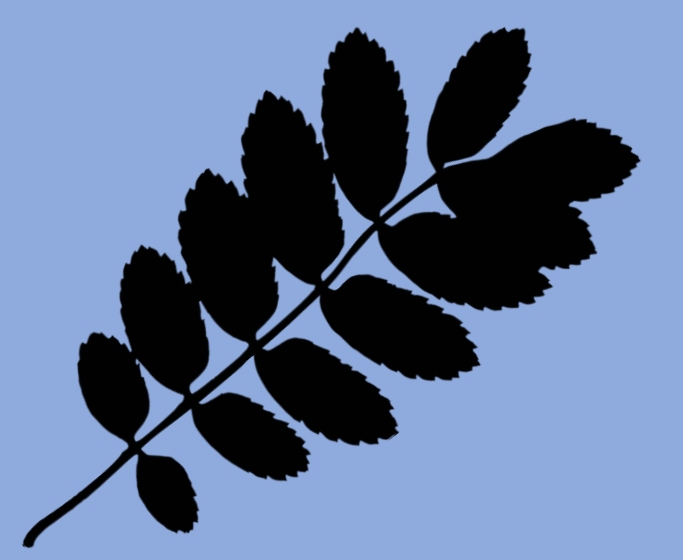




# Does *Hedlundia lancifolia* have a stable pollen morphology?

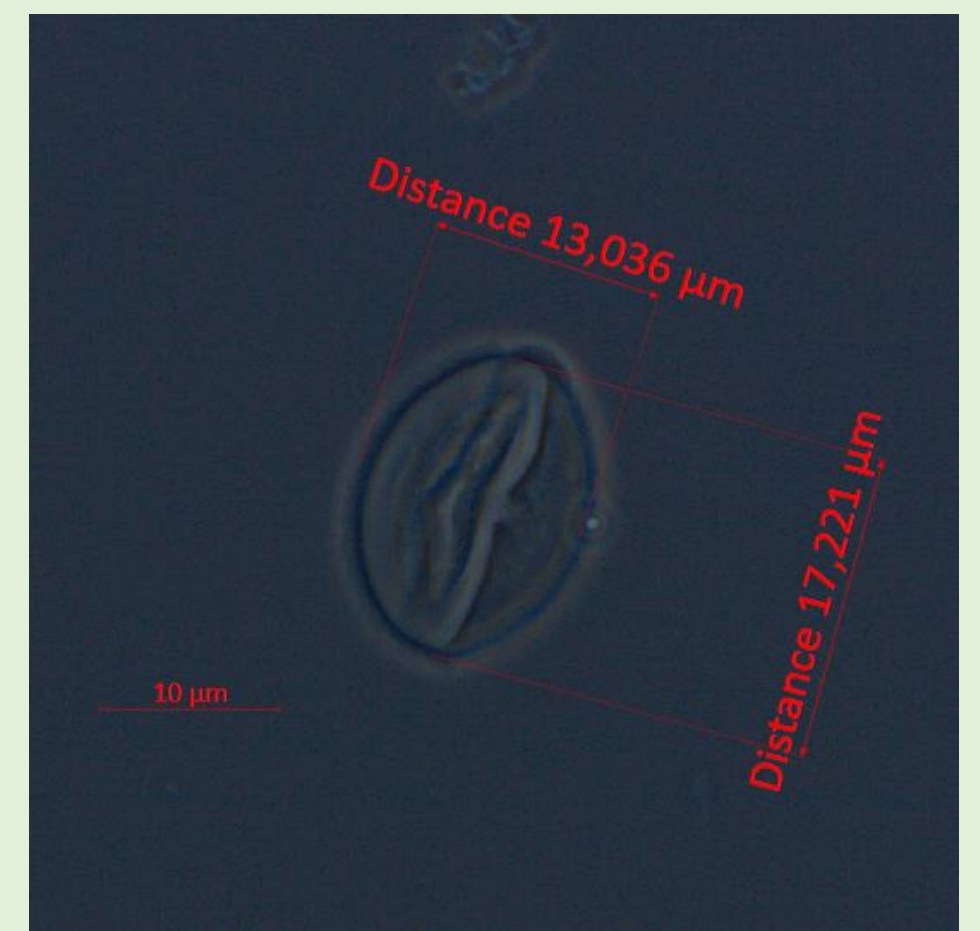


## 1 Why measure pollen morphology?

Understanding past environments is crucial for interpreting climate change, species distributions, and ecological resilience. One of the most powerful tools in this effort is pollen analysis from sediment cores – a method used in paleoecology to reconstruct past vegetation and landscapes.

However, accurate identification of pollen grains relies on subtle differences in morphology. This is especially challenging in genera like *Sorbus* (Rowans), which show complex hybridization and morphological overlap.

This study focuses on pollen variability within a rare *Sorbus* hybrid, *Hedlundia lancifolia*, to explore whether present day live individuals have a stable pollen morphology – a necessary step before confidently identifying such taxa in sediment records.



**Figure 1:** Lateral view of pollen grain with polar- and equatorial length marked.

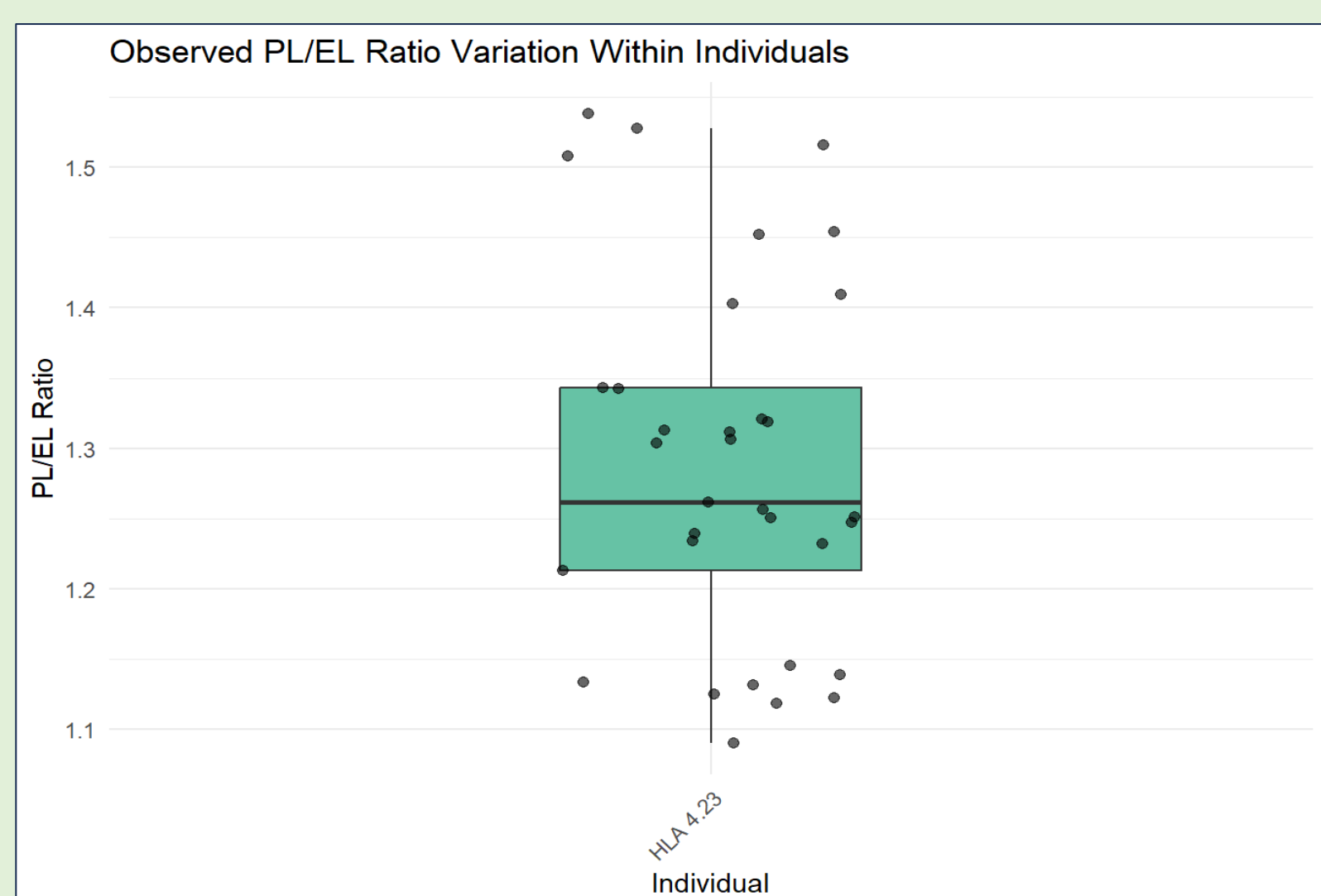
## 2 How was the study done?

Pollen grains from 12 *Hedlundia lancifolia* individuals were imaged using light microscopy. The PL/EL ratio (polar length / equatorial length) was calculated for each grain using imaging software.

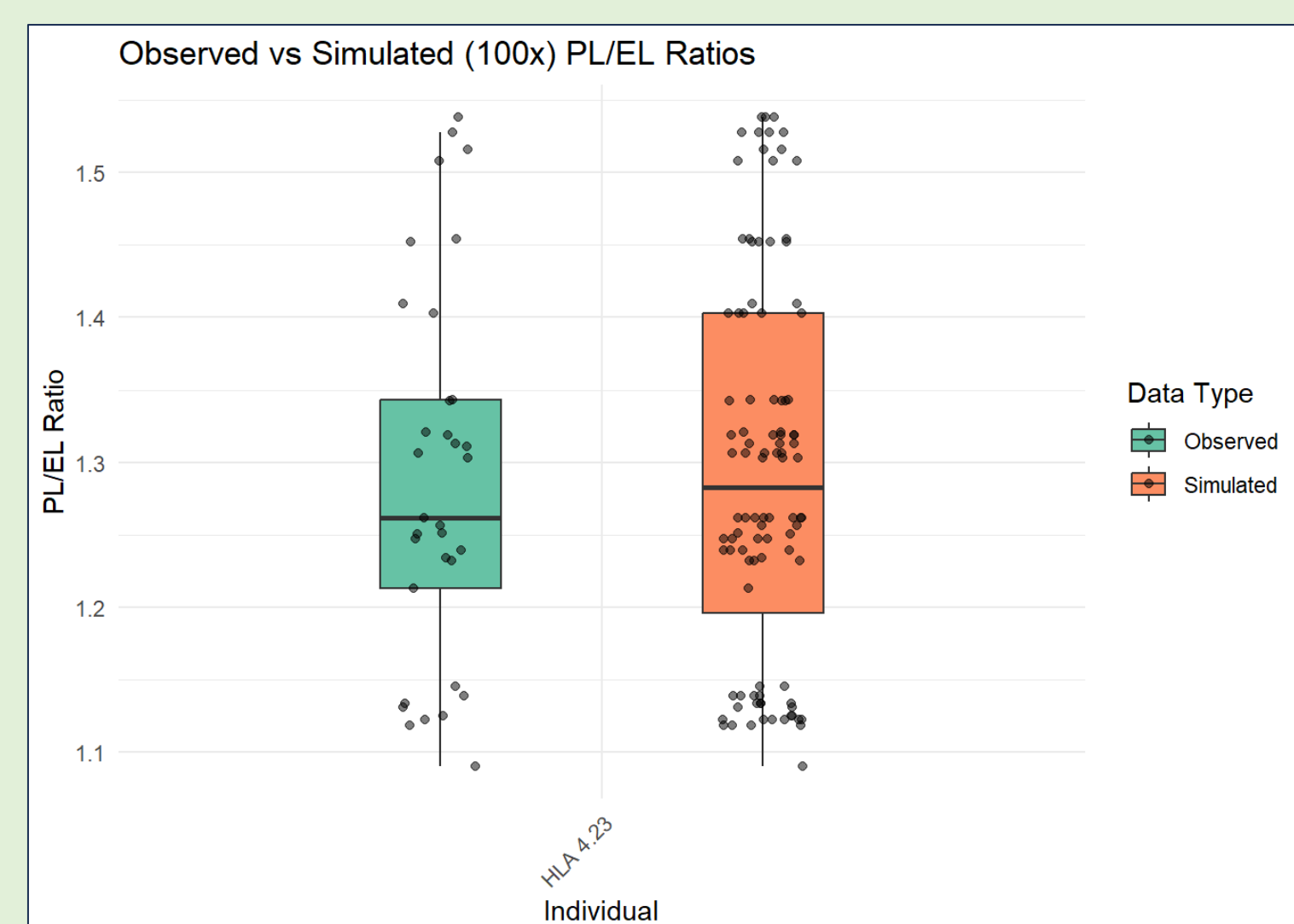
Analysis was performed in R:

- A Bootstrap simulation (n = 100 per observed grain) to assess the limited data
- Wilcoxon rank-sum test comparing simulated vs observed data
- Coefficient of variation (CV) used to evaluate stability in morphology.

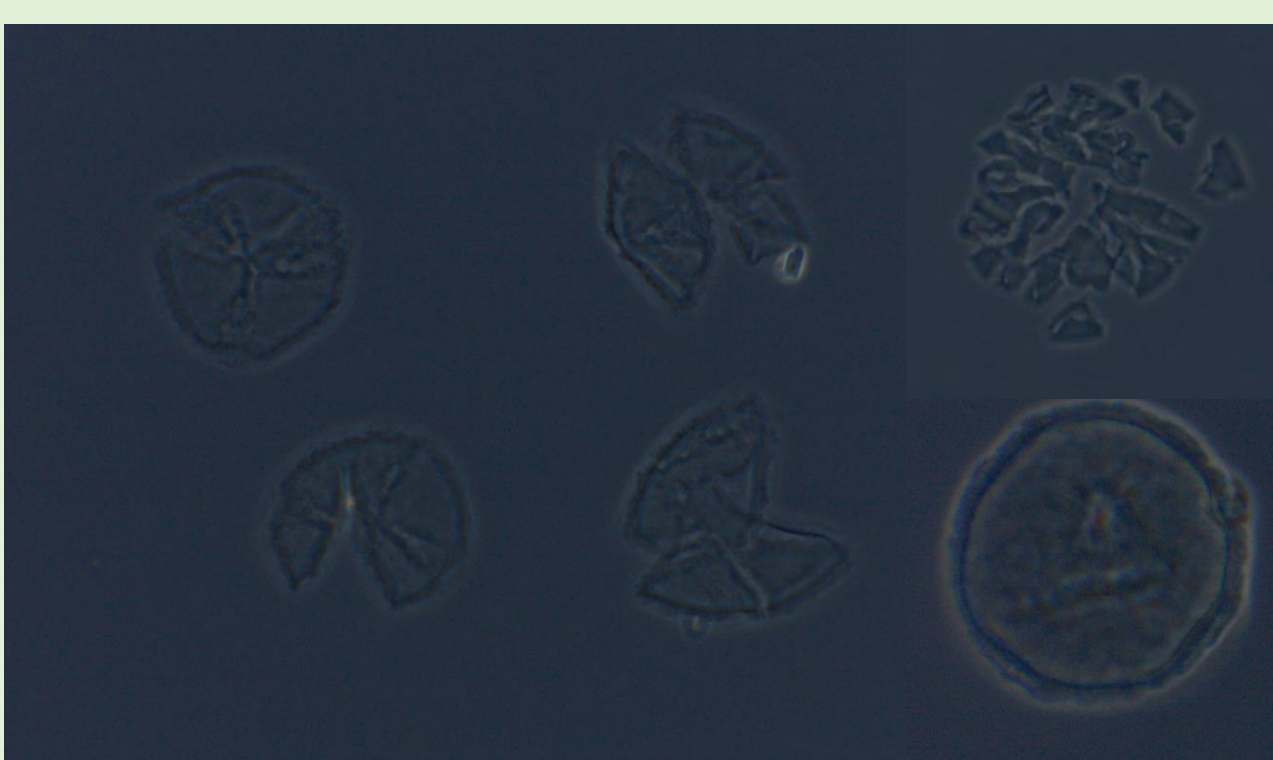
## 3 Limited data – but promising results



**Figure 2:** Boxplot of observed PL/EL ratios for individual HLA 4.23 – each dot represents a pollen grain



**Figure 3:** Boxplot of Observed vs Simulated PL/EL values



**Figure 4:** Many pollen grains where either fragmented or observed in polar view – Limiting the number of usable observations and affecting the amount of data

I have analysed the variation in pollen shape (PL/EL ratio) from a single *Hedlundia lancifolia* individual (HLA 4.23) – The only individual where intact pollen grains were present in the sample.

- The distribution of PL/EL ratios was relatively narrow, with a coefficient of variation (CV) of 10%, indicating stable morphology within the individual.
- To assess whether the observed variation could be explained by random sampling variation, I ran bootstrap simulations and compared them to the observed values.
- A Wilcoxon rank-sum test showed no significant difference ( $P = 0.849$ ) between observed and simulated values ( $p > 0.05$ ), supporting that the observed variation is consistent and not due to random noise.

Together, these results suggest that pollen morphology in this individual is statistically stable.

## 4 What's next?

Stable within-individual pollen morphology suggests *Hedlundia lancifolia* can potentially be reliably identified via fossil pollen.

Due to limited intact grains in this sample, between-individual variation could not be analysed – but future sampling could extend this work.

