

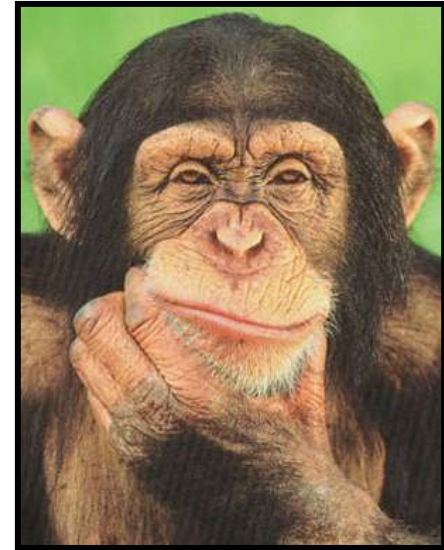
## To Self or Not to Self:

Does pollen performance differ between outcrossing and selfing *Clarkia*  
sister taxa?



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- James Jackson  
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Funded by NSF

# Mating Systems

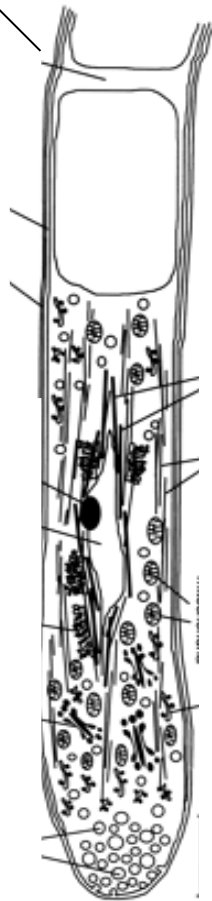


DNR Photo by  
Mike Luisi



# PLANT SEX

Callose Plug



Anther



Stigma

Pollen

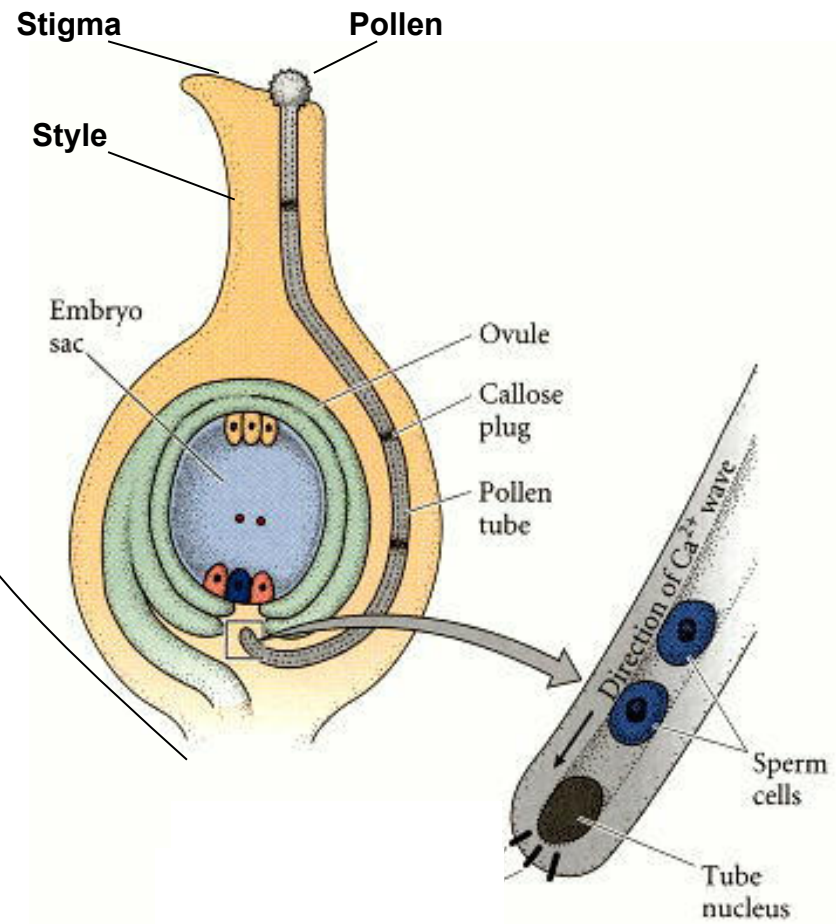
Style

Embryo sac

Ovule

Callose plug

Pollen tube



Direction of  $Ca^{2+}$  wave

Sperm cells

Tube nucleus

# Sister taxa are genetically similar.

## Selfers:

*C. xantiana* ssp *parviflora*



*C. exilis*



## Outcrossers:

*C. xantiana* ssp *xantiana*



*C. unguiculata*





# Why Self?



## Pros:

- Reproductive assurance.
- No reliance on pollinators.
- Shorter life cycle--drought avoidance.

## Cons

- Inbreeding depression: negative alleles will be expressed more often.
- Less genetic diversity--more chance of extinction.

# How does one self?

## Herkogamy

- Separation of stigma and anthers
- Structural

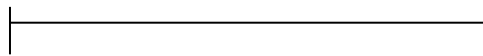
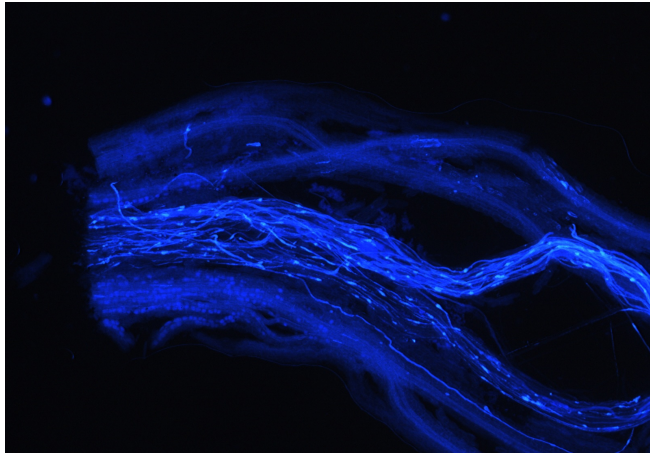
## Dichogamy

- Sequential hermaphroditism
- **Protogyny**: stigma receptivity precedes anther dehiscing. Female is ready first.
- **Protandry**: anther dehiscing precedes stigma receptivity. Male is ready first.

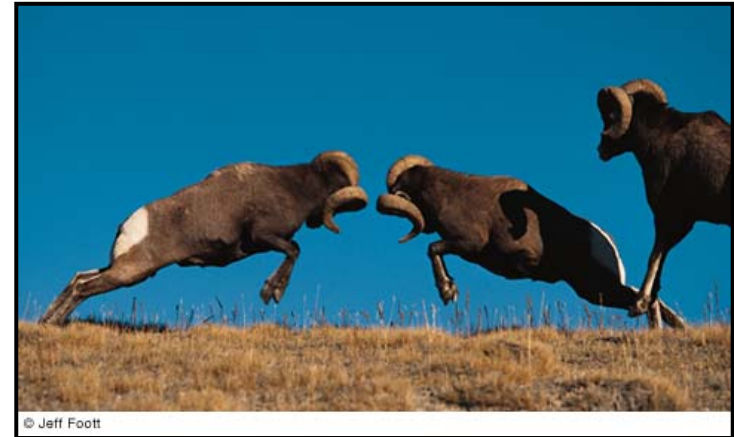
**Protandry** occurs in outcrossing *Clarkia*.  
And is common in humans--  
males are ready first.



# Which tubes are mas macho?



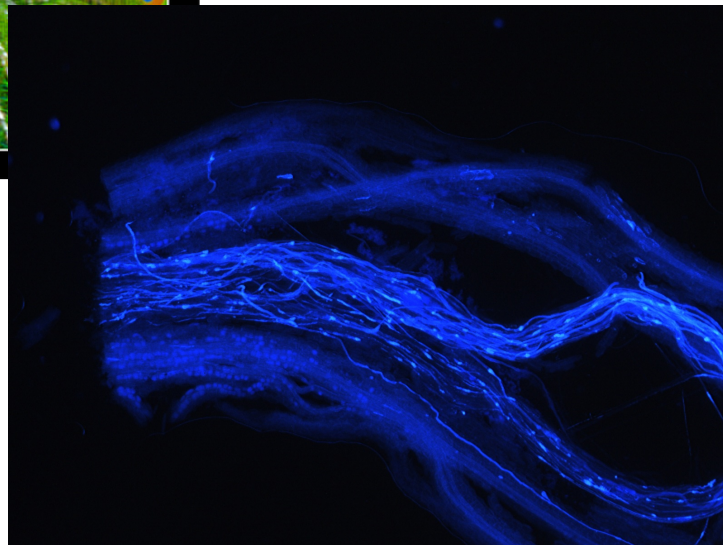
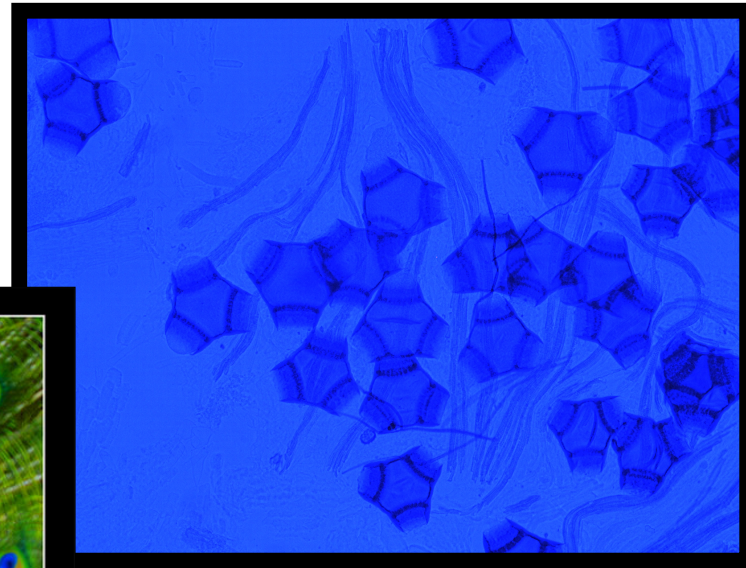
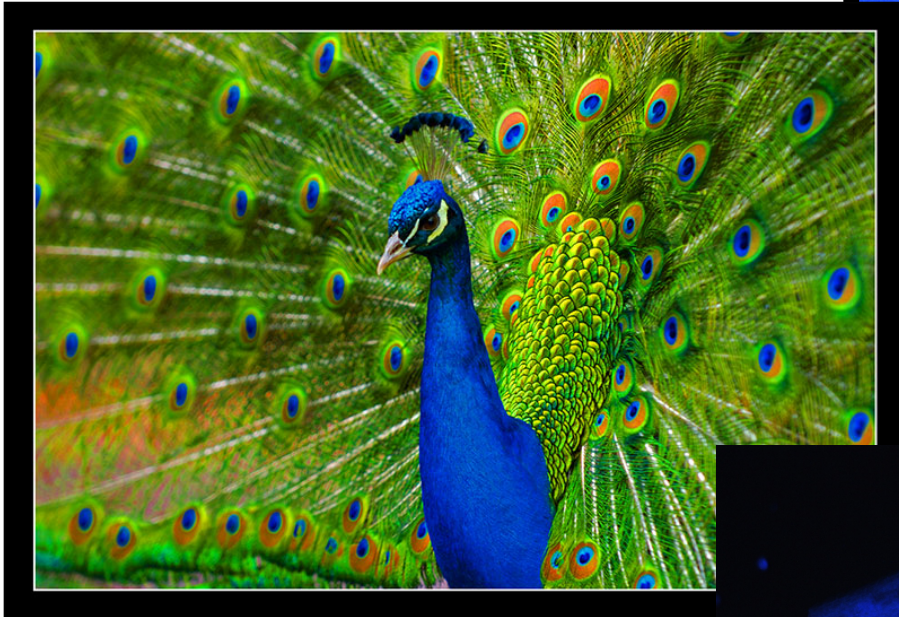
3mm



- **Our hypothesis:** Outcrossers will have more attrition and faster tubes.
- Why would we guess that?
- More competition from diverse males in outcrossers.
- The females have more choices so they can be selective.
- Counter intuitive? The tubes of outcrossers are faster and more virile than selfers; but because of male-male competition and selective females, outcrosser's tubes die more often.
- DOES SEXUAL SELECTION OCCUR IN PLANTS?



# Sexual Selection





# Field Methods:

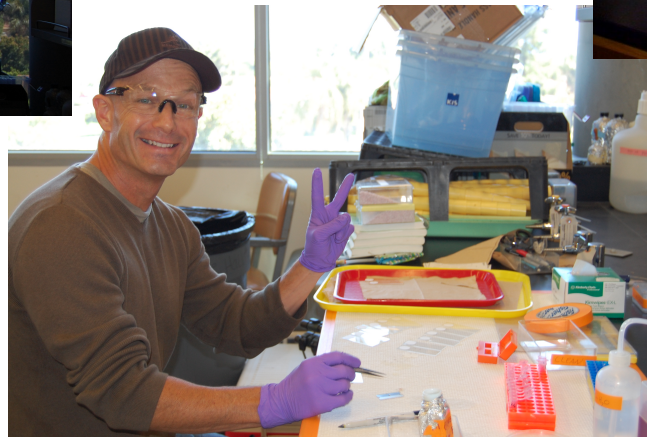
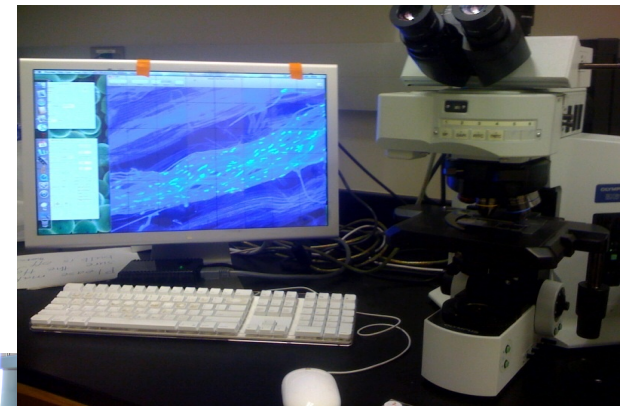
The four sister taxa were collected and brought to the lab.

- The Flowers were naturally pollinated.
- The flowers were collected after the stigma senesced.--the stigmas were no longer receptive to pollen.



# Fluorescence Microscopy

Samples are preserved in FAA. We then soak them in NaOH. Next we dye the samples in alanine blue and mount them using glycerol. We then use fluorescence microscopy to view and count the pollen tubes (callose plugs) in the mm closest to the stigma and at the base of the style. Finally we compare the tubes at the top to the tubes at the base to find pollen tube attrition.



## Sister taxa--again:

### Selfers:

*C. xantiana* ssp *parviflora*



*C. exilis*



### Outcrossers:

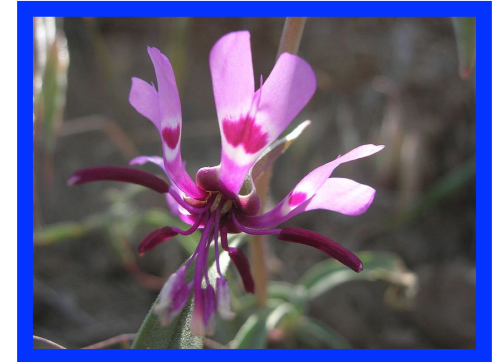
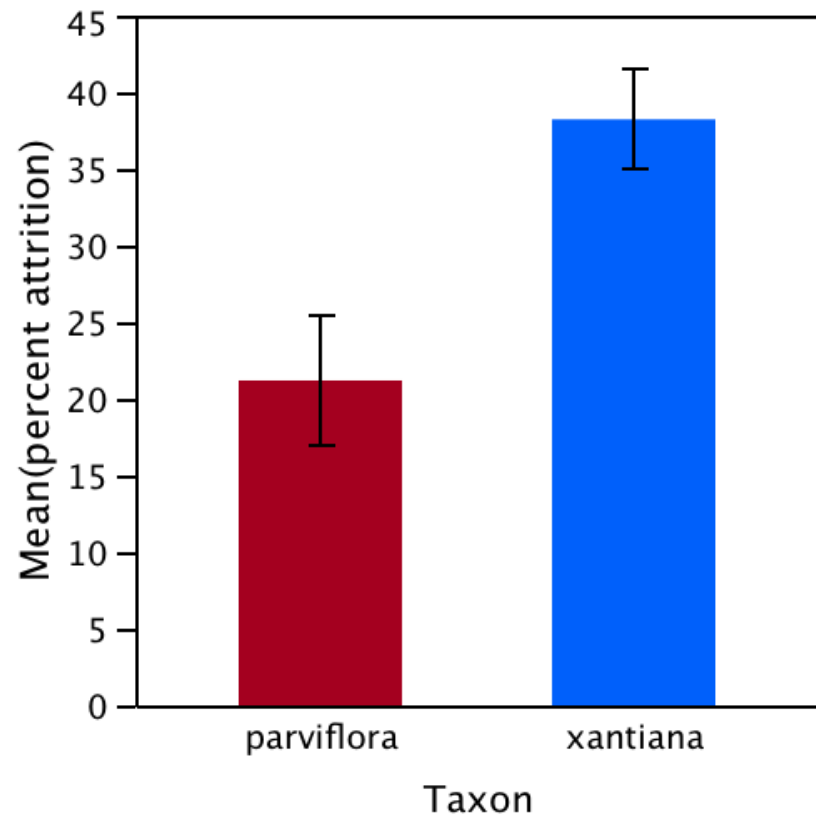
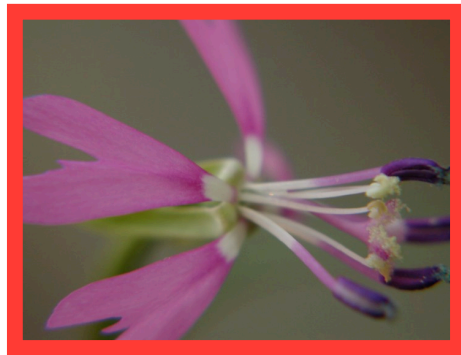
*C. xantiana* ssp *xantiana*



*C. unguiculata*



# Results



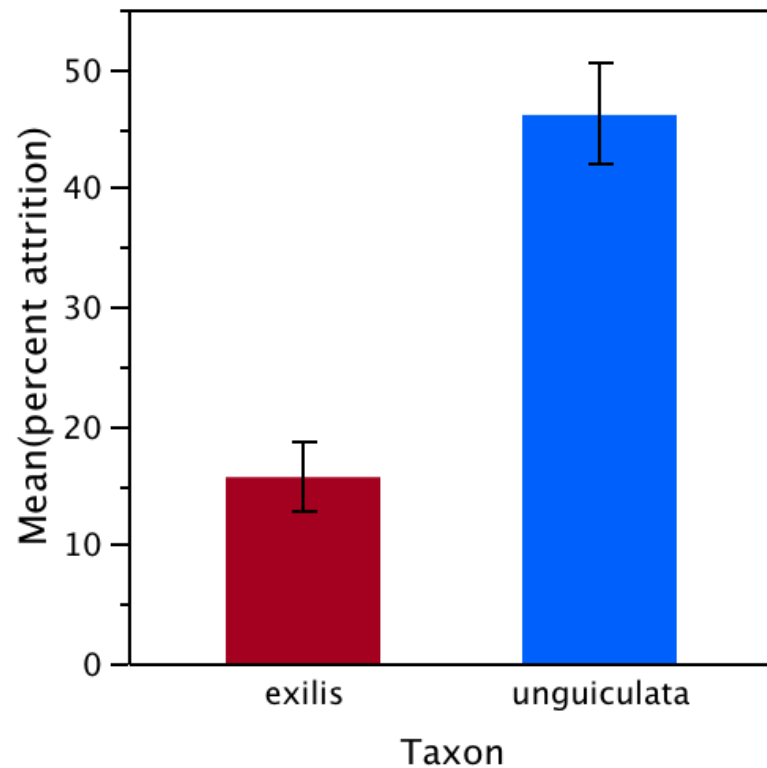


## Results:

### Percent attrition:

$\frac{\text{Tubes at stigma style junction} - \text{Tubes at base of style}}{\text{Tubes at junction}}$

Selfer



Outcrosser



## Conclusion:

Pollen tube attrition occurs at a greater rate in outcrossing species of *Clarkia*.

- **Summary:**
- Mating systems
- Sexual selection
- Pollen performance
- Alisa will find out which pollen is faster...

# Acknowledgements

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