

General successional patterns of the heathland following a burning event.

Annika Balke, Cristina Beams, Anna Berry and Ugne Bytautaitė



Abstract

Present day ecological structure is a direct result of past patterns of succession. The Island of Lygra in Norway is an ideal environment to study these patterns due to its isolated ecological niches and limited external inputs. Here the impacts of burning on the formation and structuring of communities at Lygra are explored.

Introduction

- Landscape burning is one of the most forceful abiotic factors in the structuring of ecological communities.
- Pioneering species in secondary succession are generally photoautotrophic, and here pollen is used as a proxy to explore their colonisation after a burning event.
- Influx of species into a newly colonised environment is dependent on a wide range of biotic and abiotic factors, and so succession patterns are generally unique from site to site.

Aims

- To use pollen samples collected as a proxy to measure the progression of species composition over time.
- To use these progressions alongside charcoal layer positions to explore re-colonisation of species.

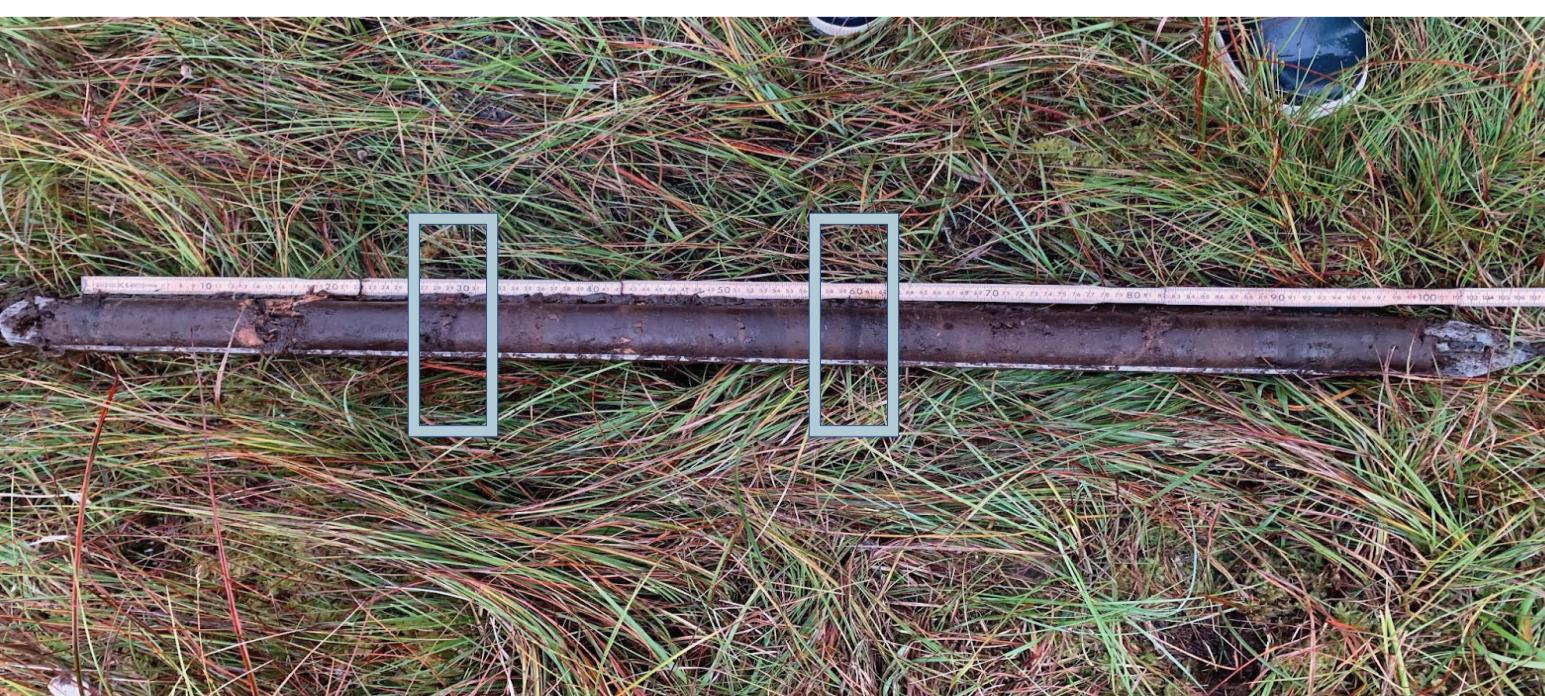


Figure 1: Image of a core sample used for the sampling. Blue boxes show the charcoal layers at around 30cm and 60cm.

Methods

- A core was taken using a Russian corer from a bog located in Lygra heathlands, Norway.
- The core was analysed between two charcoal layers at 0.6 and 0.3 metres.
- 5 samples were taken around each charcoal layer.
- The slides were examined using a light-microscope with 40x magnification. Pollen species were identified with a minimum of one hundred grains recorded per sample. Charcoal was also counted.

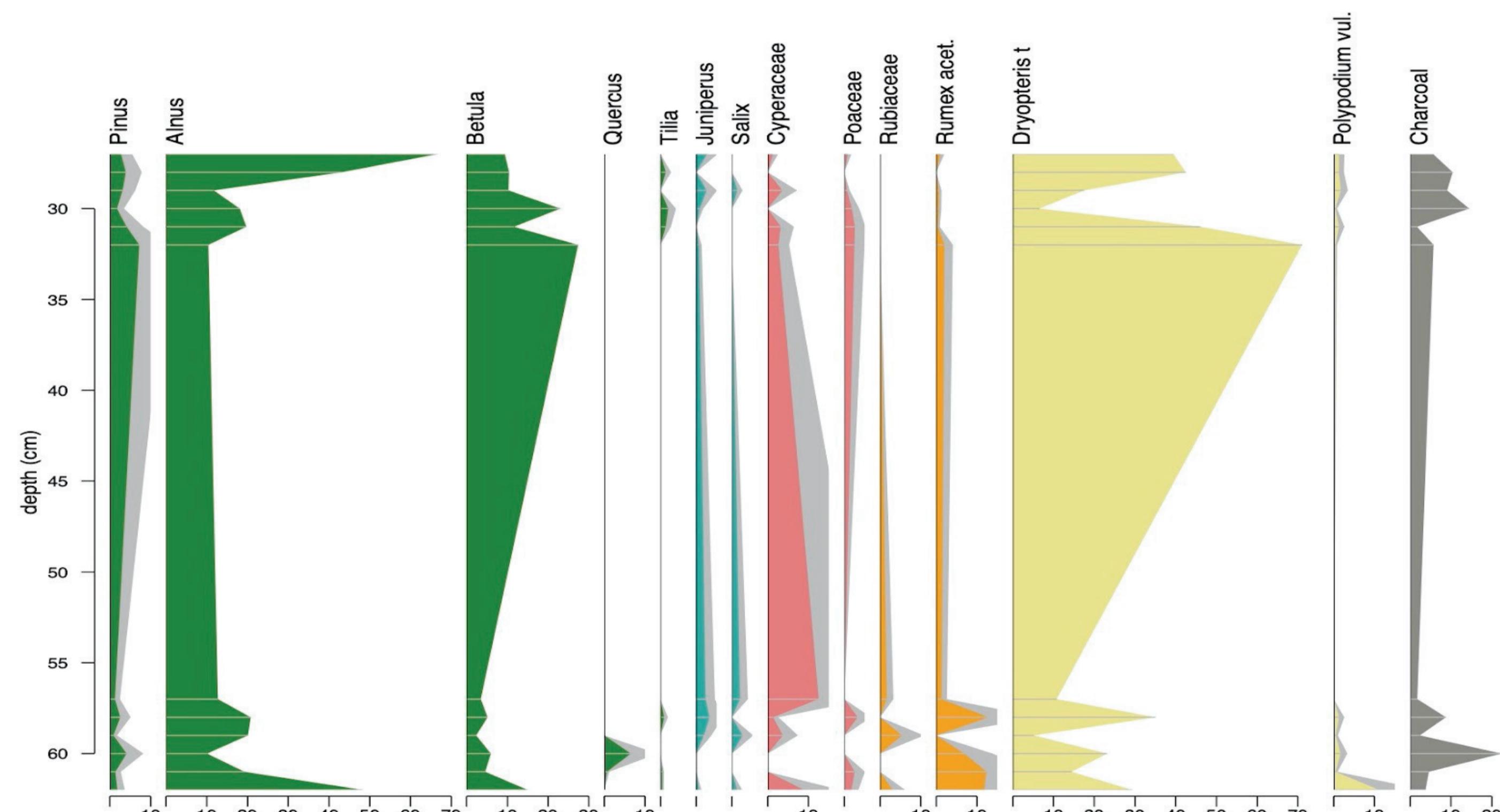


Figure 2: Pollen count percentage accounting for removal of species with proportion less than 10%, sampled in Lygra, Norway. Green= trees, blue= shrubs, pink= grasses, orange= herbs, yellow= fern and grey=charcoal. Note that charcoal is the number of microscopic fragments found and the burning periods happen at 60cm and 30cm.

Results

- Inference of data in figure 2 shows evidence of secondary succession patterns.
- Grasses: Two grass pollen types were found and showed variable response to the burning,
- Shrub: Maintain low percentages with a gradual decrease over time. Both species appeared to be nearing 0% before they were able to recover after the second burning.
- Ferns: Characterised by fastest and strongest recovery post burning event. *Dryopteris t.* had the highest pollen percentages prior to the second burning event.
- Trees: take the longest to recover, and birch recovers the quickest and pinus takes the longest.

Conclusions

- Proportional growth of the species' recorded suggests the presence of pioneering and late-stage activity
- Herb, grass, and shrub species are able to colonise fastest after the burning event due to reduced competition. They are R strategists, and stabilise the environment and allow for the growth of larger species with long life history processes. The herbs and grasses begin to decrease as larger species recover, due to reduced sunlight and resource competition
- Ferns are also pioneering species, but are not negatively affected by the influx of later stage species. This could be because they inhabit a distinct ecological niche and so are less affected by biotic inputs.
- Tree species recover after the stabilisation of the environment by pioneering species. Their numbers increase at a slower rate than pioneering species as they



Figure 3: The left image shows a microscopic piece of charcoal. The right image shows a variety of pollen using a light microscope with magnification x40.

References and acknowledgments

- Gloaguen, J. 1990. Post-burn succession on Brittany heathlands. *Journal of Vegetation Science*, 1(2), pp.147-152.
 Smith, T., and Smith, R (2015). *Elements of ecology*. Edinburgh: Pearson.
 With thanks to Anne Elisabeth Bjune and Maaike Zwier for their assistance in the laboratory to help identify pollen species. And to the Russian Corer for being retrievable.
 Course module: BIO250