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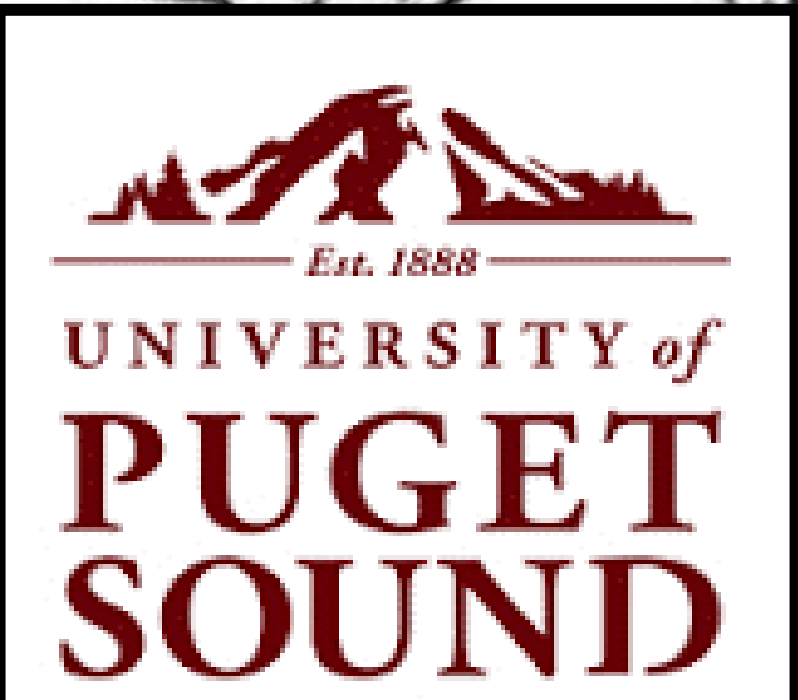
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Comparing fungal communities in *Tsuga heterophylla* seedling roots across nurse log decay stages and the forest floor



Reisha Foertsch*, Ellie Olpin*, & Dr. Carrie Woods

Introduction

- **Nurse logs (NLs)**: fallen decaying trees
- Seedlings succeed better on nurse logs than the forest floor (FF)
- Plant-fungi interactions could influence this pattern across NL decay
- **Mycorrhizal fungi** form a symbiotic relationship with roots and facilitate growth
- **Pathogenic fungi** negatively impact seedling health
- **Saprotrophic fungi** decay wood

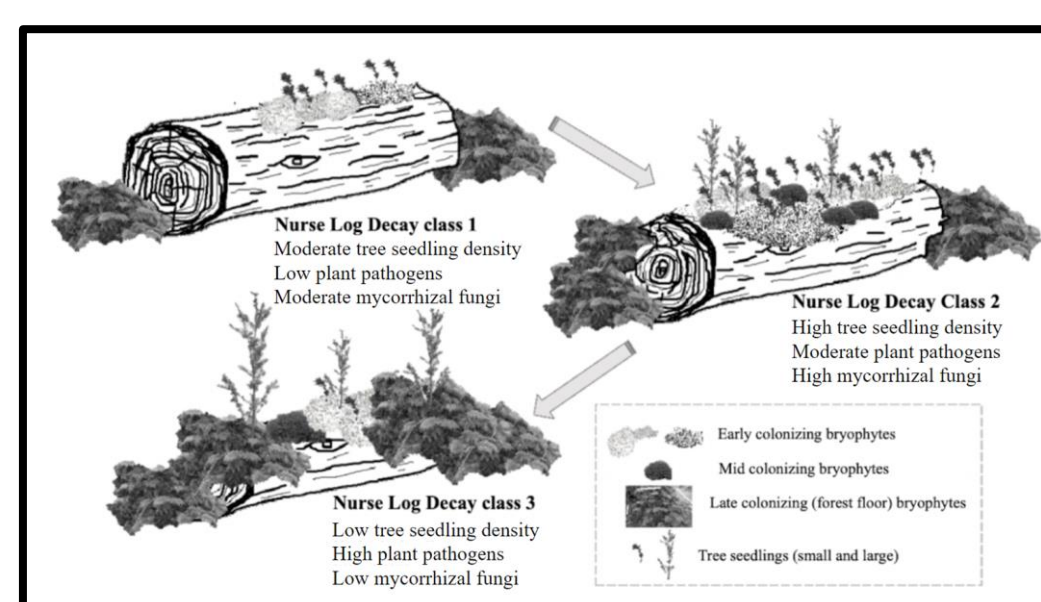


Research Questions

How do fungal communities in seedling roots change between nurse logs and forest floor?

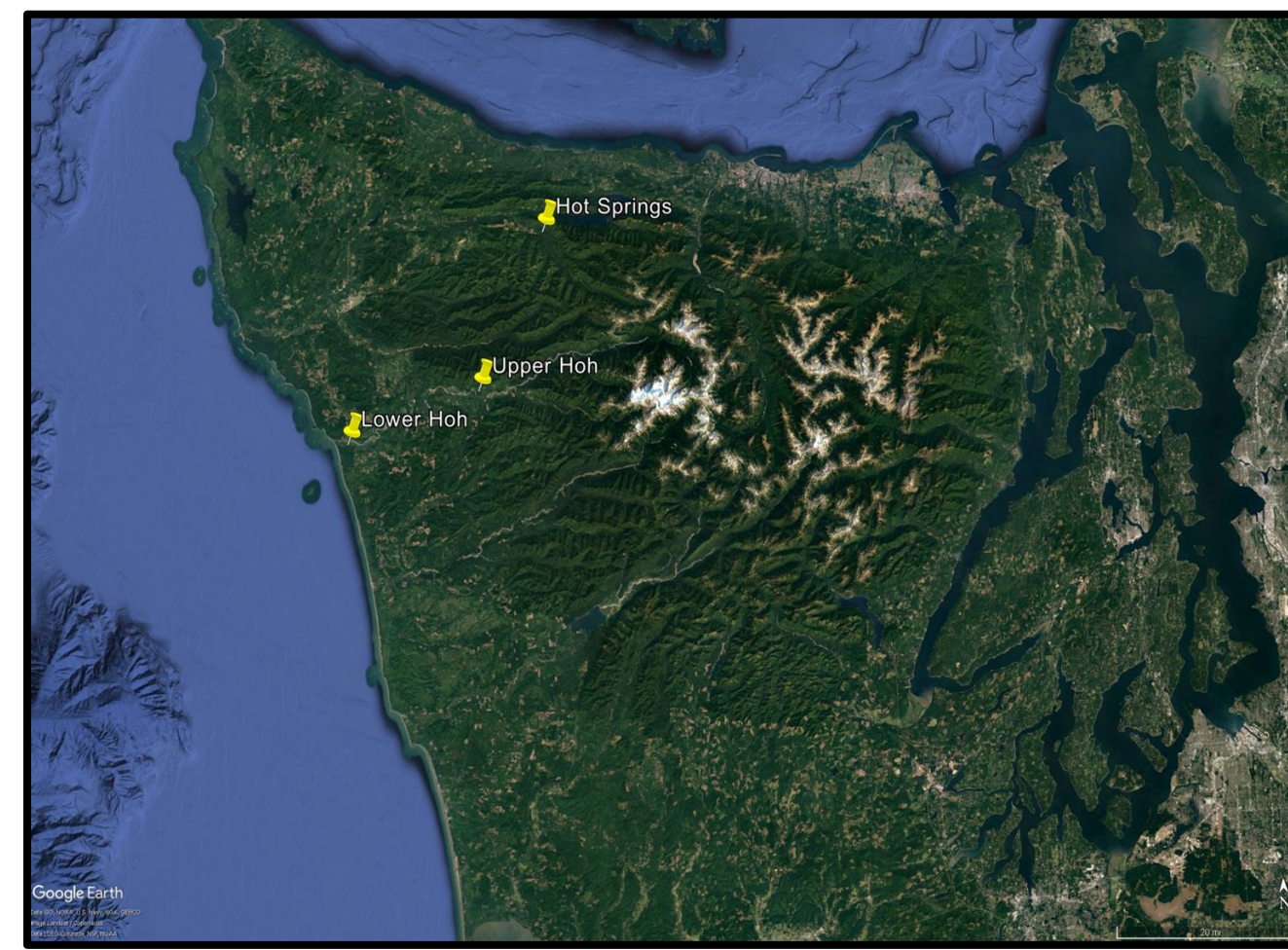


How do fungal communities in seedling roots change across different stages of nurse log decomposition?



Methods

- Western hemlock (*Tsuga heterophylla*) seedlings (5-10 cm) collected from NLs of each decay stage and FF at three field sites: Upper Hoh, Lower Hoh, and Hot Springs (see map)
- Measured canopy cover, distance to and diameter of parent tree, and bryophyte substrate



Map of field sites on the Olympic Peninsula, WA



Seedling collection methods

- Root tips removed and sent to Jonah Ventures lab for DNA extraction, PCR, and next generation sequencing
- Preliminarily categorized fungal OTUs into ecological roles using FunGuild database and literature search



Root processing for DNA analysis

Results

- Percent mycorrhizal ($p = 0.39$, $n = 259$) and pathogenic ($p = 0.85$, $n = 45$) OTUs did not significantly differ across substrates.
- Percent saprotrophic OTUs varied across substrates, with increased number of saprotrophs in NL1 and NL2 ($p = 0.002$, $n = 88$).
- Fungal community composition varied across substrates (2-D stress = 0.26 with 10,000 permutations).
- FF had most overlap with NL3 and had the least overlap with NL2 (Figure 2).

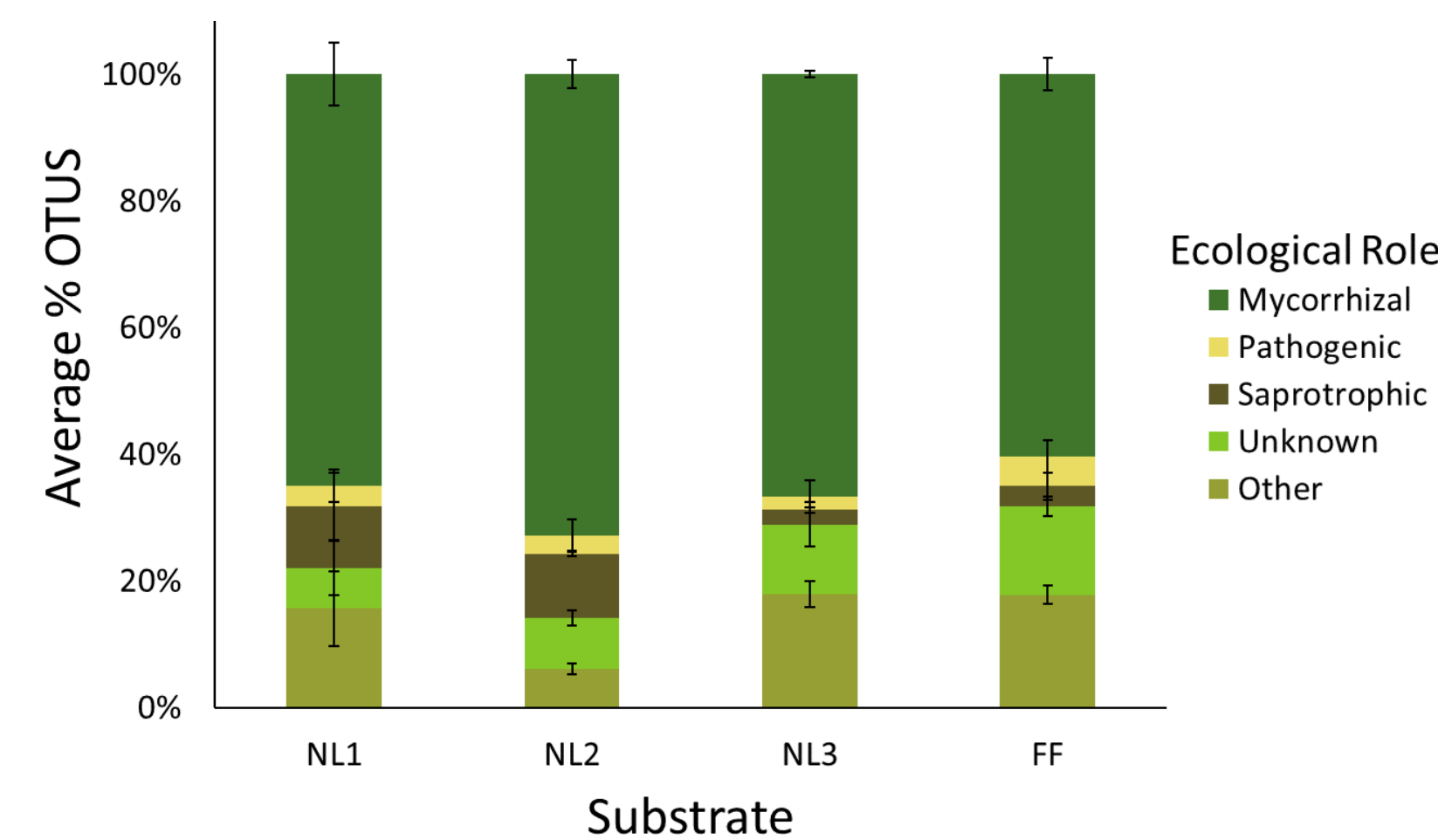


Figure 1. Mean (\pm SE) % fungal OTUs corresponding to different ecological roles across substrates.

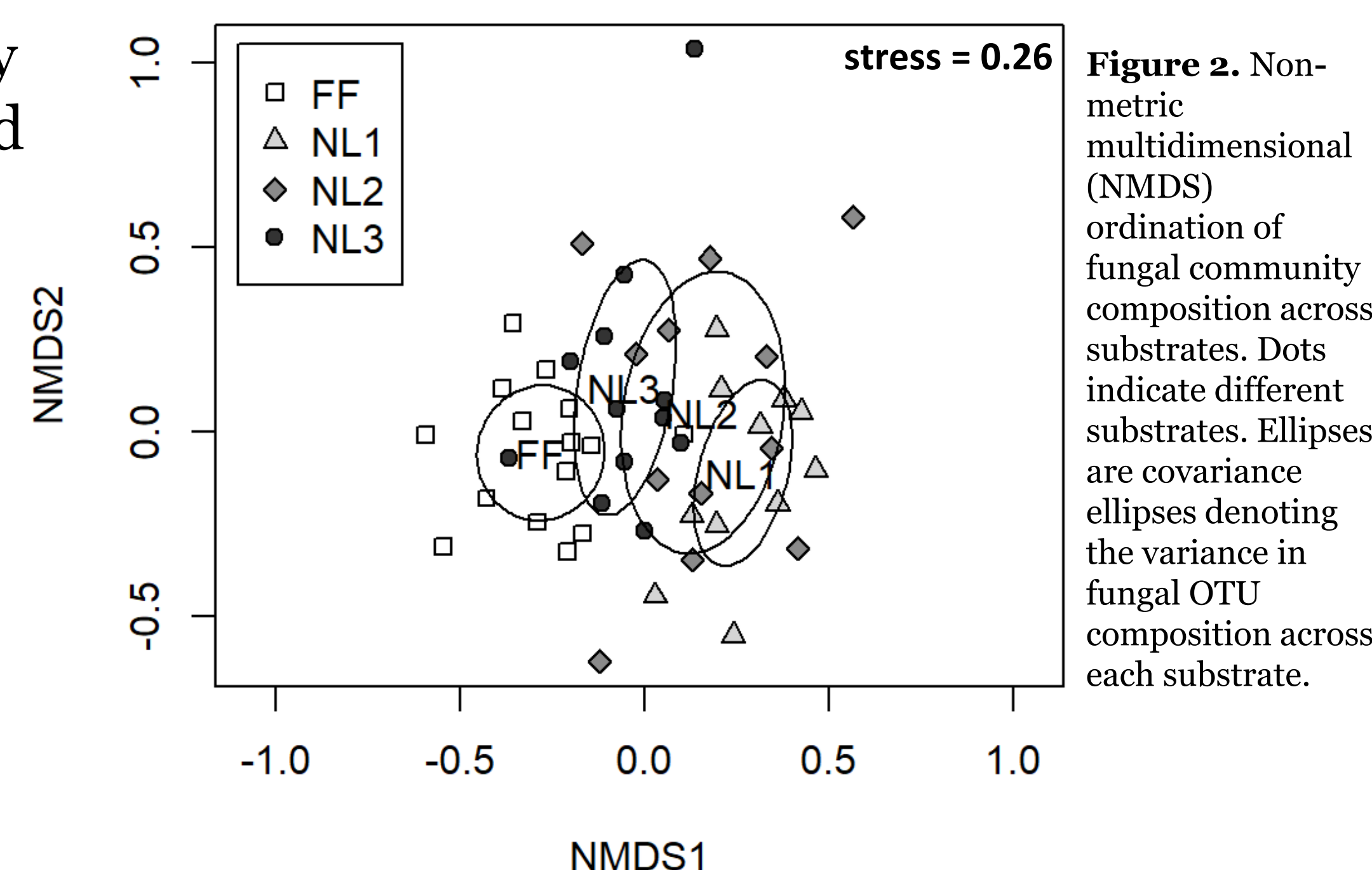


Figure 2. Non-metric multidimensional (NMDS) ordination of fungal community composition across substrates. Dots indicate different substrates. Ellipses are covariance ellipses denoting the variance in fungal OTU composition across each substrate.

Discussion and Future Directions

- No significant trend emerged across substrates for mycorrhizal and pathogenic OTUs
 - Future analyses and further literature search may reveal a pattern
 - *T. heterophylla*-specific symbionts
 - Incorporate distance to parent tree data
- Staining procedure will be used to determine percent mycorrhizal colonization

Fungal communities change across nurse log decay and the forest floor, which could influence patterns of seedling abundance across these substrates

Acknowledgements

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