

# ***Temperature effects on Arctic charr phenotypic plasticity***



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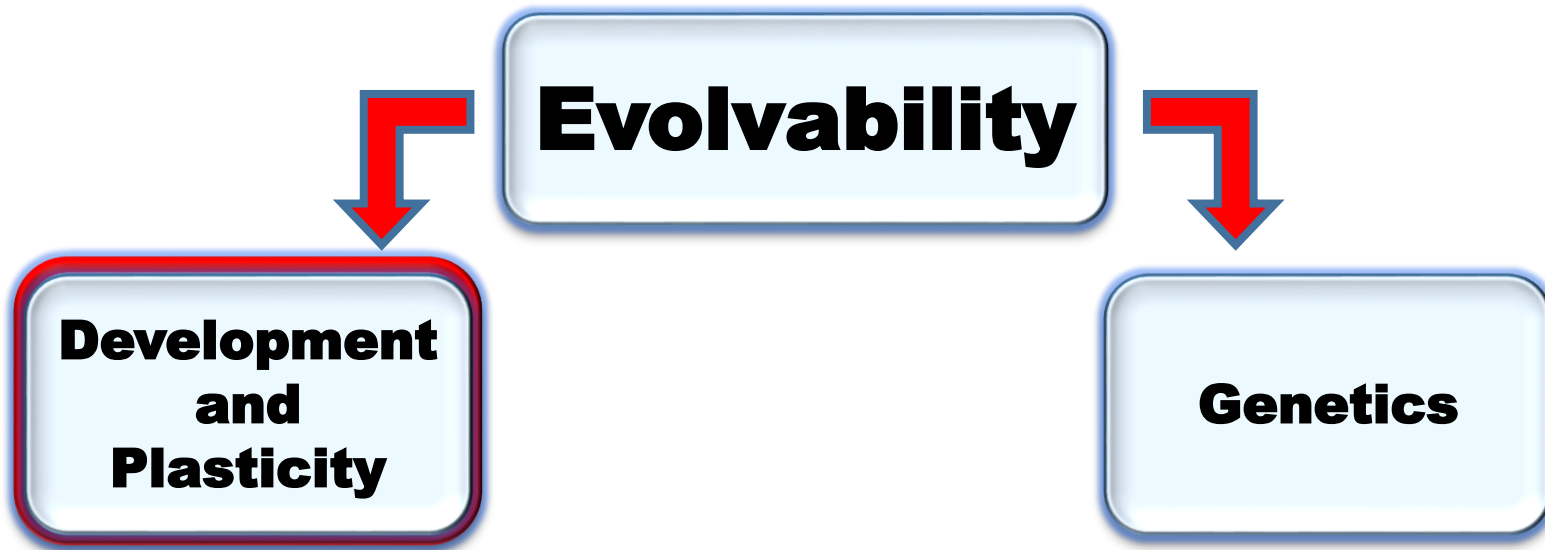


*Supervisors; Kevin Parsons, Colin Adams and Colin Bean*



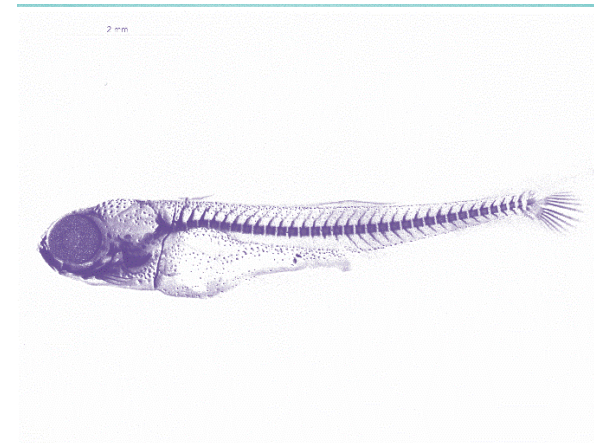
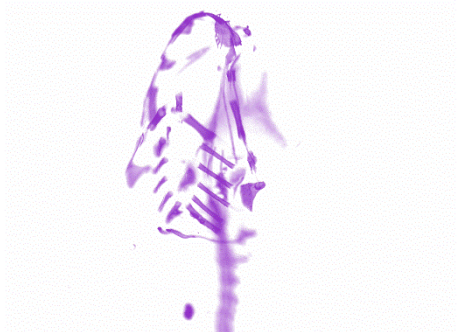
# Evolvability and Conservation Biology

Evolvability is the potential of a population to produce **adaptive** phenotypic variation



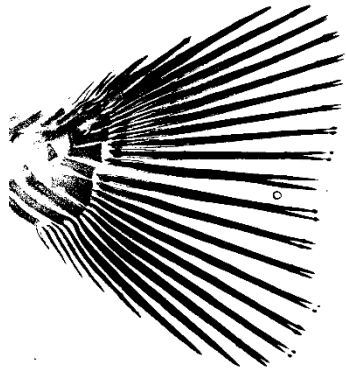
# The Effect of Temperature on Bone Ossification

- Sampled two equivalent developmental stages  
Alcian blue (cartilage) & Alizarin red (bone)
- Quantify variation in bone ossification (ImageJ)



# The Effect of Temperature on Bone Ossification

- Measuring; Area of Stain and Intensity of Stain



$F_{1,134} = 55.6, p < 0.001$

**Area**

More bone  
ossified in fish  
raised at colder  
temperature



$F_{1,69} = 28.7, p < 0.001$

**Area**

Bone more  
heavily ossified in  
fish raised at  
warmer  
temperature



$F_{1,168} = 46.1, p < 0.001$

**Intensity**

# Later-life Phenotypic Plasticity

- Diet manipulation experiment
- Induces different biomechanical stresses leading to bone remodelling
- Investigating the effect of temperature on this plastic response (2x2 study design)
- Conducted geometric morphometric analysis

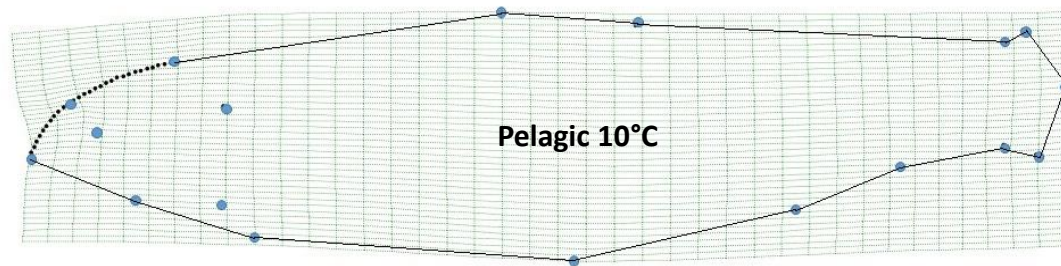




# Later-life Phenotypic Plasticity

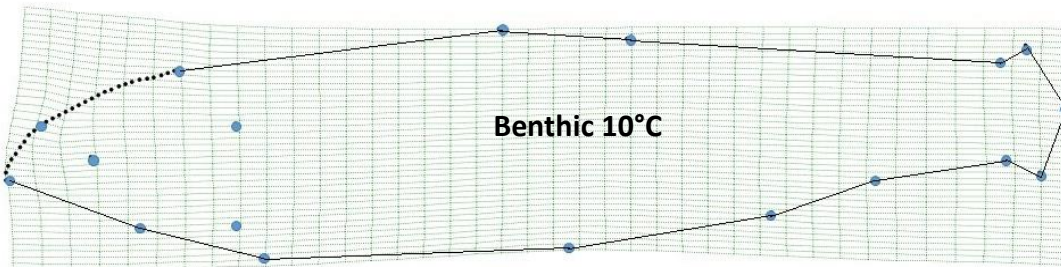
Pelagic

10°C

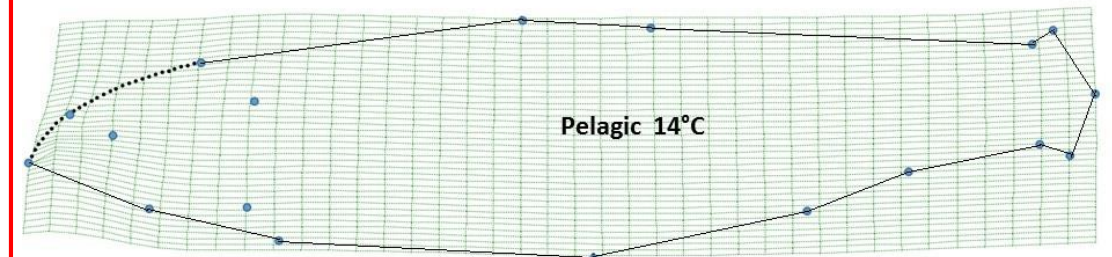


Distance between  
means: 0.0045       $P = 0.116$

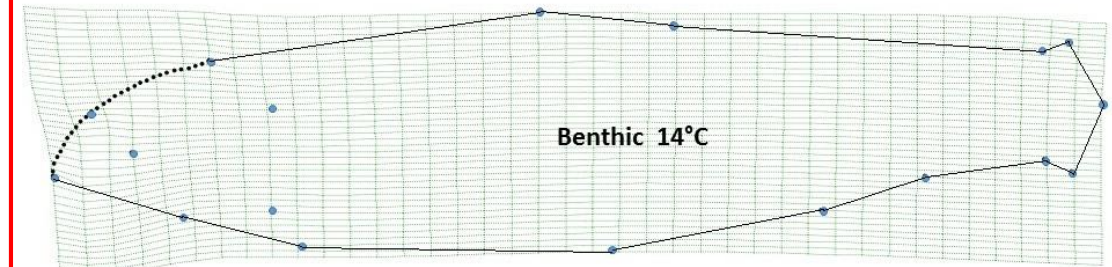
Benthic



14°C



Distance between  
means: 0.0061       $P = < 0.001$



# Take-home points

**Conservation biology should consider environmental influence on development**

**Especially given the potential of climate change to influence the developmental process**

**Putative results suggest bone ossification may be more heavily ossified at an earlier stage under lower temperatures**

**Results suggest temperature does have an impact on plastic response to diet manipulation**