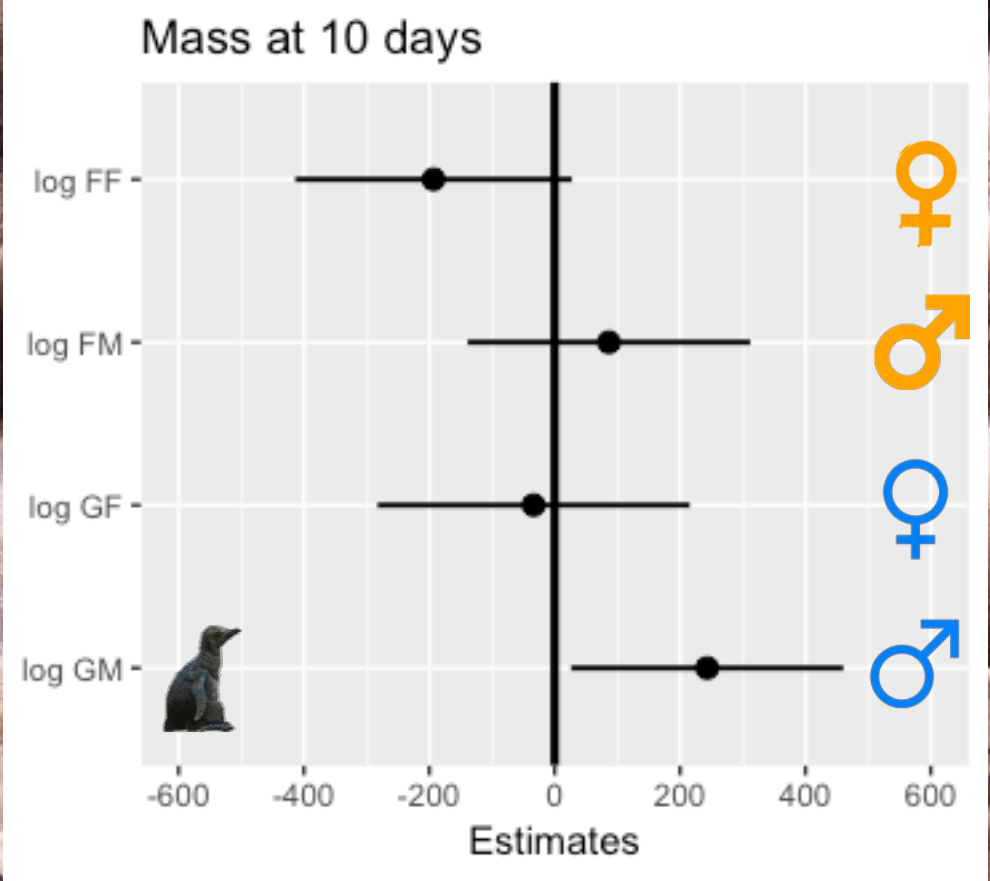
No effect of telomere length on egg mass and hatching success

Does parental TL reflect chick size?

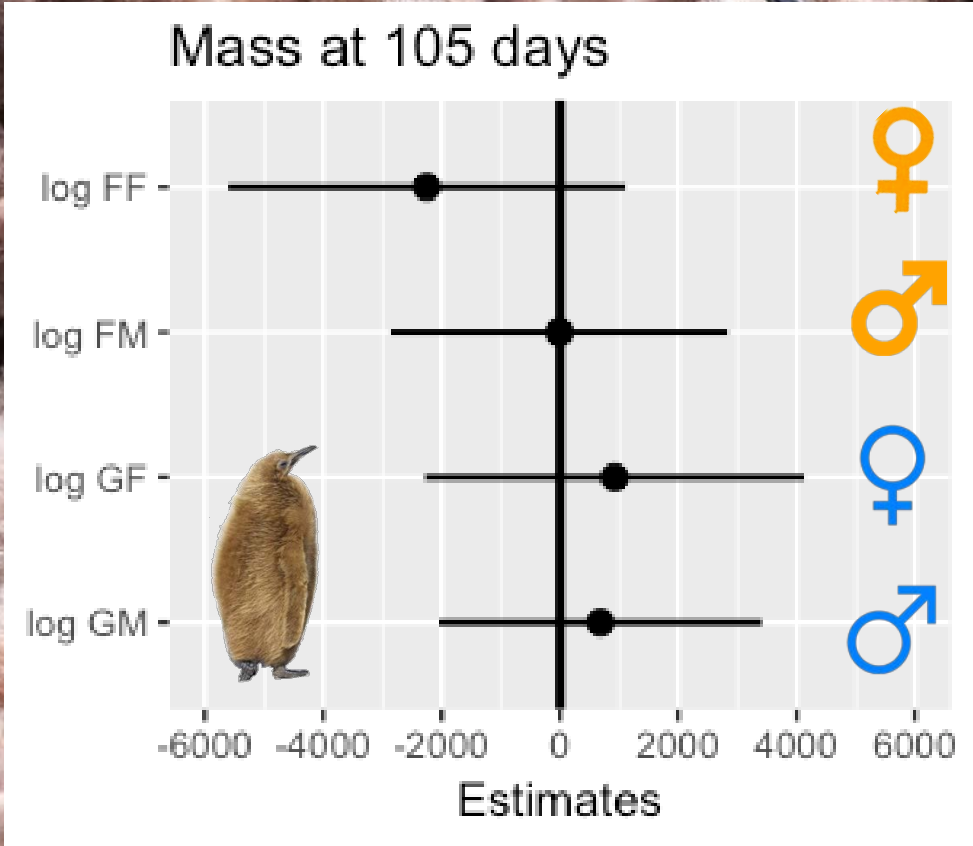


No effects of parental TL on structural growth rate

Does parental TL reflect chick mass ?



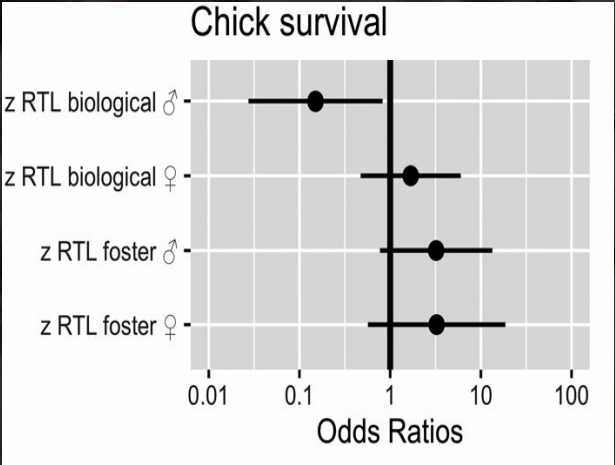
Does parental TL reflect chick mass?



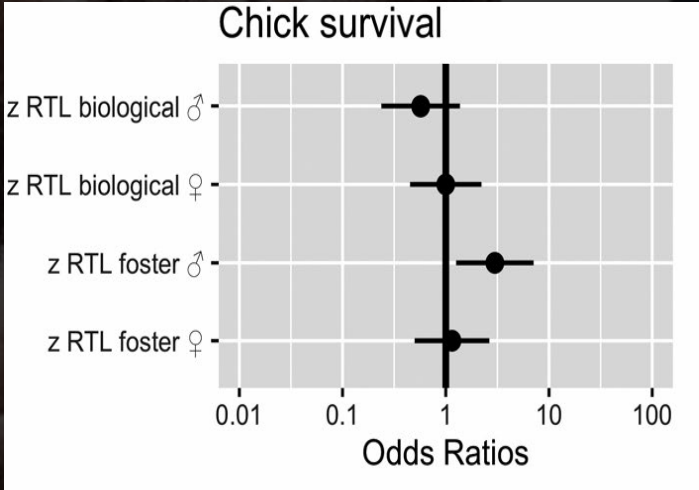
Effect dissapears by 105 days



Does parental TL reflect chick survival?

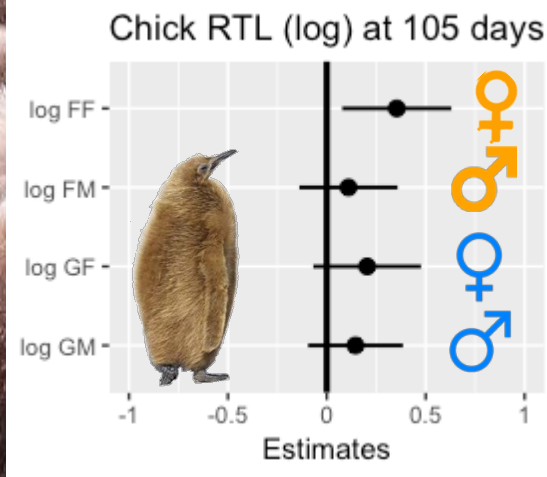
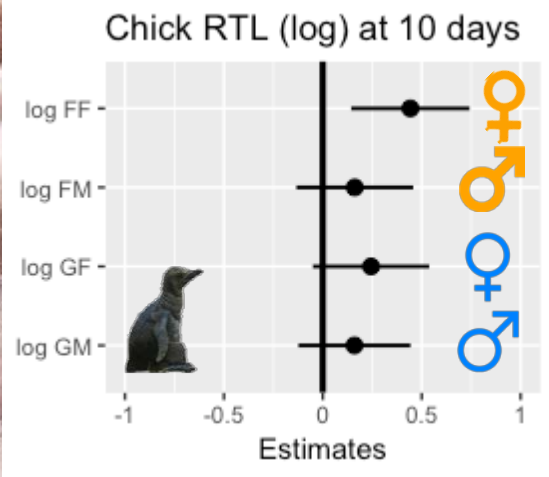


10 days

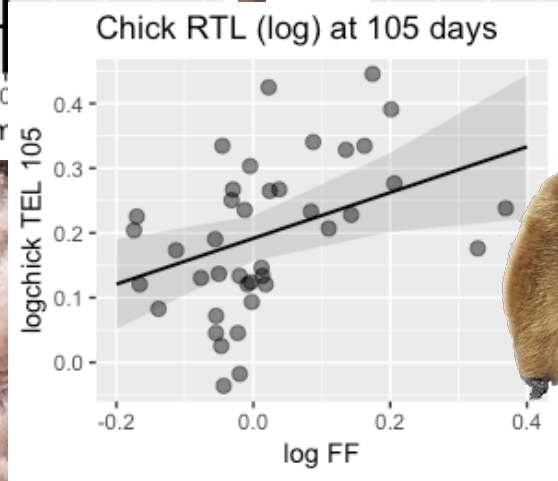
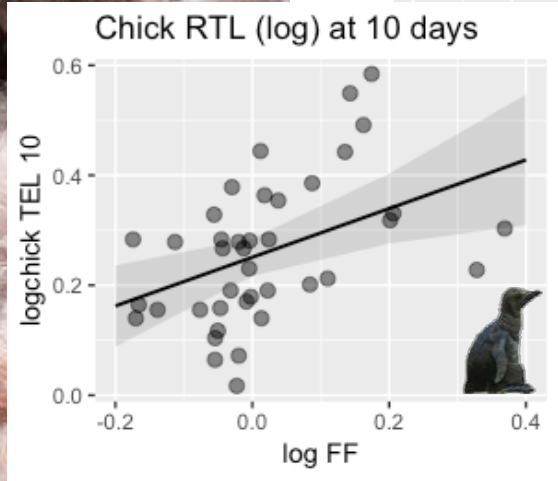
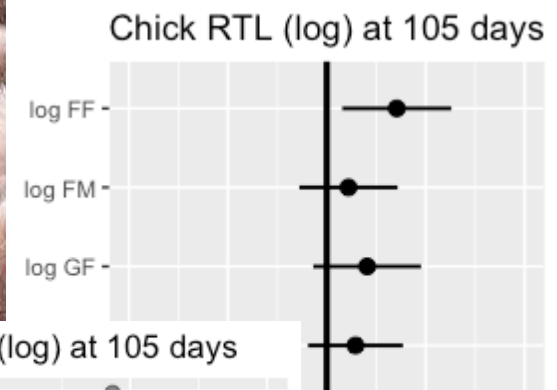
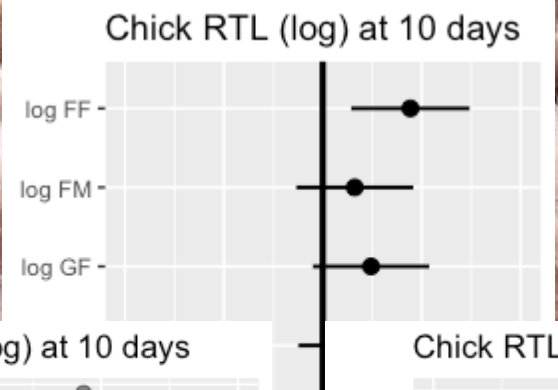


105 days

Does parental TL reflect chick TL?

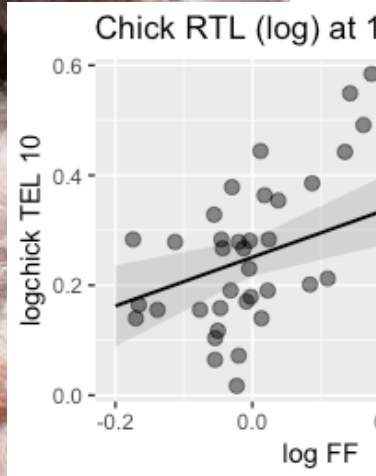
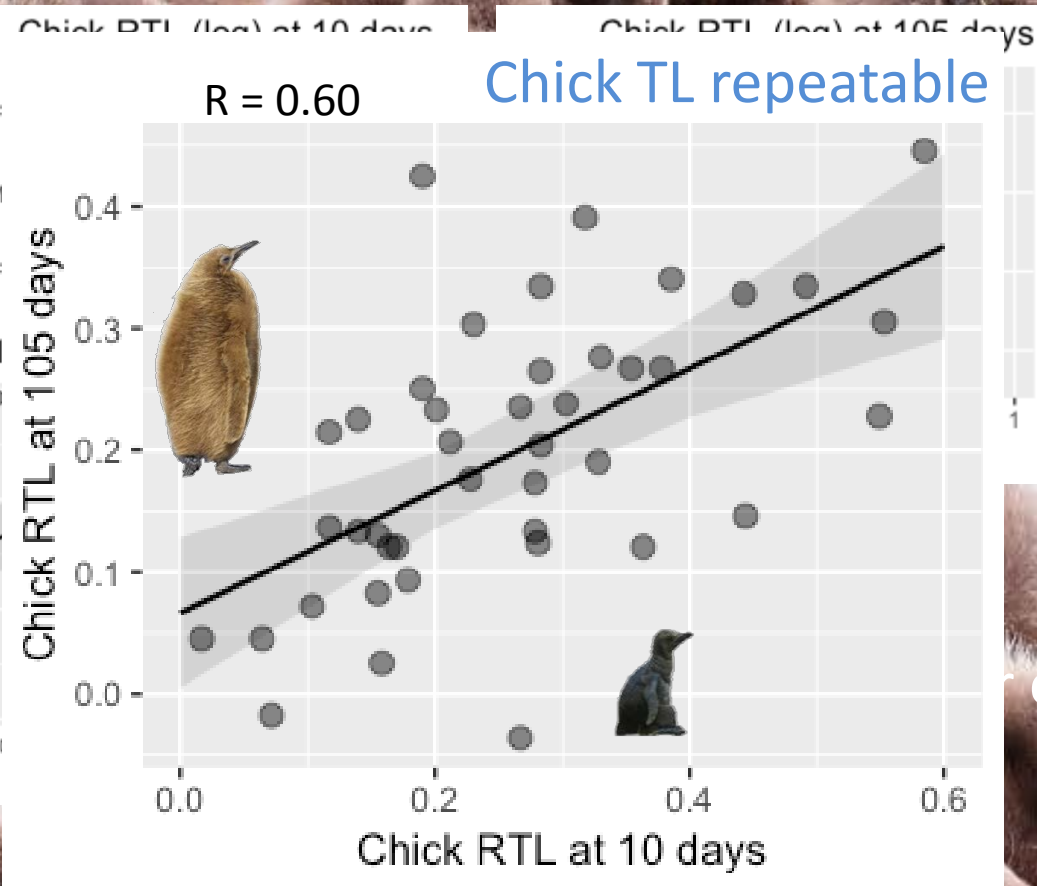


Does parental TL reflect chick TL?



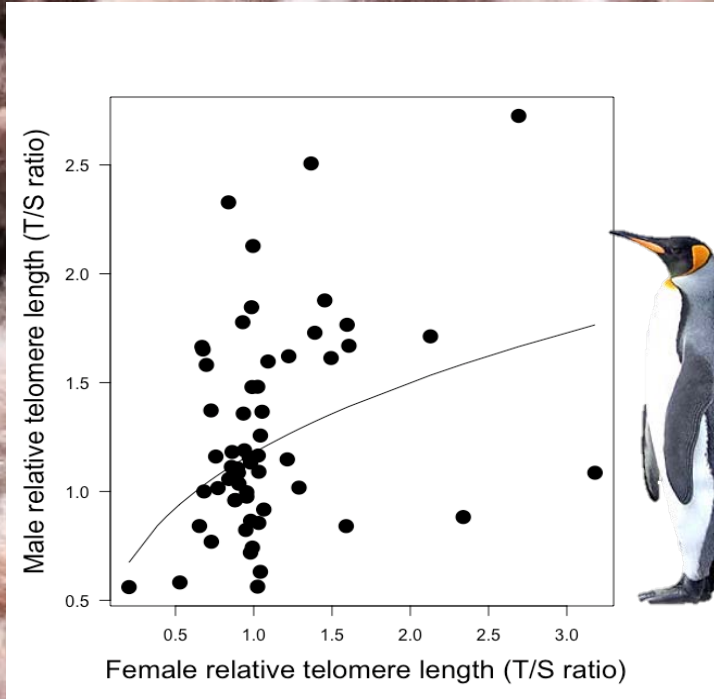
Foster effects early in life !

Does parental TL reflect chick TL?



effects early in life !

Is telomere length a target for mate choice?

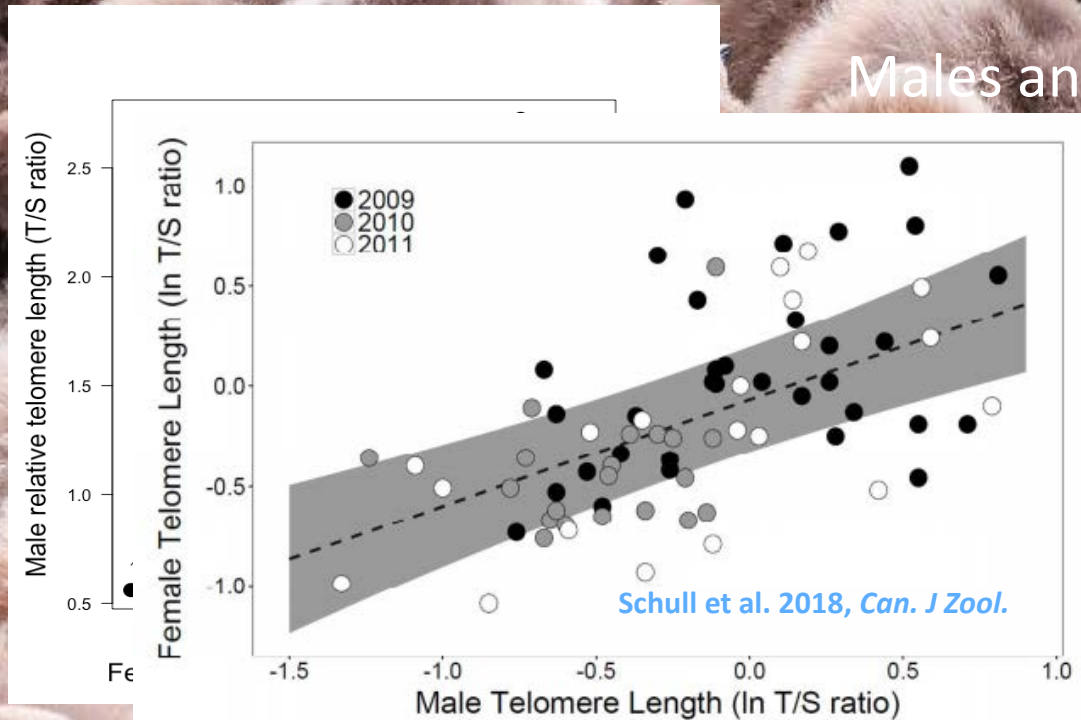


Males and females paired assortatively by telomere length



- Mate choice for partners of high quality?
- Age-related?

Is telomere length a target for mate choice?



Males and females paired
by telomere length



choice for partners of high quality?
ed?

Take home messages

- Mate choice non-random: assortative pairing by TL
- Parental TL associated with some reproductive characteristics
- Parental foster effects more important than genetic effects in determining chick phenotype





Merci pour
votre attention