

Developmental approaches toward the preservation of biodiversity

Kevin Parsons

Institute of Biodiversity, Animal Health, and Comparative Medicine
University of Glasgow



University
of Glasgow

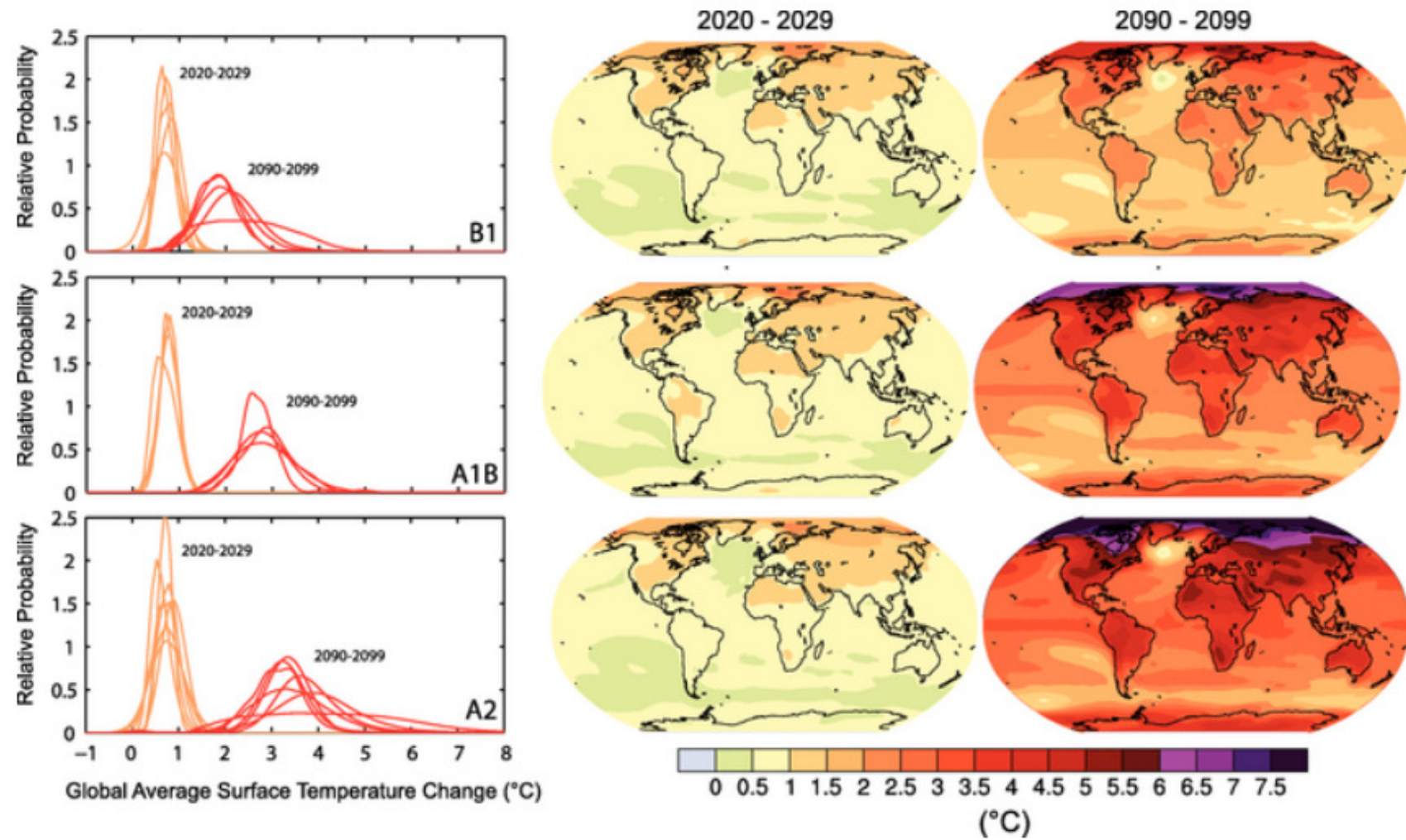
Development occurs from fertilization until death

Development relies on both internal and external cues

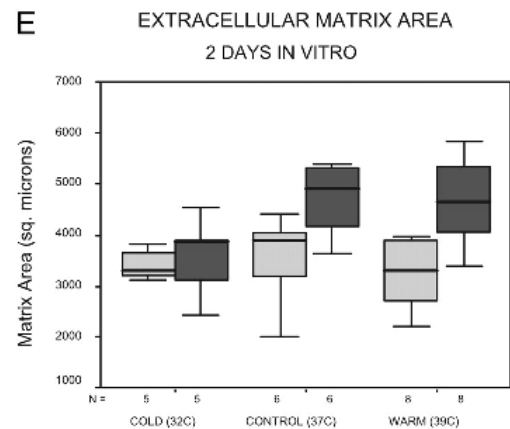
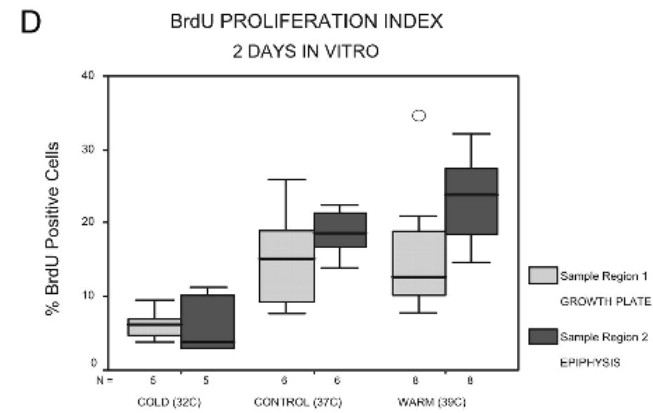
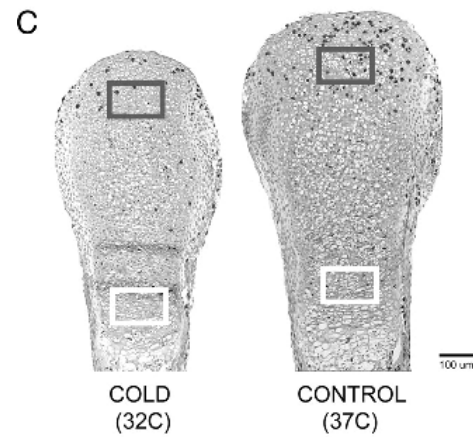
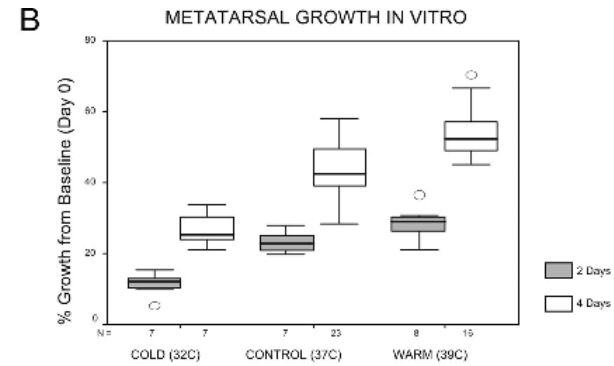
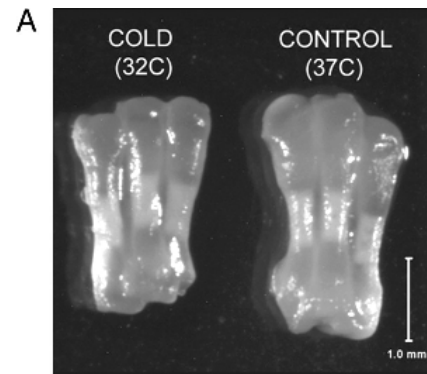
Environmental induction of phenotypic variation (plasticity) is ubiquitous



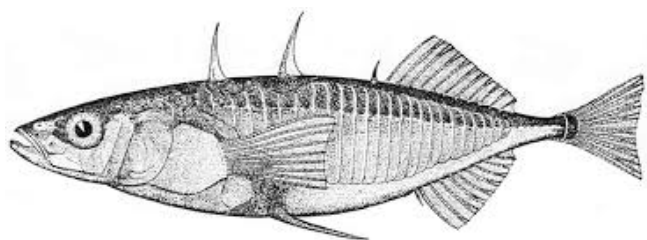
PROJECTIONS OF SURFACE TEMPERATURES



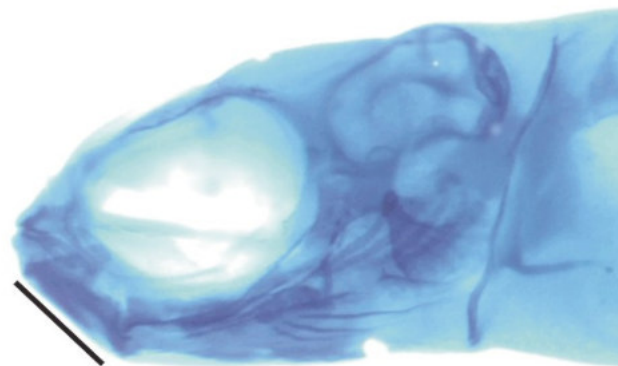
IPCC (2007)



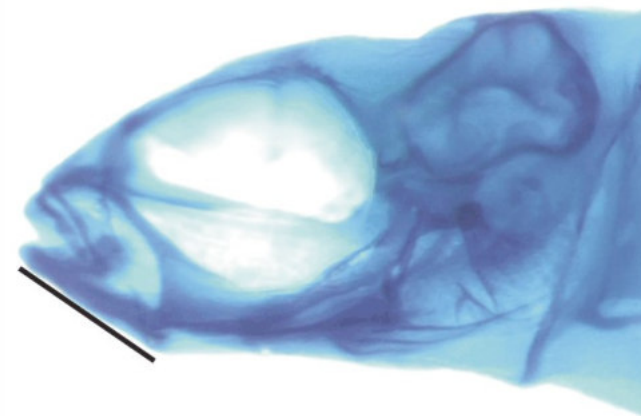
Serrat, King, Lovejoy 2008,
PNAS 105:19348-19353



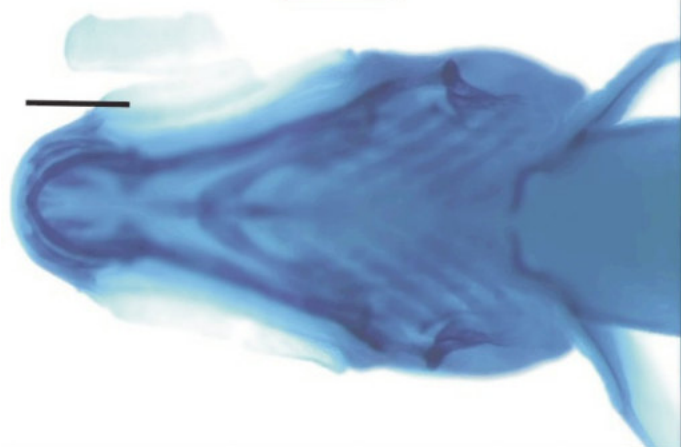
12



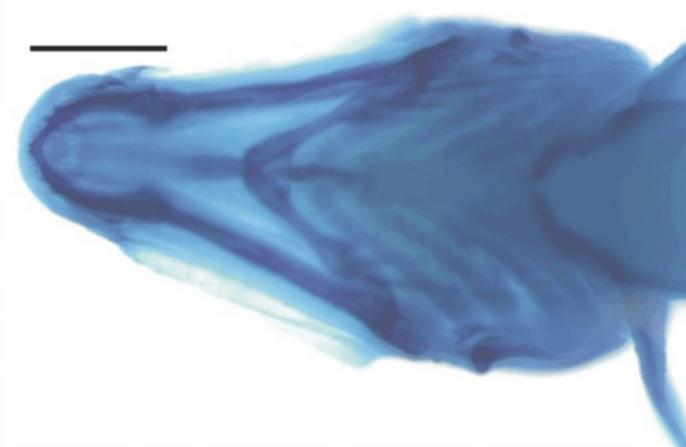
18



12



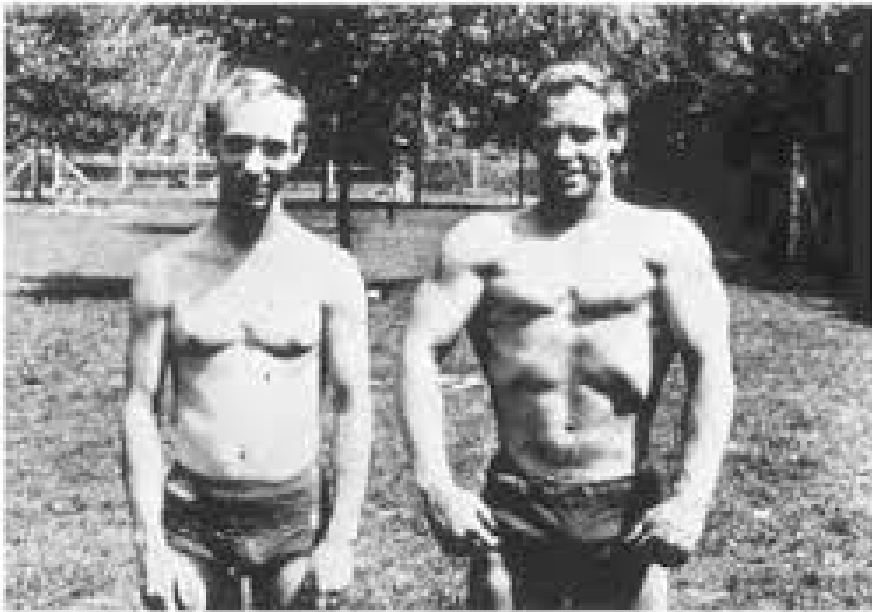
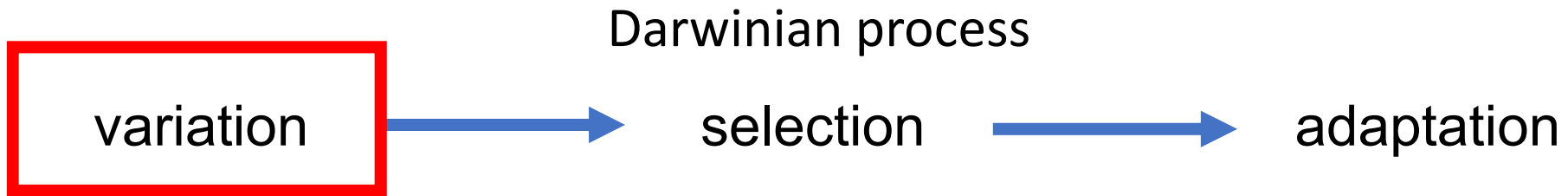
18



Why does developmental change matter?

How can we use 'developmental thinking' and approaches?

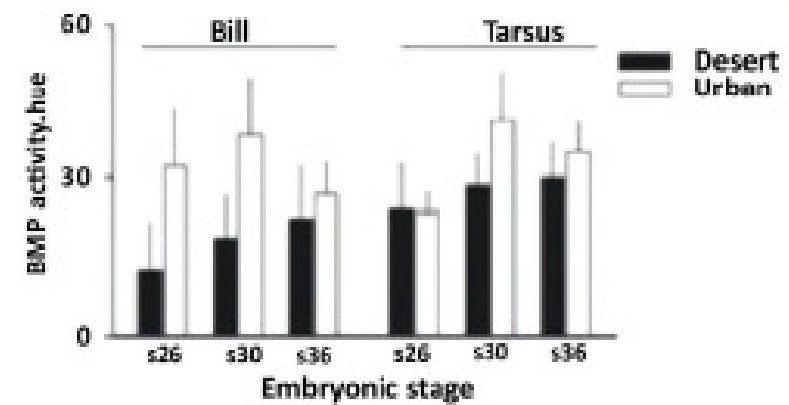
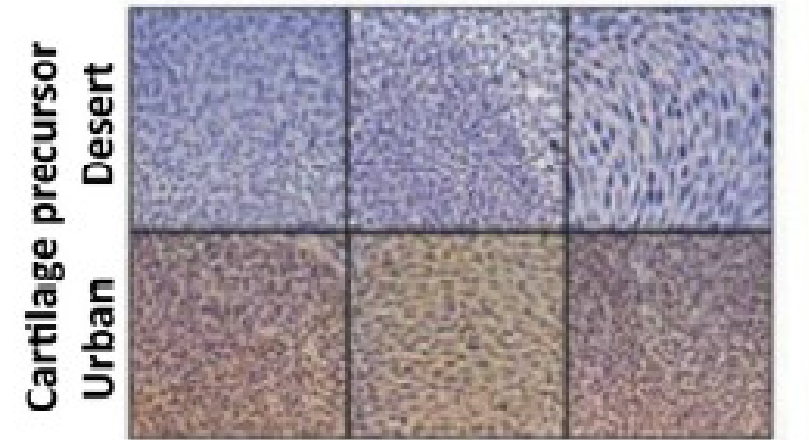
Why does development matter?



Otto

Ewald

- Development can change variation in response to environmental cues
- Development can influence performance



urban versus rural house finches

Development determines what genes are used to create adaptive phenotypes

Development matters because.....

Alters performance/fitness in new environmental conditions

Determines what genes are involved in adapting to changing environments

*Responds to environmental change before demography or genetic variation

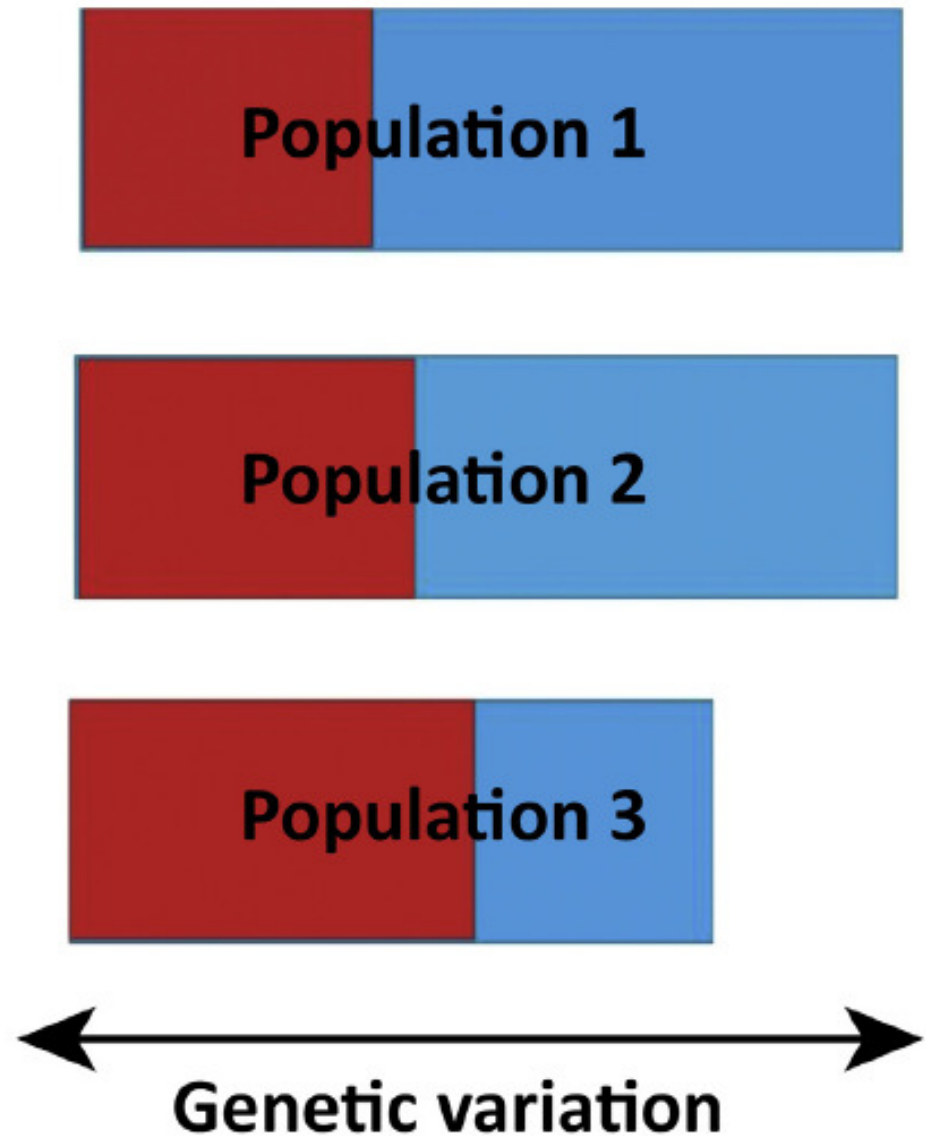
How can we use 'developmental thinking' and approaches?

Conservation genetics

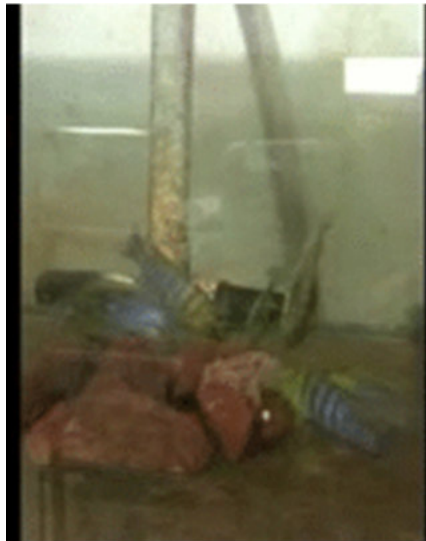
Red = degree of adaptive genetic variation

Blue = degree of neutral genetic variation

Degree of adaptive genetic variation may change in future environments!



Foraging plasticity experiment

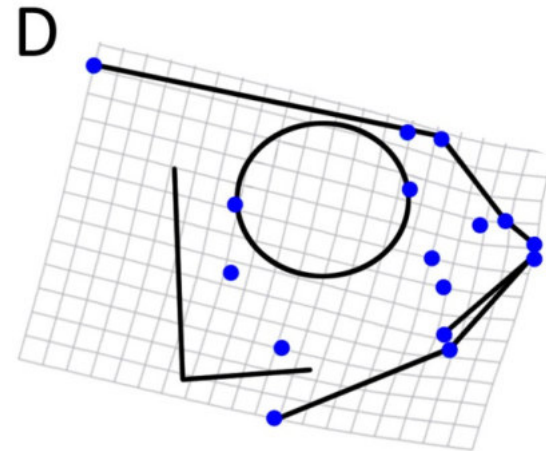
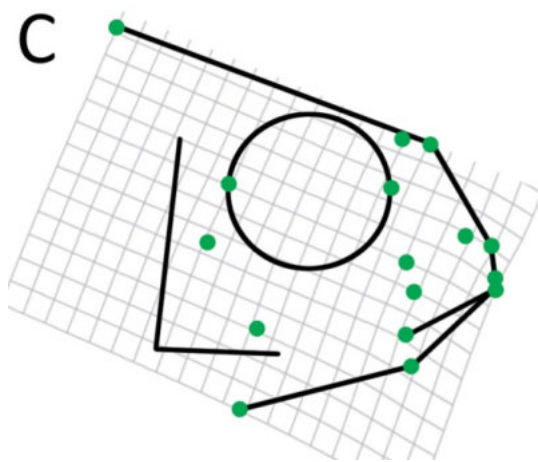
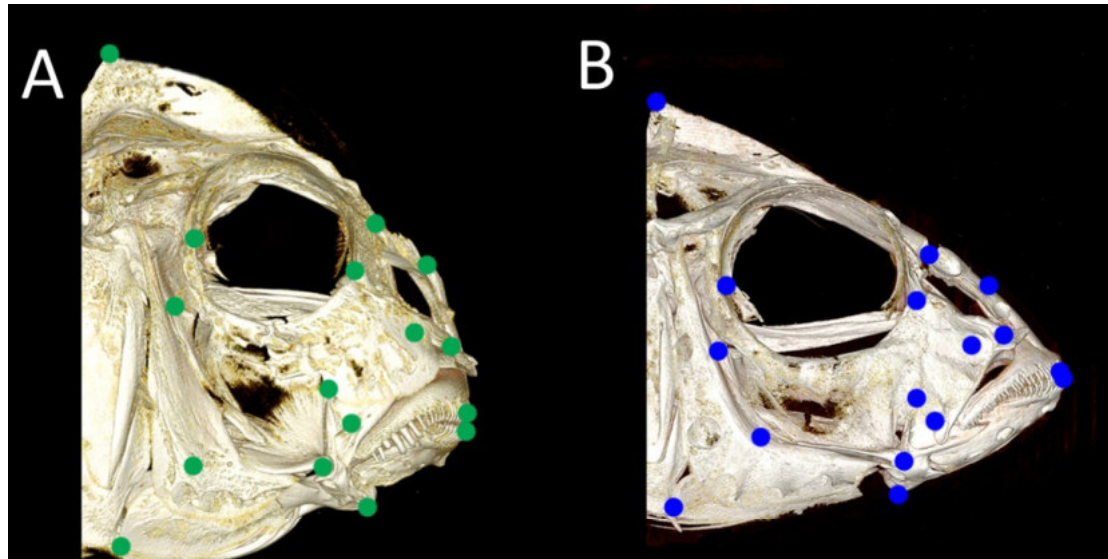


Benthic

6 months

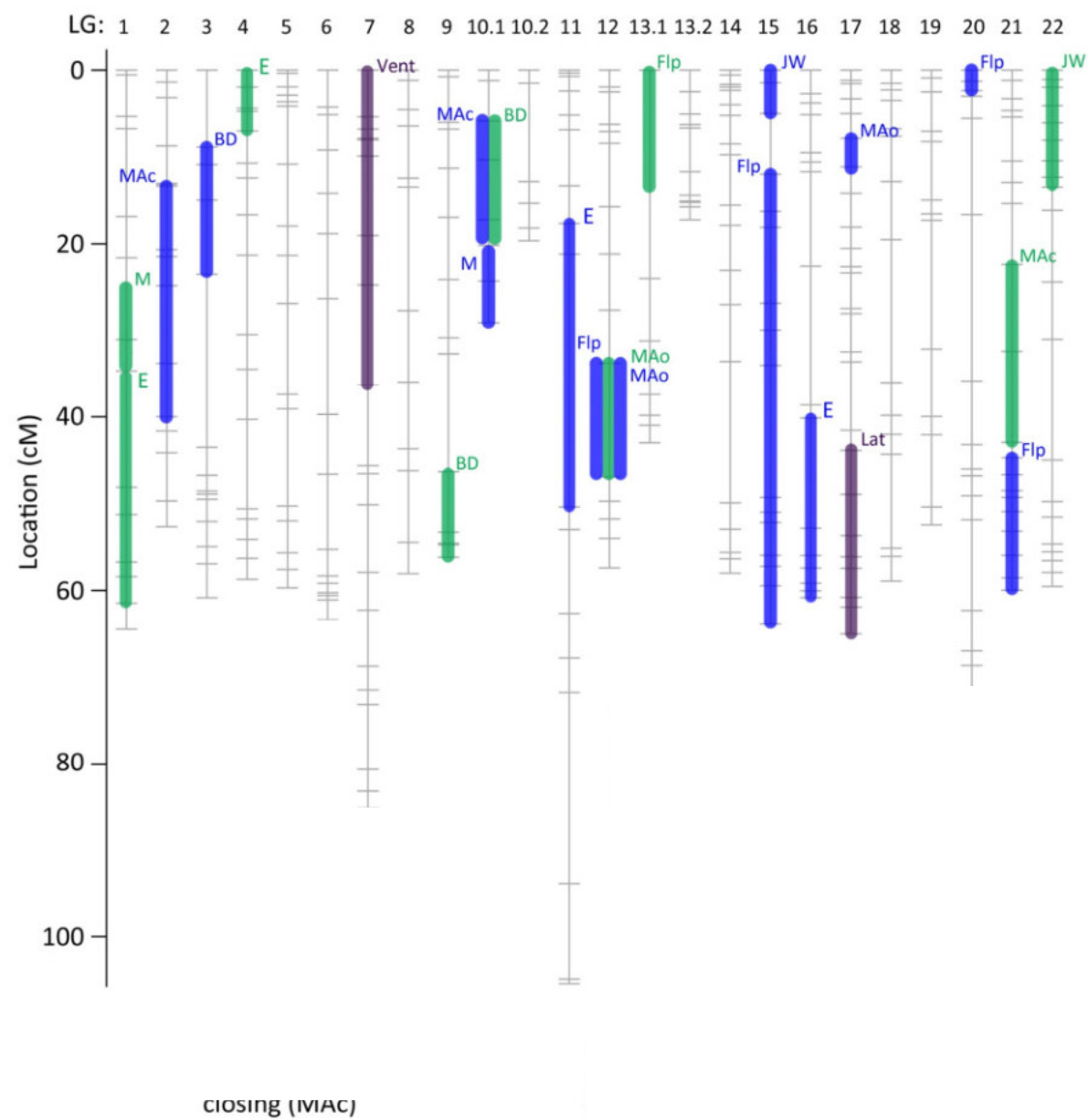


Limnetic

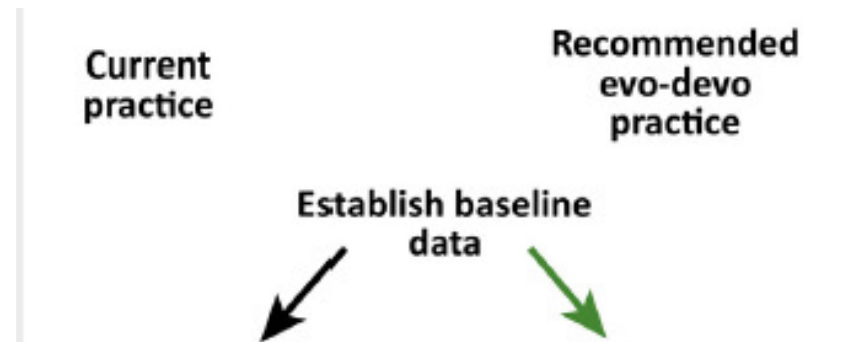


benthic

limnetic



How do we implement
this type of approach?



Trends in Ecology & Evolution

32: 746-759

CellPress

Review

Conservation Evo-Devo: Preserving Biodiversity by Understanding Its Origins

Calum S. Campbell,¹ Colin E. Adams,¹ Colin W. Bean,² and
Kevin J. Parsons^{1,*}