

ascr#10x-omics

David Angeles-Albores

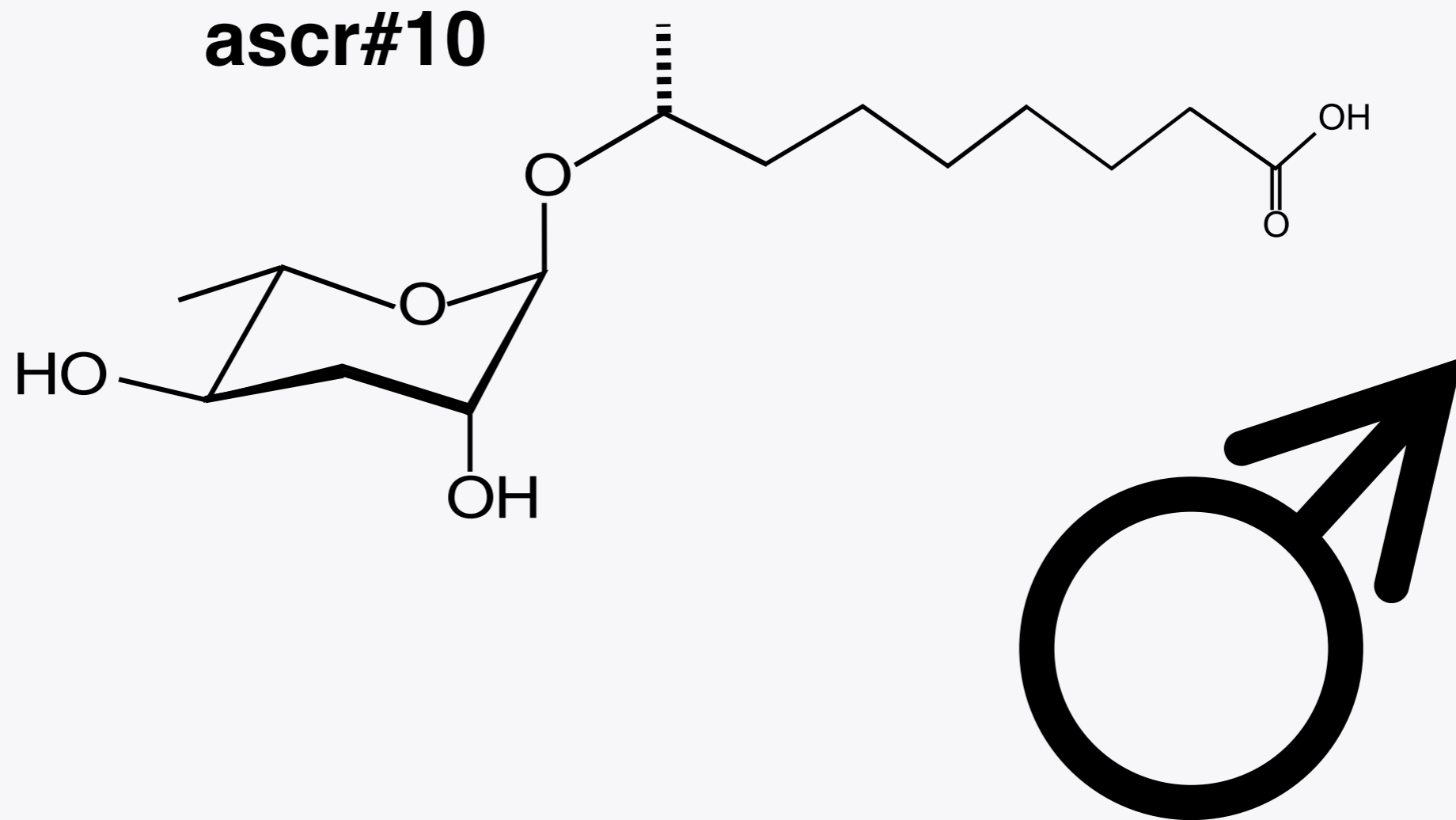
Erin Z. Aprison

Svetlana Dzitoyeva

Ilya Ruvinsky

Northwestern University

Nematode ascarosides convey social cues



ascr#10 is a male cue

ascr#10 promotes germline proliferation

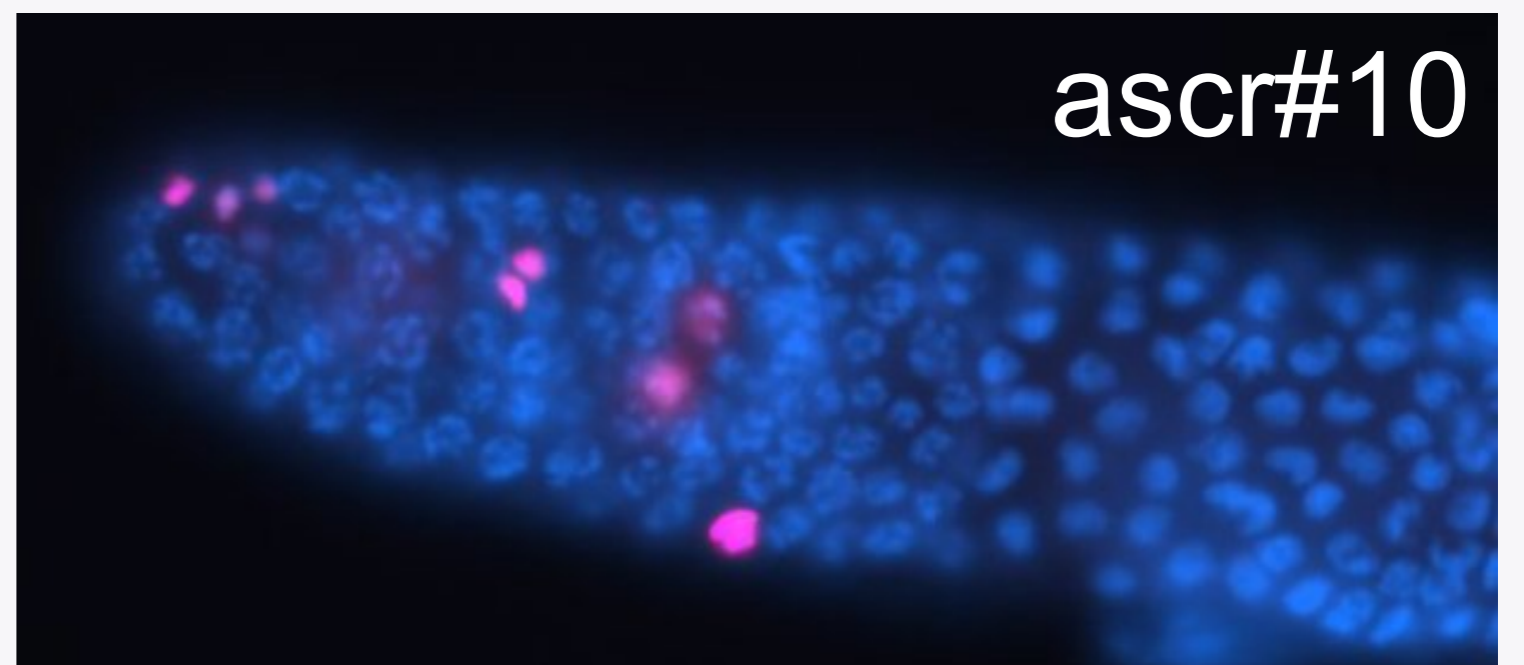
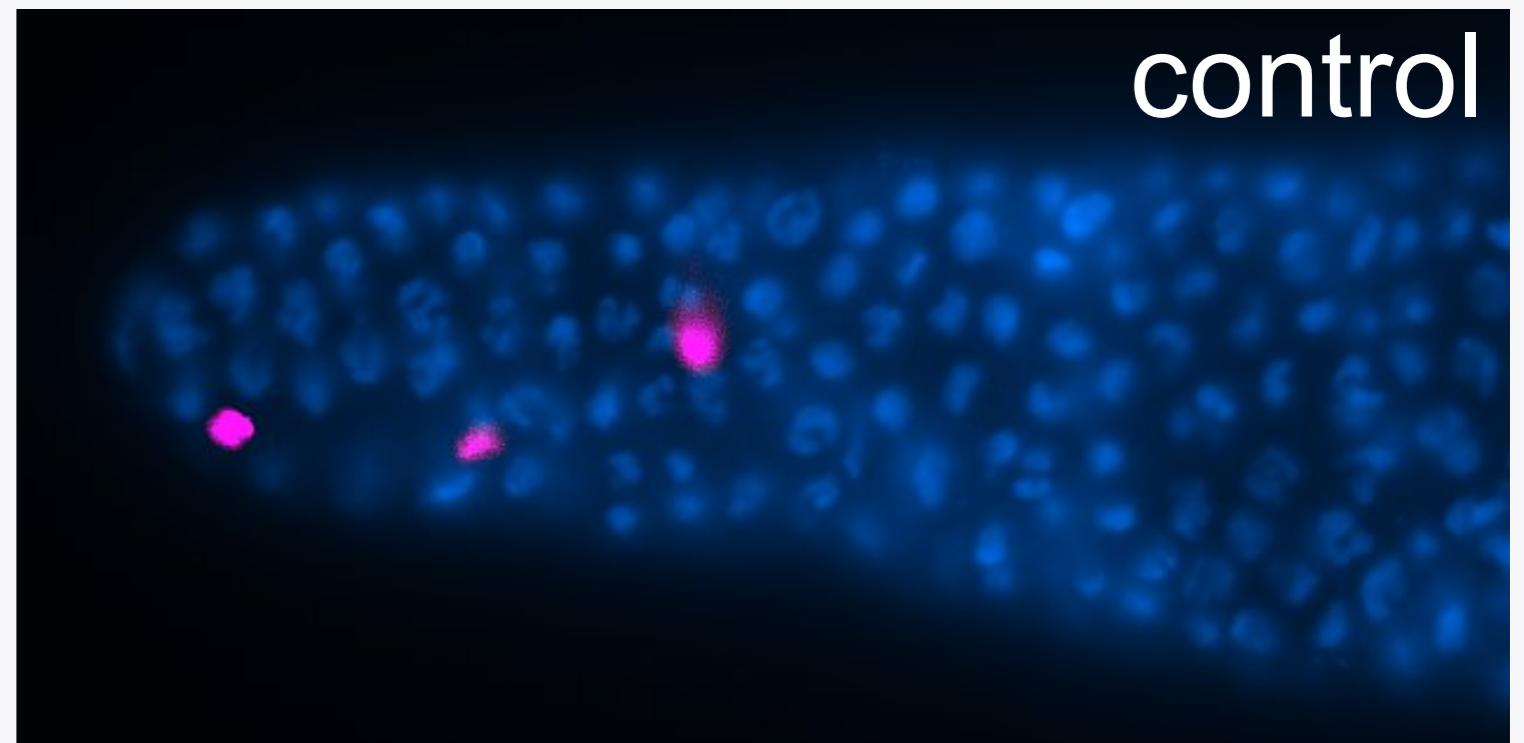
ascr#10 affects:

Behavior

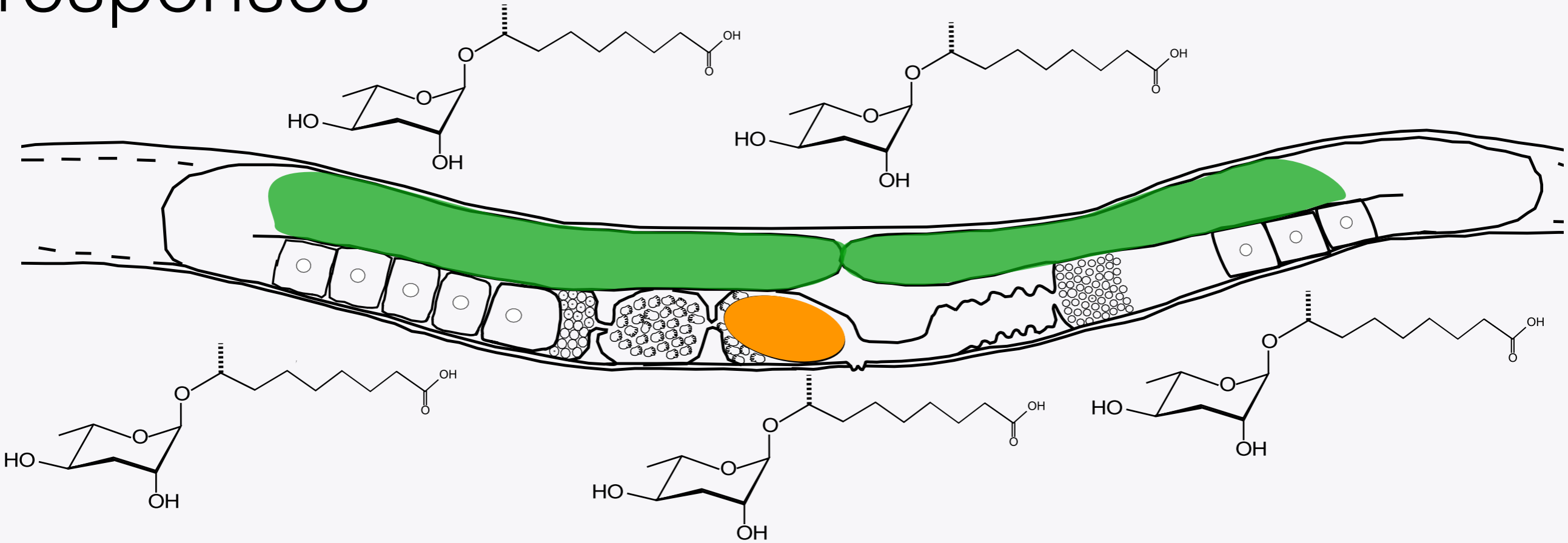
Lifespan

Oocyte quality

Etc...



Only egg laying animals show ascr#10 responses



Ascr#10 exposure

Effect

Prior to pre-licensed adulthood

None

After licensed adulthood

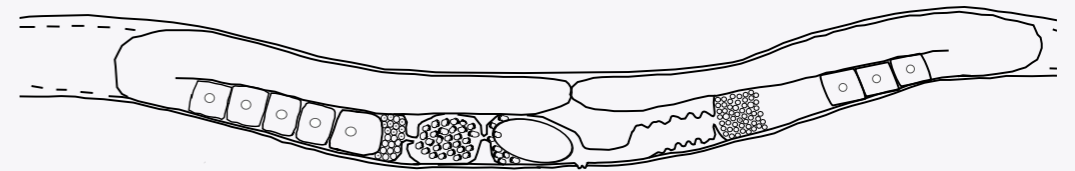
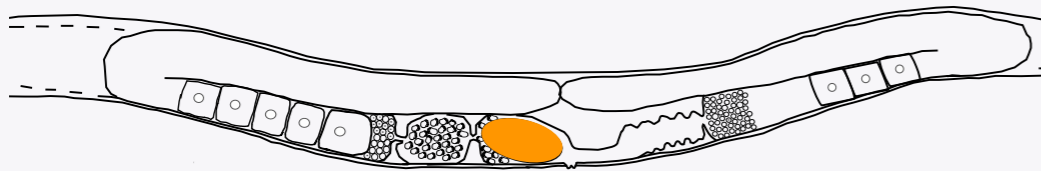
Several

A 2-factor experimental design to evaluate ascr#10 transcriptomic effects

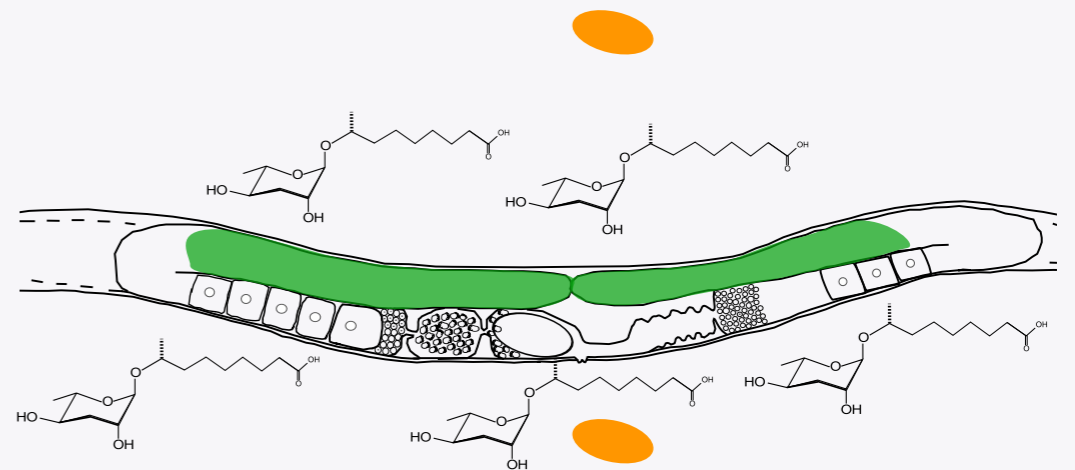
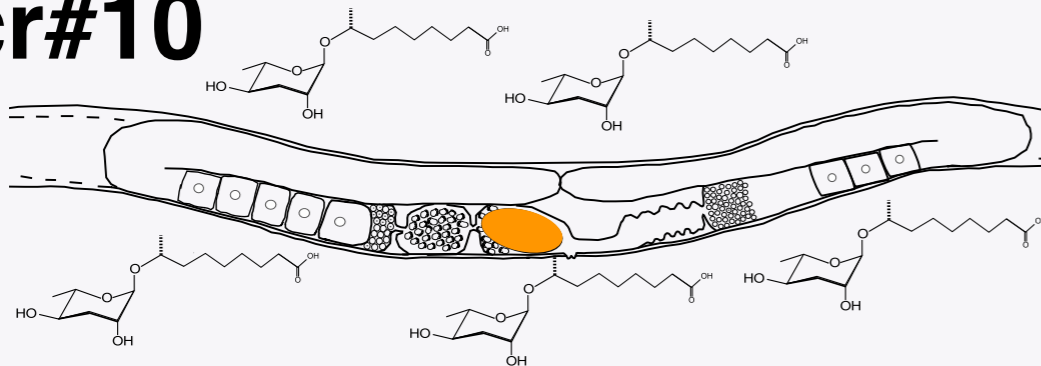
Pre-licensing

Licensed

No ascr#10



ascr#10



No Effect

Big effect

ascr#10 alters gene expression in
pre-licensed hermaphrodites

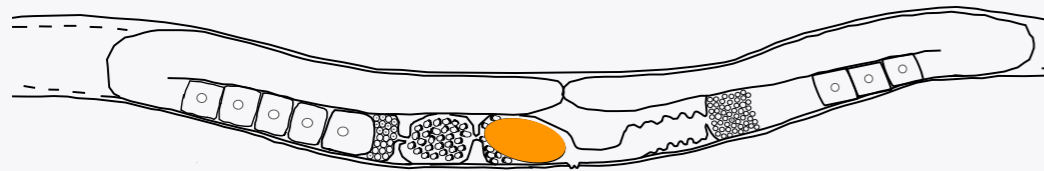


1653

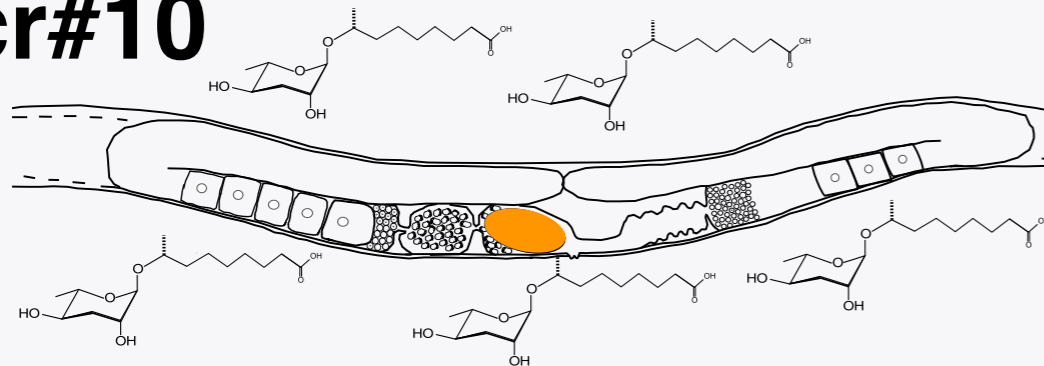
The ascr#10 receptor pathway is active in pre-licensed animals

Pre-licensing

No ascr#10



ascr#10

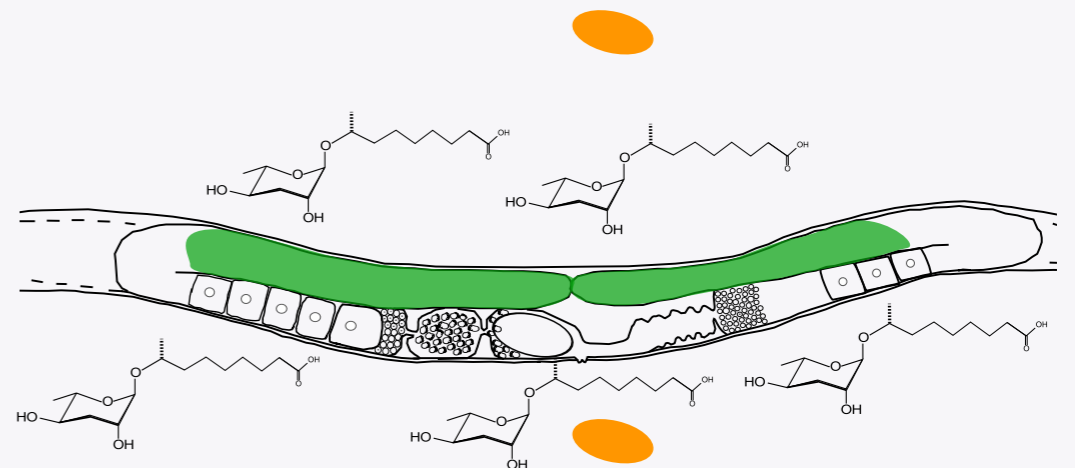
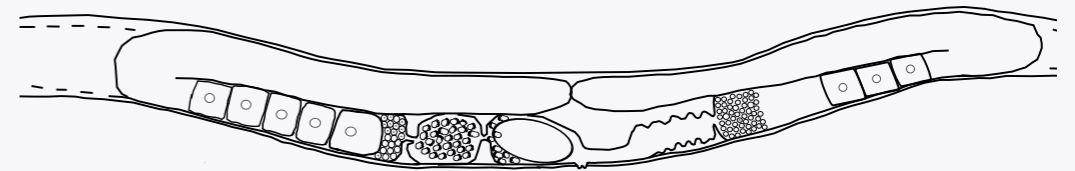


No Effect

Response 1

Response A

Licensed



Big effect

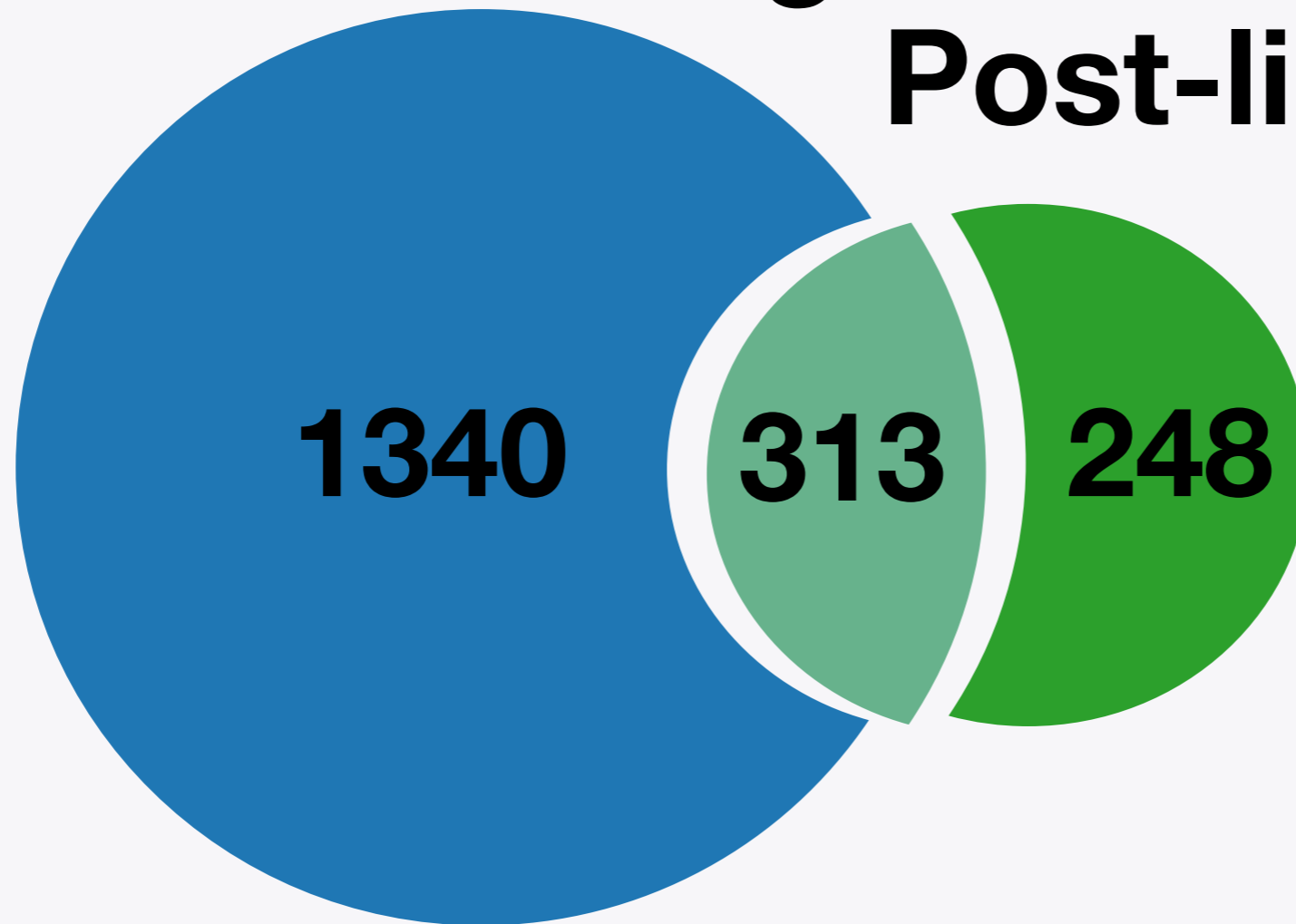
Response 2

Response A +/- B

Many ascr#10 effects are shared
in pre- and post-licensed animals

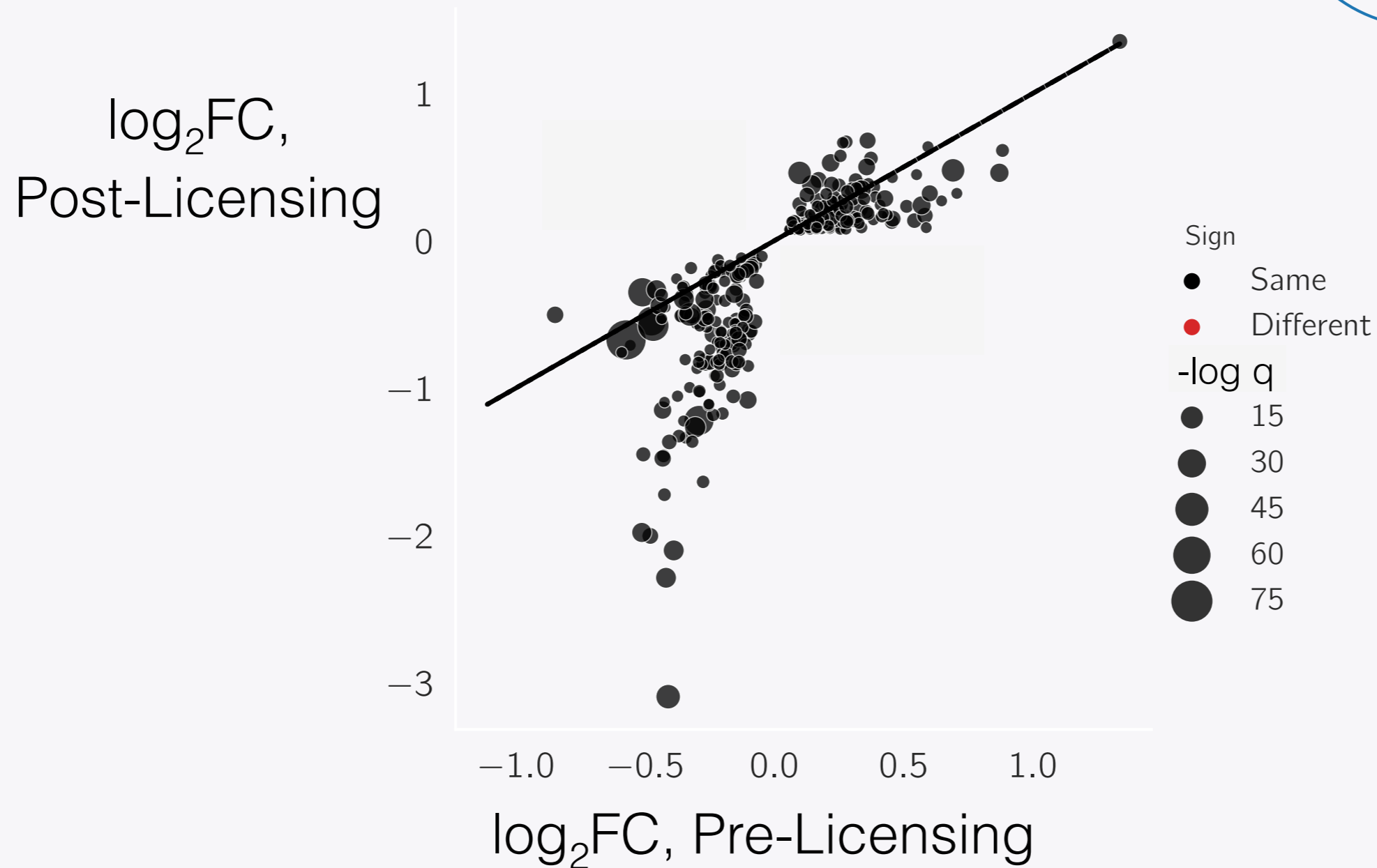
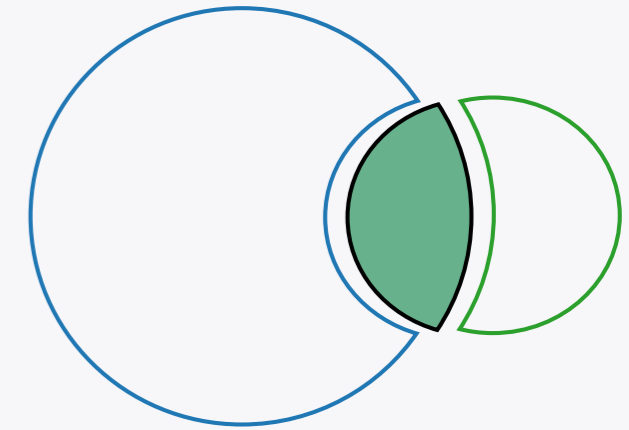
Pre-licensing

Post-licensing



**The post-licensing response is NOT completely distinct
from the pre-licensing response**

Discordant gene expression measurements look spurious



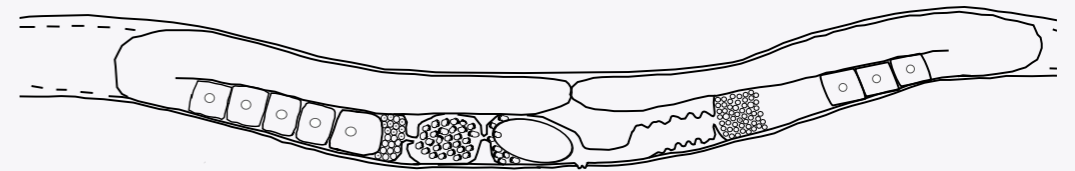
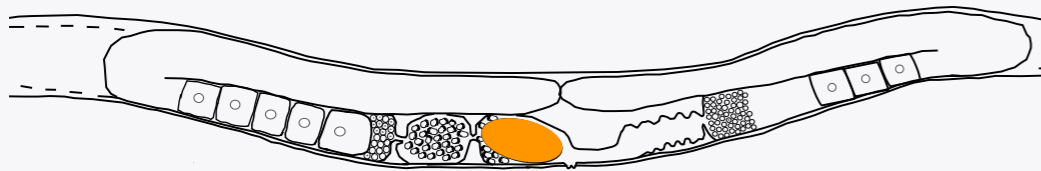
- **Few discordant genes relative to concordant genes**
- **Discordant genes have poor q-values**

A 2-factor experimental design evaluates ascr#10 transcriptomic effects

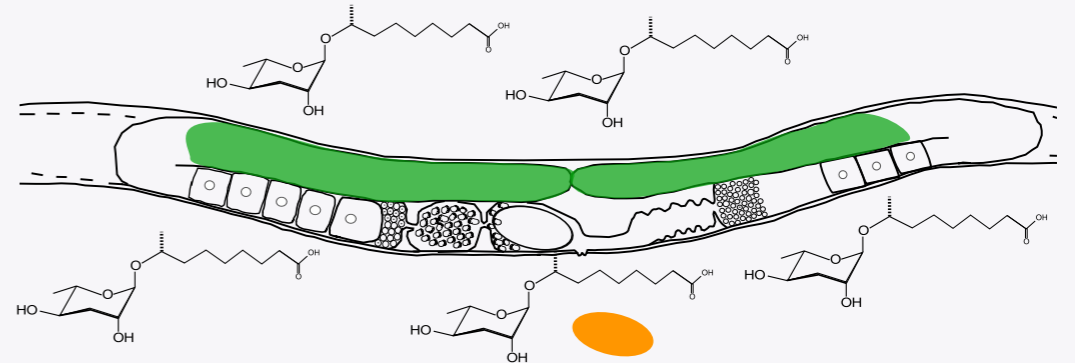
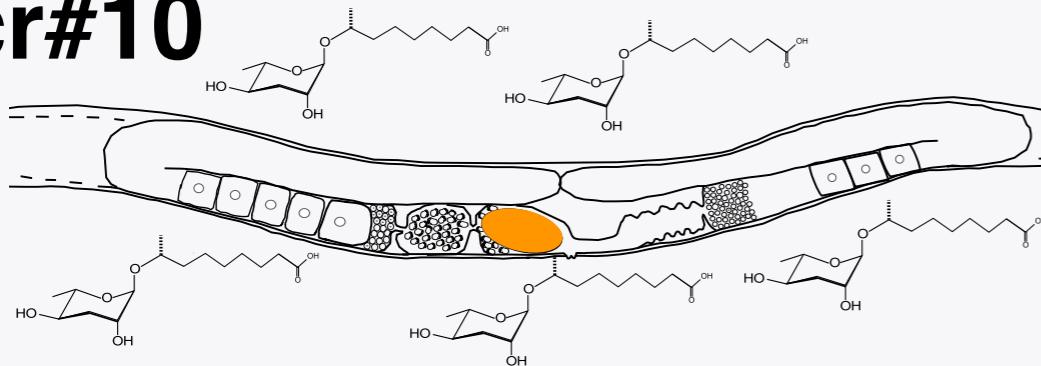
Pre-licensing

Licensed

No ascr#10



ascr#10



No Effect

Big effect

Response 1

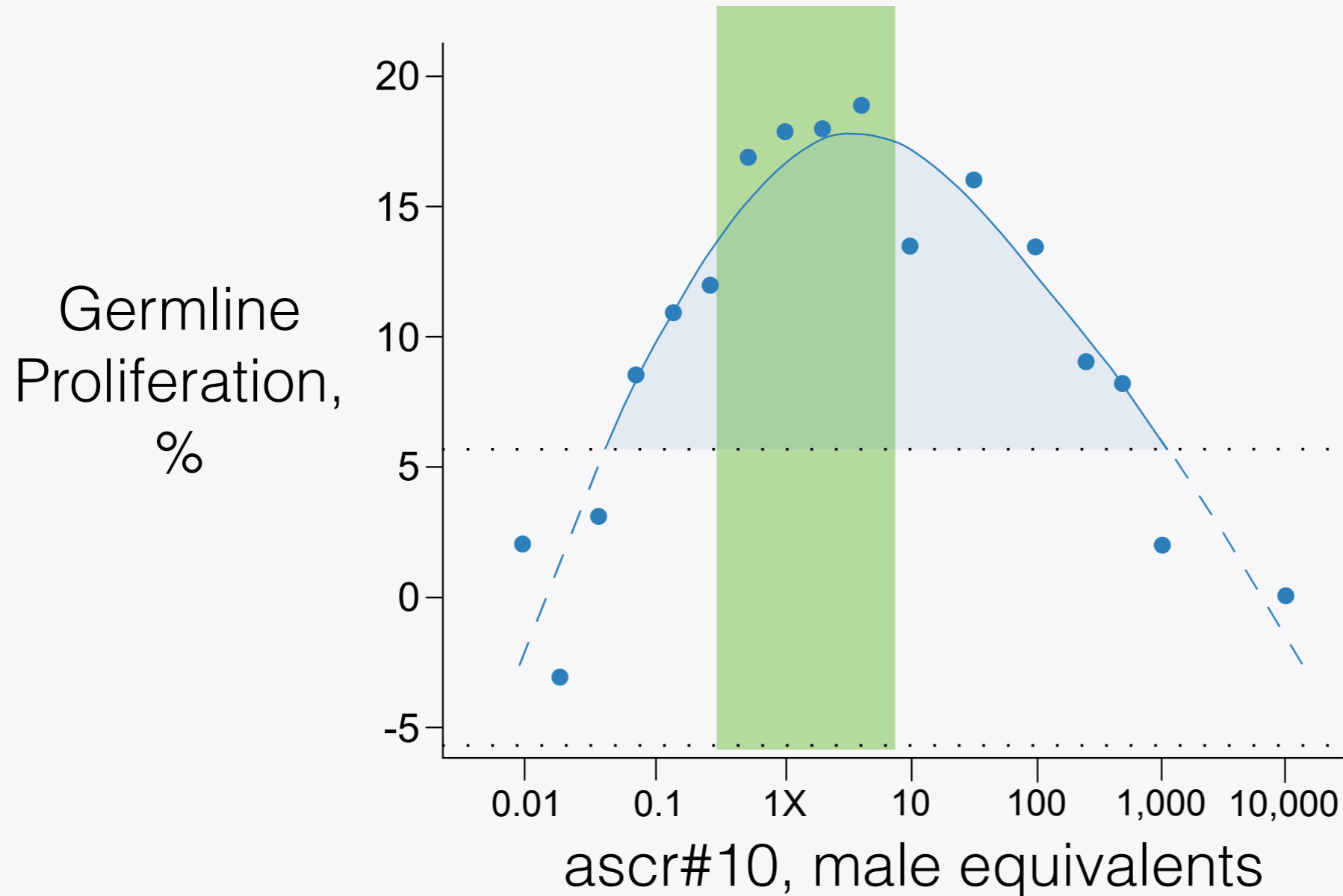
Response 2

Response A

Response A +/- B

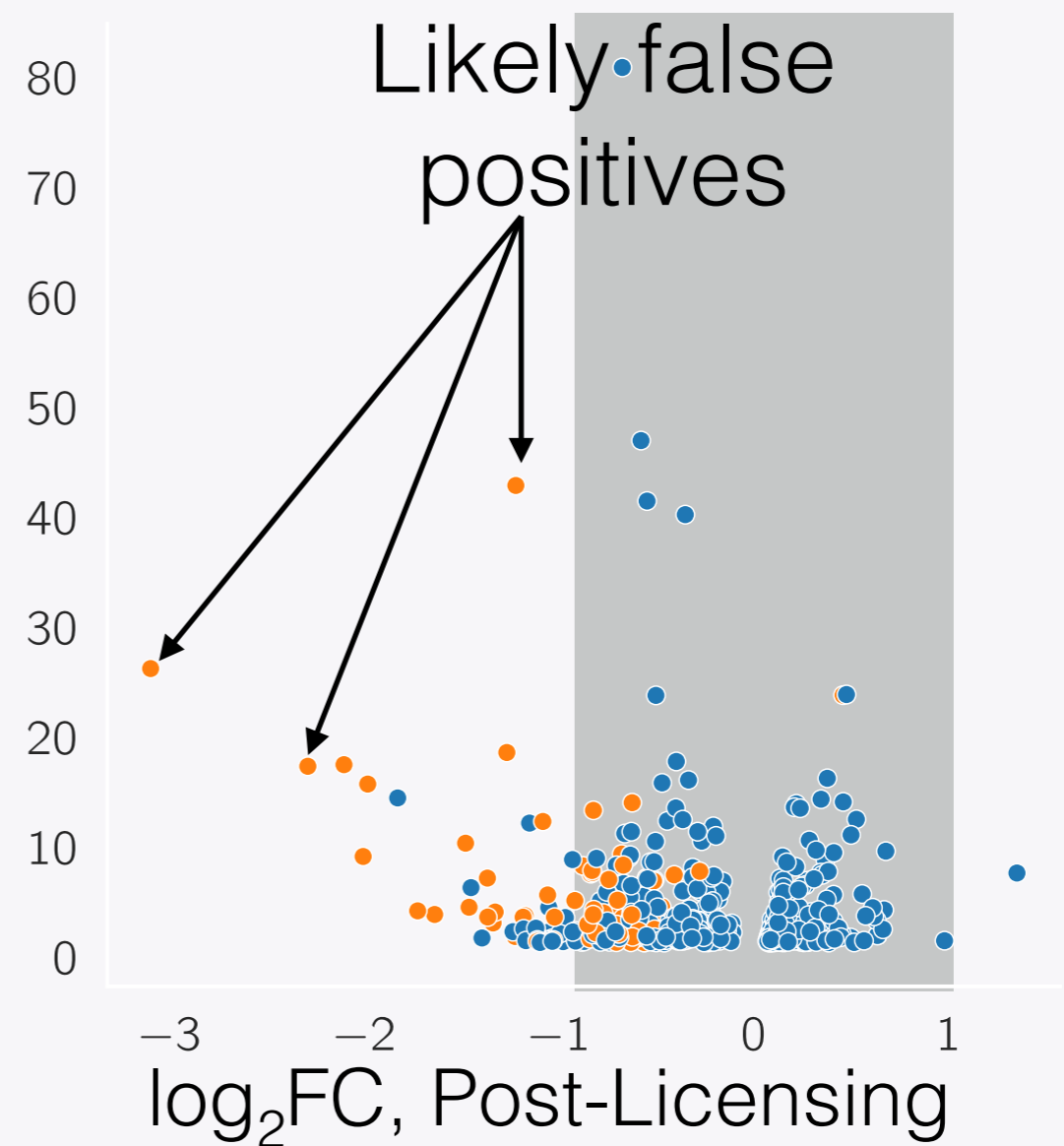
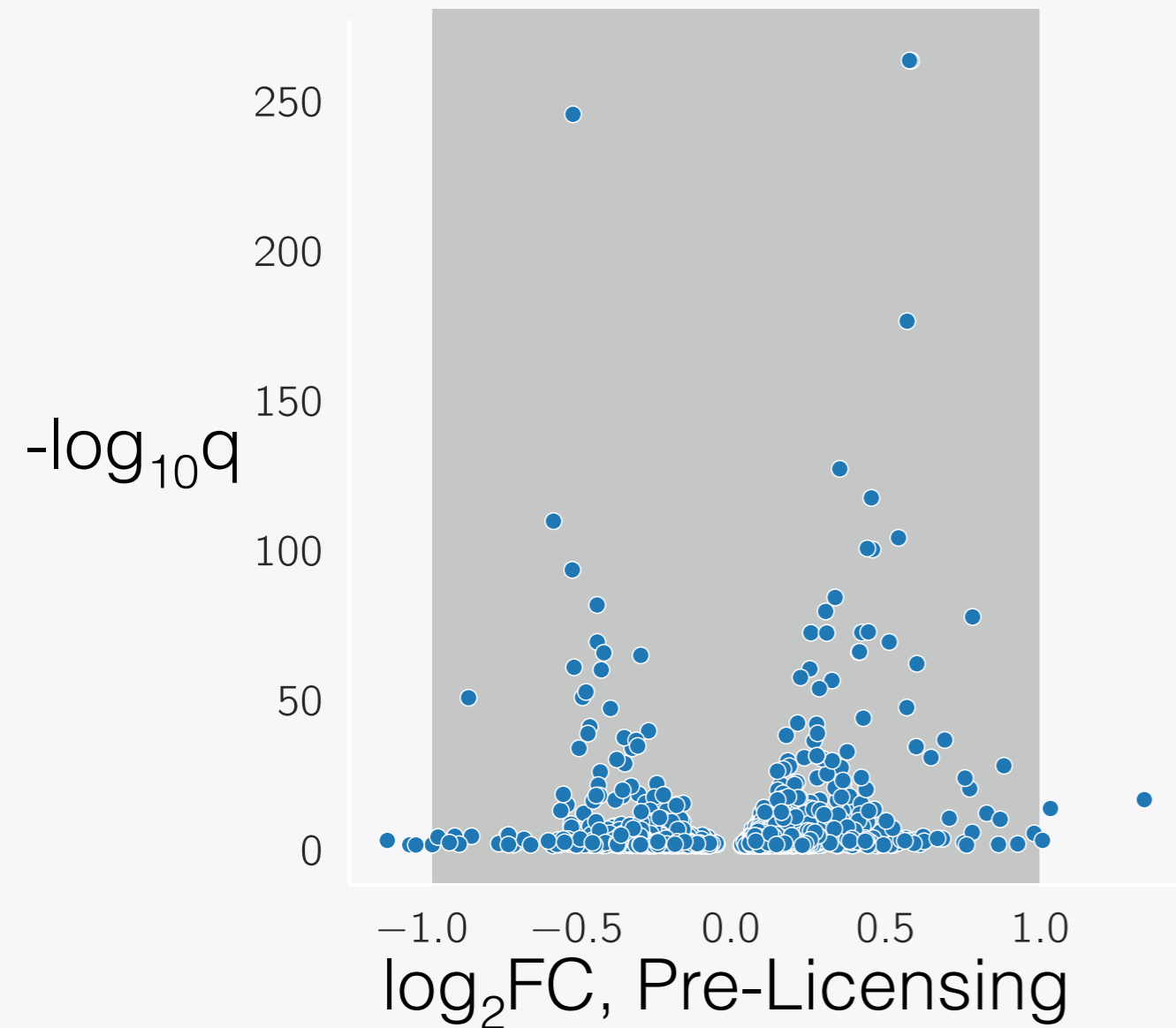
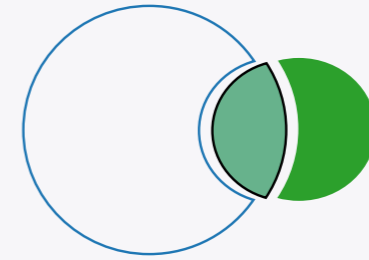
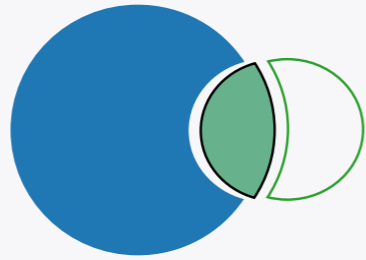
Pheromone signaling is exquisitely dose-dependent

Aprison & Ruvinsky
(2017) *Curr Biol.*



Our experiments were performed at a low, physiologically relevant, concentration of ascr#10

Average fold-change is < 2



Imposing fold-change cutoffs distorts results

ascr#10 shortens hermaphrodite lifespan

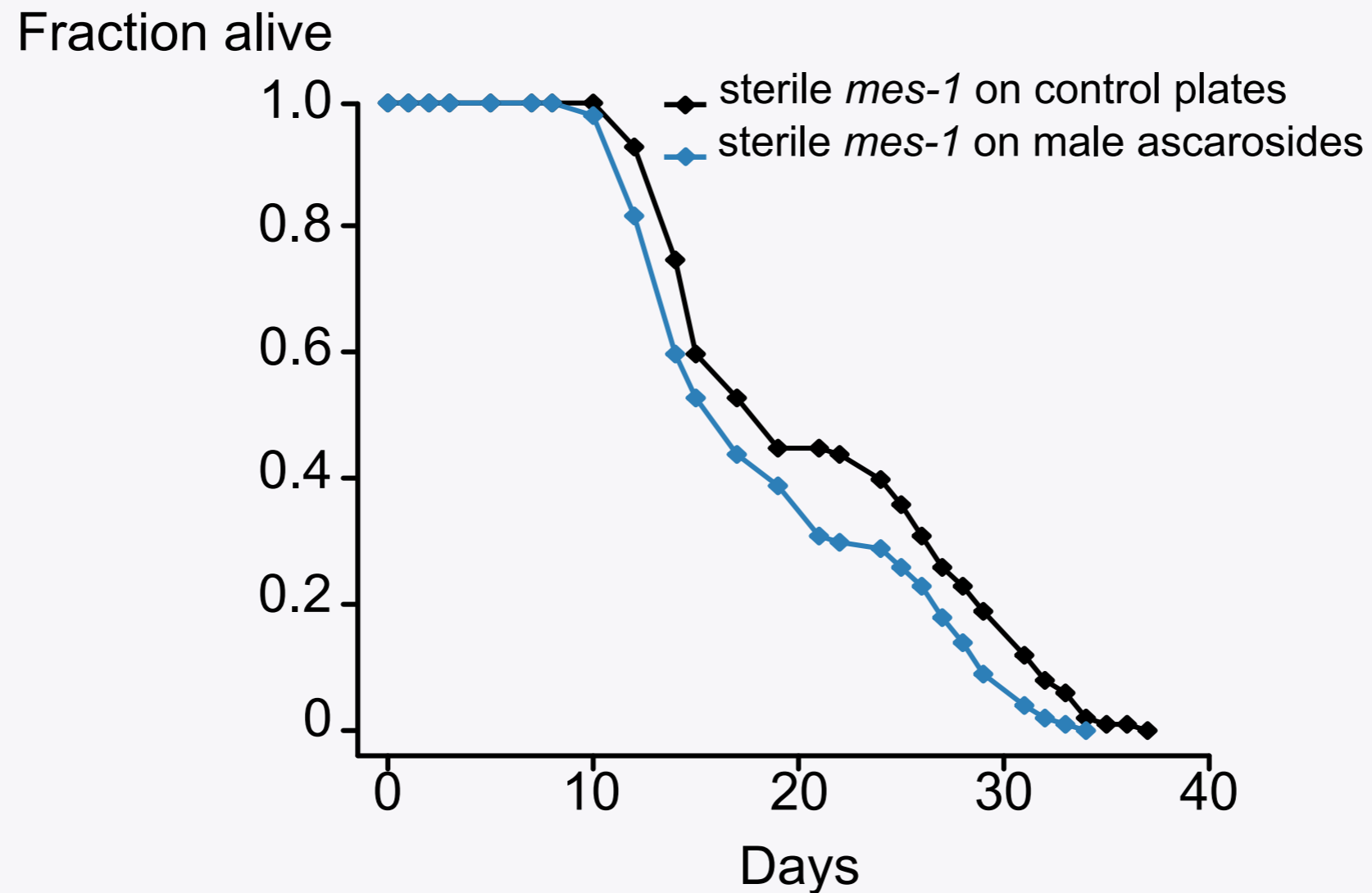


Fig from: Aprison & Ruvinsky (2016) *Curr. Biol.*

Also see:

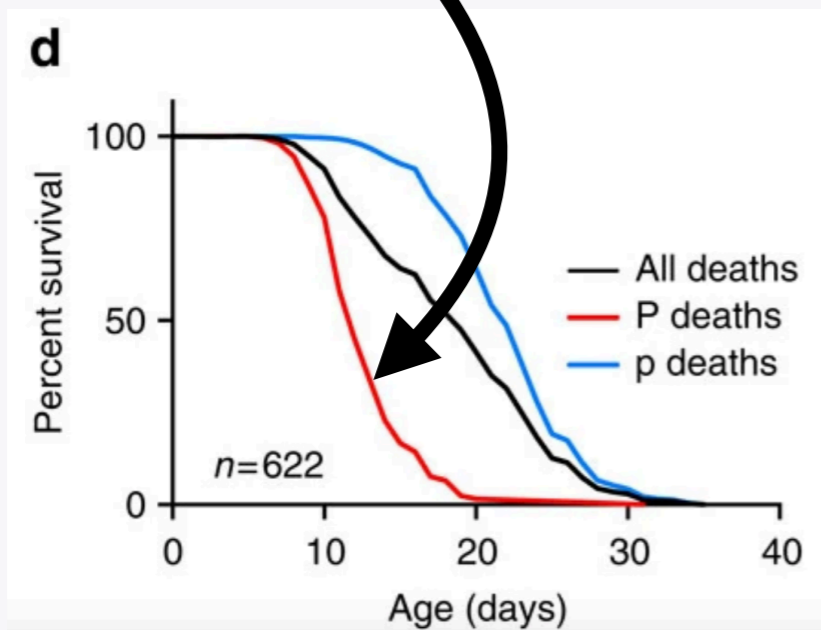
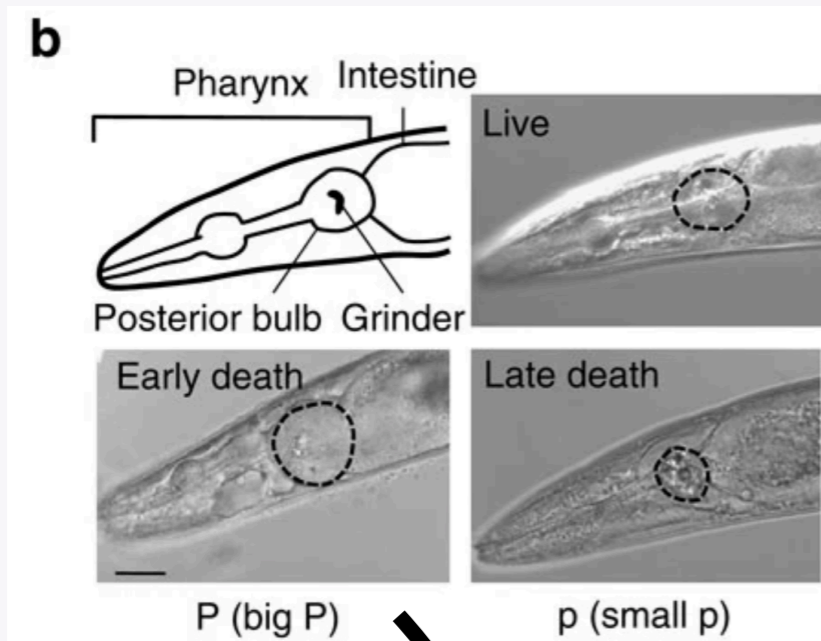
Maures *et al.* (2014) *Science*

Shi & Murphy (2014) *Science*

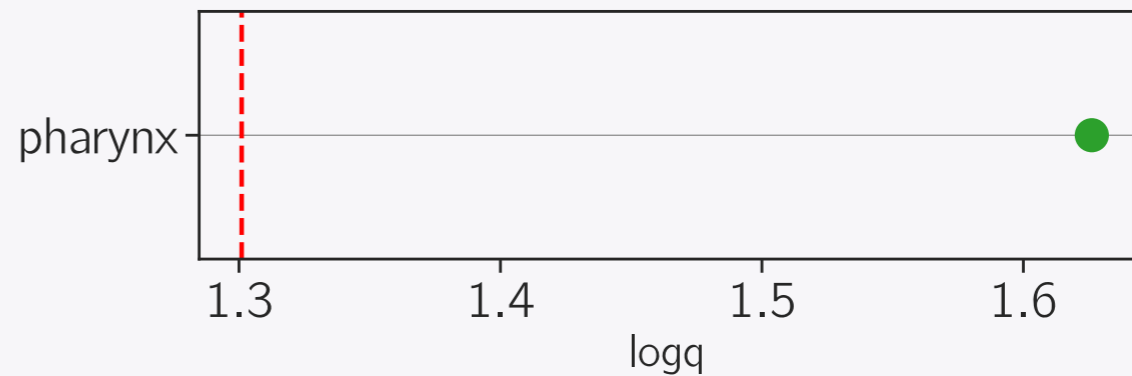
Shi *et al.* (2017) *eLife*

Ludewig *et al.* (2019) *Nat Chem Biol*

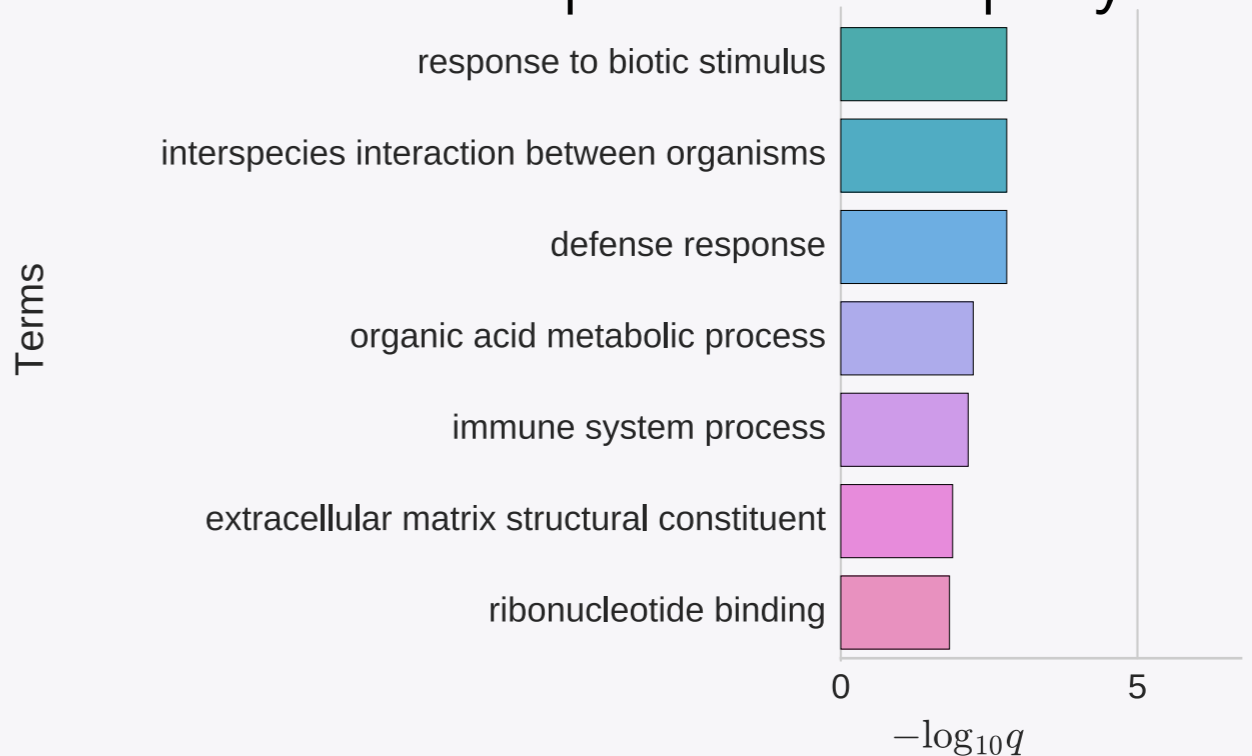
Transcriptomic analysis points to pharynx as cause for earlier demise



Pharyngeal Exp. goes UP

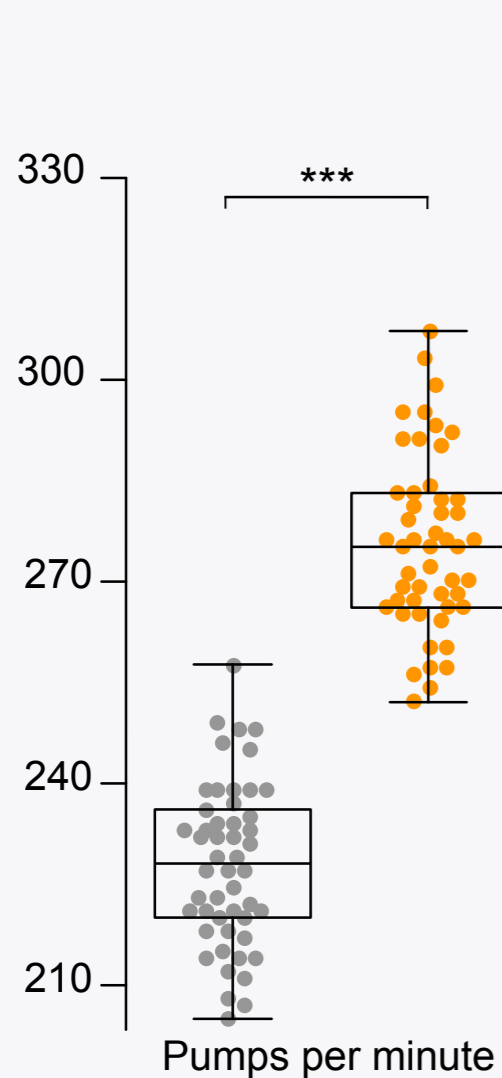
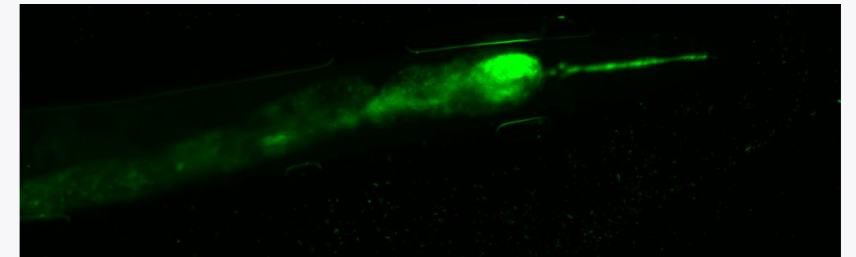
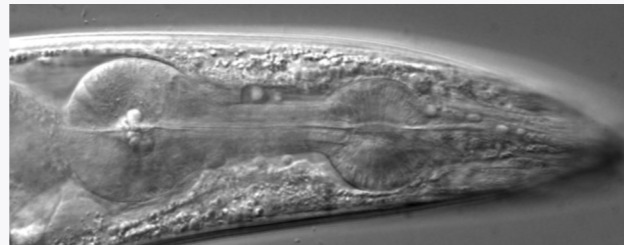


Immune Response is deployed

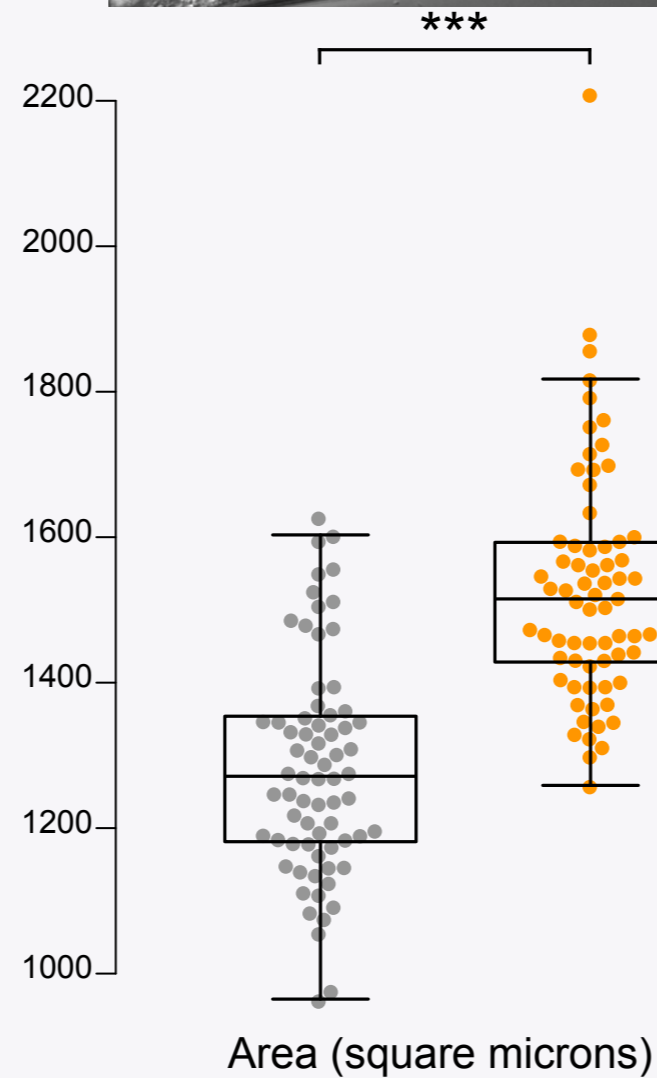


Transcriptomic analysis points to pharynx as cause for earlier demise

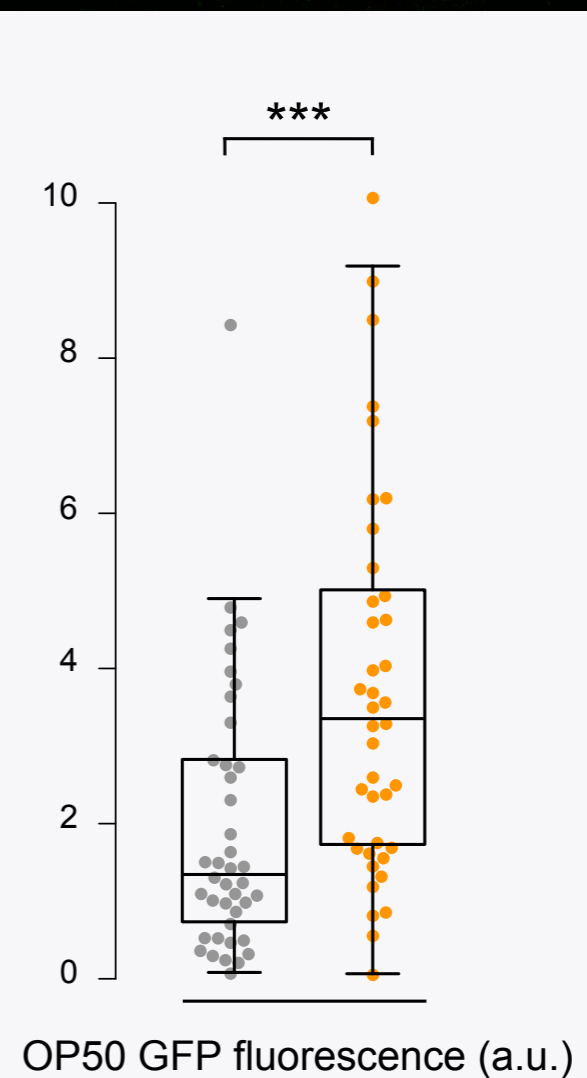
- control
- ascr#10



Increased pumping



Enlarged Posterior bulb



More live bacteria in intestine

Acknowledgments

Ruvinsky Lab



Erin Z. Aprison Svetlana Dzitoyeva

Frank Schroeder (Cornell)

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