Unravelling the link between population fluctuations with changes in genetic diversity in Finnish butterflies

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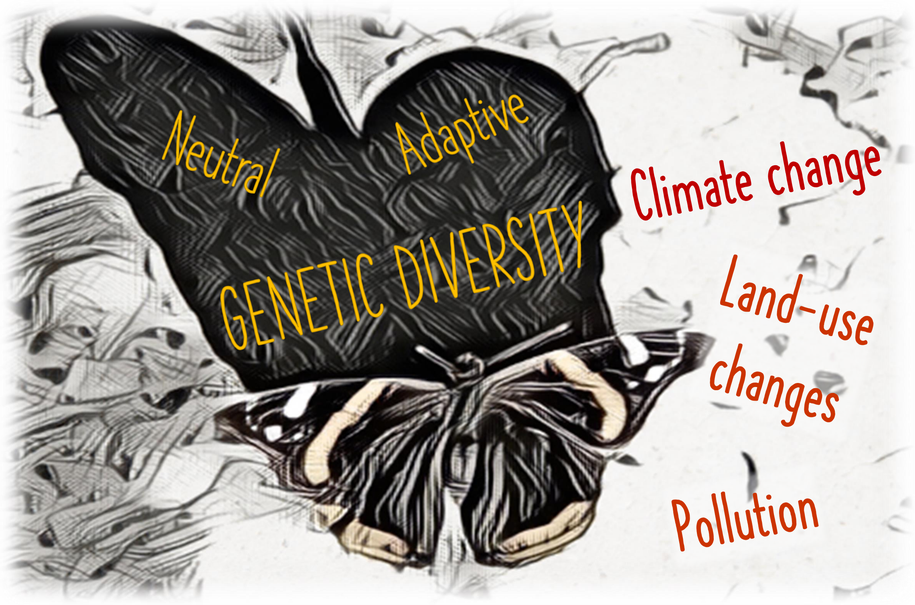
BACKGROUND

Insects have been reported to be declining worldwide in terms of numbers of species and population densities. Whereas species losses are quantifiable through long-term biodiversity monitoring, genetic losses remain difficult to quantify over time. The long-term monitoring surveys of butterflies in Finland have shown they respond differently to climate change with species presenting various population trends[1].

We aim to assess how **climate change** and other factors responsible for insect decline have **shaped genetic diversity** over a century using a museomics approach.

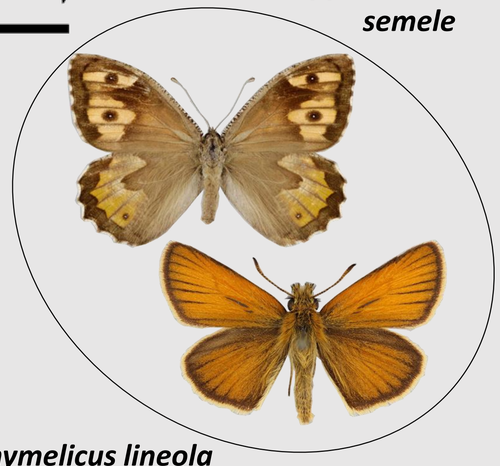


1 What are the effects of population declines on the genetic diversity of species?

HYPOTHESES

- Reduction of genetic diversity
- Increase of deleterious alleles

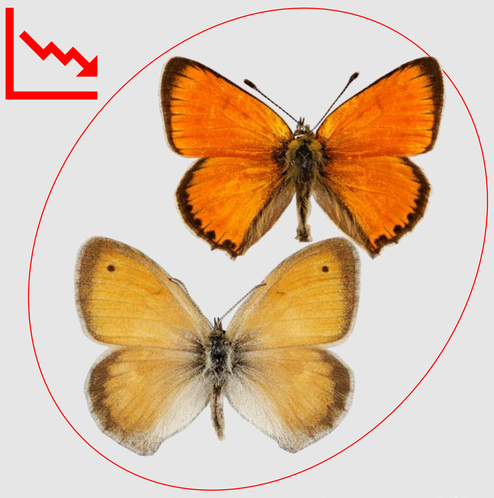
Hipparchia semele



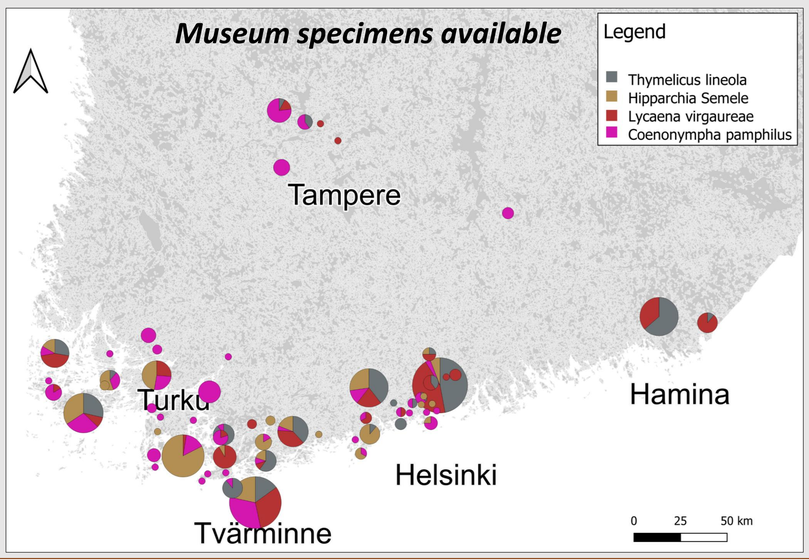
Thymelicus lineola

VS

Lycaena virgaureae



Coenonympha pamphilus



2 Why within a genus, species with similar habitat requirements have contrasting population trends?

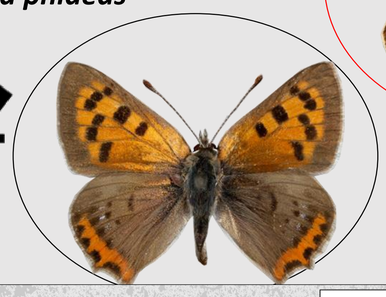
HYPOTHESES

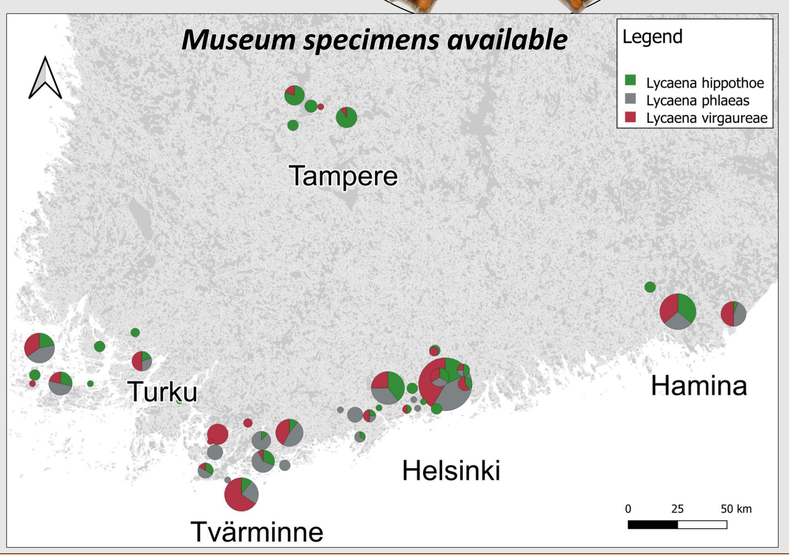
- Purge of deleterious alleles
- Selection on genes linked to thermoregulation, flight or detoxification
- Reduction of genetic diversity

Lycaena hippothoe

Lycaena virgaureae

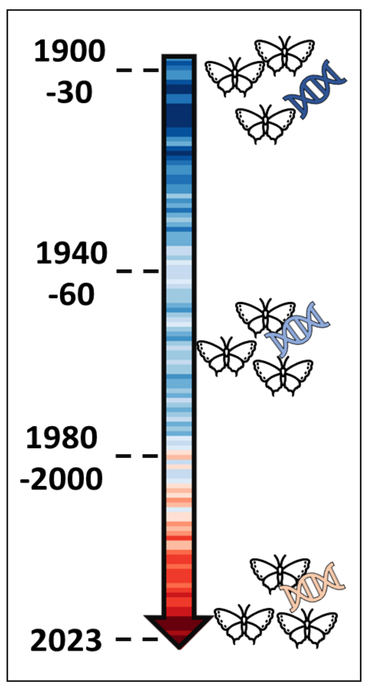
Lycaena phlaeas





METHODS

Compare current populations to ones from critical periods

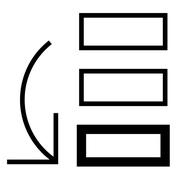


Museum & fresh specimens

Library preparation

Whole Genome Sequencing

Data analysis



Searching for genetic patterns

TO BE CONTINUED …

[1]Hällfors, M.H., Pöyry, J., Heliölä, J., Kohonen, I., Kuussaari, M., Leinonen, R., *et al.* (2021). Combining range and phenology shifts offers a winning strategy for boreal Lepidoptera. *Ecol. Lett.*, 24, 1619–1632.