

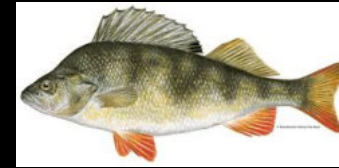


“Intraspecific diversity and its conservation

A summary and take-home messages”

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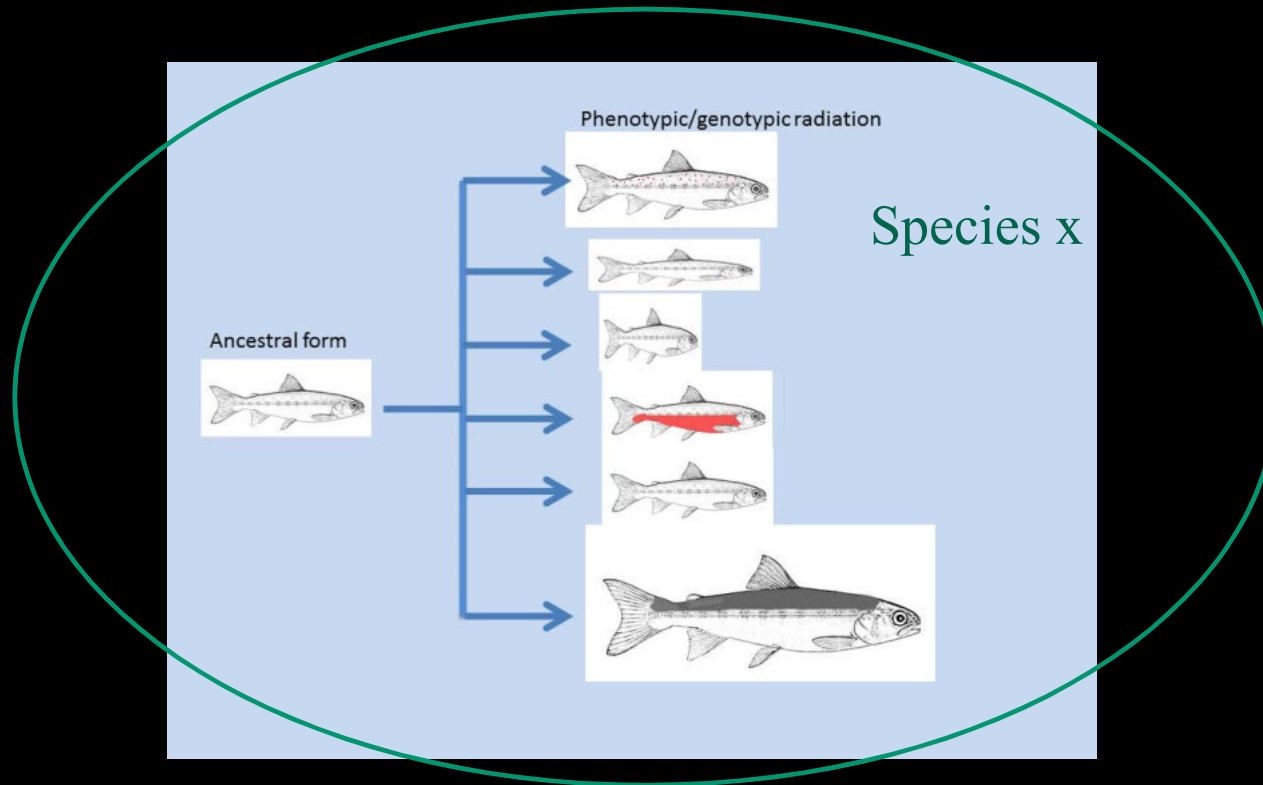


In the last few talks we have:

- Described the nature of the intraspecific structuring
- Given a flavour of the how and why it has arisen
- How it has potential to influence the way we think about conservation and management of wild species

What are the take home messages?

Take home message 1: The extent of significant intraspecific variation in phenotype and genotype is becoming increasingly apparent





Rainbow smelt
Osmerus mordax



Brook charr *Salvelinus fontinalis*

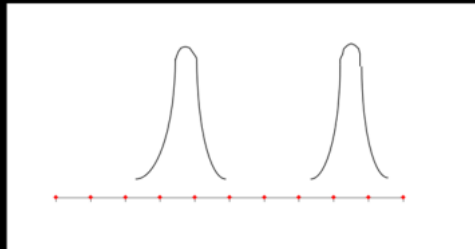
Take home message 2: Species are not static – they are subject to dynamic processes that continue to operate

Good evidence that:

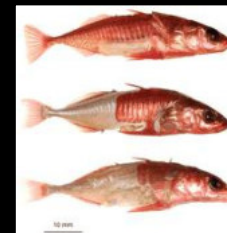
- These processes are more **frequent** and operating **faster** in Arctic and sub arctic systems
- not only fishes that this applies to



European whitefish
Coregonus lavaretus



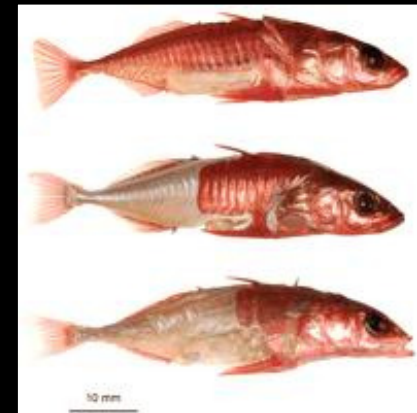
Phenotype/genotype gradient



3-spined Stickleback

Take home message 3: The processes that drive intraspecific divergence are ontogenetic development, ecological and evolutionary processes

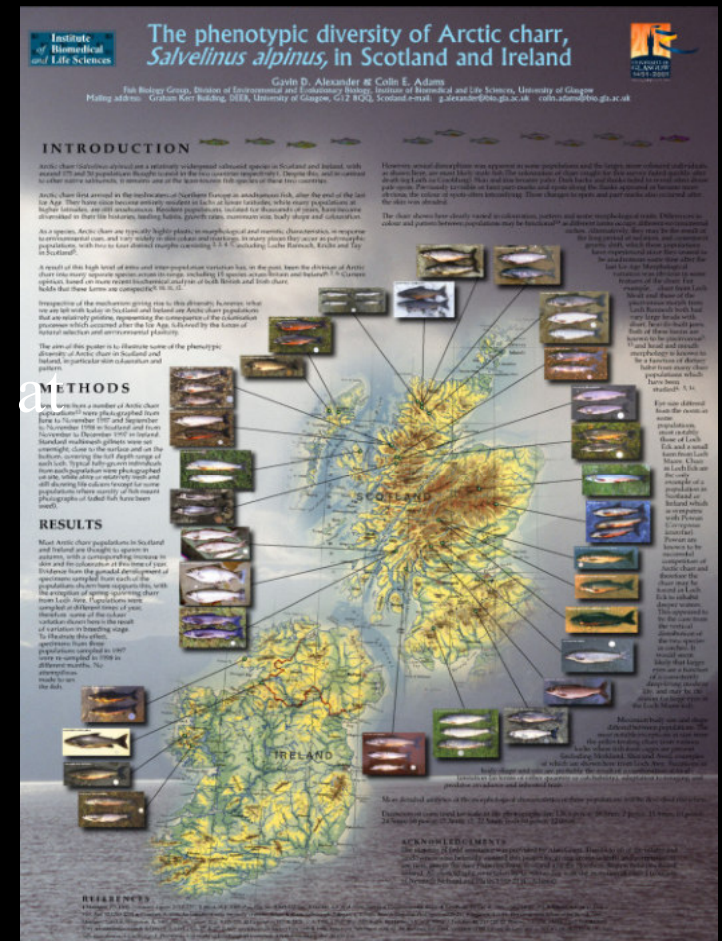
Opportunities to test theoretical models of the origins of biodiversity



3-spined Stickleback

Take home message 4: Intraspecific diversity has considerable impact on ecosystem function

- Predator – prey interactions; food web structure; niche size
- Evidence is that intraspecific morphs – have effects at least as great as those of species



Take home message 5: To adequately protect biodiversity – we must include the diversity manifest within species

- A species centric focus for practical conservation means that we are (mostly) ignoring this cryptic biodiversity in national conservation policy and actions
- But high level policy does recognise intra-specific diversity

“Biological diversity ... the variability this includes diversity within species,” (Rio Convention 1992)



What can we do to implement conservation to practically take account of these issue?

Take home message 6: Full protection of biodiversity requires recognition of the processes that allow it to emerge and be maintained

- Discussed -how we might integrate developmental processes into conservation
- General sense – we need protection of the environment that shapes processes

Advantages of this approach:

- Capture **all** diversity (not just some of it)
- Build in biotic resilience to environmental change; diversity is the raw material that buffers against change
- Capacity to response to environmental change is heritable



Take home message 7: we are seeing the beginnings of practical intraspecific biodiversity protection policy

- Some populations being managed like species

UK SSSI selection guidelines – priority to:

- Unique phenotypes and genotypes
- Exemplars of a genetic, or ecological type
- Protection of evolutionary process – through population and habitat protection

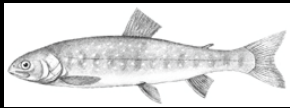
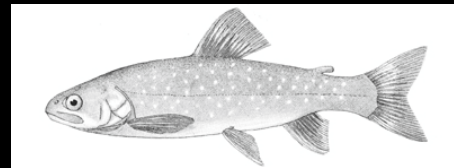
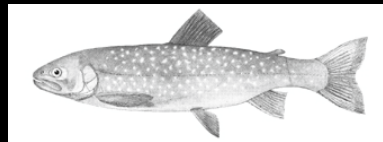
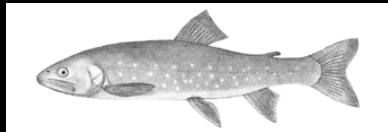


Arctic charr *Salvelinus alpinus*



Whitefish *Coregonus lavaretus*
Genetic and phenotypic structuring

Take home message 8: The taxonomic confusion resulting from intraspecific variation – has little relevance to its protection



Whither these are:

- a) All the same species or
- b) Multiple species

is irrelevant to our need to recognised them as contributing to biodiversity

Nine species of Arctic charr?

Take Home messages:

- 1: Significant intraspecific variation in phenotype and genotype is apparent
- 2: Species are not static
- 3: The processes that result in intraspecific divergence are ontogenetic, ecological and evolutionary
- 4: Intraspecific diversity has consequences for ecosystem function
- 5: We must include within-species diversity as a component of overall biodiversity
- 6: To do this requires recognition of the processes that allow diversity to emerge
- 7: We are starting to see intraspecific biodiversity protection policy.
- 8: The taxonomic confusion resulting from of intraspecific variation – has little relevance to its protection