# DisturPloidy

https://github.com/rozeykex/ploidy

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**How does disturbance on a landscape affect the establishment of new polyploid plant species?**

# Polyploidy

(Explain genome duplicaton)

- Unreduced gametes
- Non-disjuntion of early embryos

# Polyploidy

- Common in plants, amphibians and fish.
- In plants especially, we've known about it's prevelance for over 100 years.
- Plant community surveys frequently report ~25% polyploids recorded.

# Polyploidy

Genome duplication is a saltational event; a mutation so large that it can cause instant speciation.

- It could explain much of the plant biodiversity we see.
- ~15% of angiosperm speciations coincide with genome duplication.
- ~30% of fern speciations coincide with genome duplication.

# Polyploidy / Benefits

- Resistant to the deleterious effects of inbreeding.
- Able to flip the inhibition to selfing switch.
- Often display *gigas-effects*.
- Or, *hybrid vigour*.

Does this confer greater invasive potential?

# Polyploidy / Costs

- Reduced access to compatible mates via outcrossing.
- Reduced fecundity due to *diploid pollenswamping*.
- Reduced fecundity due to *triploid sterility*.

Extinction rates are high.

# So why are they so successful?

- Why are polyploids so common in nature?
- What allows these mutated lineages to persist?
- And, when is their establishment success most favoured?

This is a classic problem of plant biology.

# Individual-based models (IBMs)

What is an IBM? Explain

- IBMs differ to mathmatical models.
- They allow fewer assumptions to be made.
- They allow for individual variation.

# What I thought the model had to do

EVERYTHING!

# What the model actually had to do

Not SO much.

# The model

Every generation there is:

1. **Survival** of juvenile and adults (with a chance of increased mortality due to disturbance).
2. **Germination** followed by seed survival.
3. **Growth** of juveniles and adults, with optional clonal growth of adults.
4. **Competition** between adults for resources.
5. **Reproduction** of adults and seed dispersal.

I used an individual-based modelling (IBM) approach to simulate random plant populations on a landscape and advance them, through their life cycle and through time.

The plants began as genetically explicit diploids, and were able to undergo genome duplication during gamete and zygote formation so that polyploids naturally arose amongst the diploids.

Various costs and benefits to being polyploid were included in the model,