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Epiphyte Distributions Vary with Structural Heterogeneity in Acer Macrophyllum

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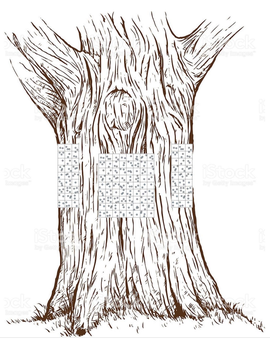
Introduction

- Epiphyte diversity is attributed to microhabitat specialization
  - Microhabitats are created by climatic and structural factors
  - Previous epiphyte studies on *Acer macrophyllum* surveyed too broadly and didn't measure structural features
- **Goal: Survey *Acer macrophyllum* extensively to determine the effect of structural heterogeneity on epiphytes**
- Prediction: epiphyte species will be specialized to microhabitats created by distinctive tree structural features.

Methods

- *Acer macrophyllum* in Hoh rainforest
- Dot-intercept method using acetate sheets – identify epiphyte species under each random dot
- Noted structural features (broken branch, hole, etc.)
  - Trunk: every 1 m around trunk
  - Branch: every 1 m along 3 branches for 3 meters
  - Analyzed with ANOVA and NMS



Results

- The interaction of zone and structure significantly influences species richness (p = 0.001, Fig.1)
  - Zones with >1 structural feature had higher species richness
- The interaction of zone and orientation significantly influenced species richness (p = 0.003)
- Community composition was influenced by height and orientation (Fig. 2)

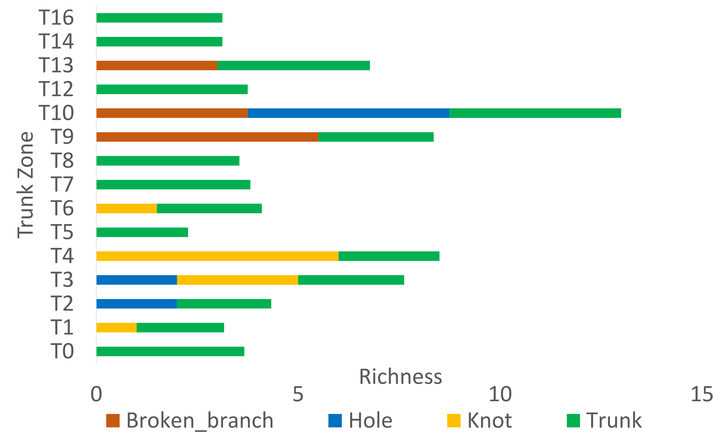
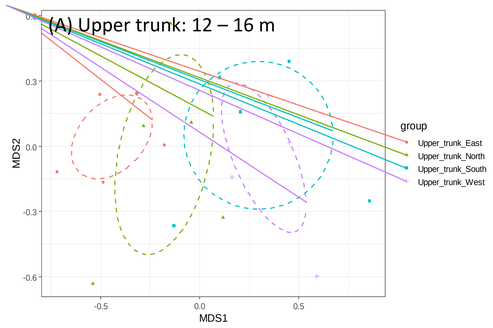
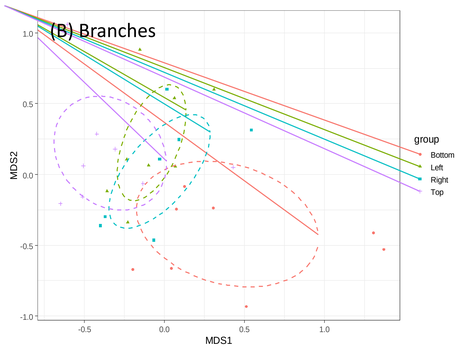


Figure 1. Chart of species richness by trunk zones and structural characteristics. Zones which contain more structural heterogeneity have increased richness.

Species on E side were different from S and W sides; S and W had similar species.



Top and bottom had very different species; left and right have similar compositions



Species found on South and West sides represent all species found in zone

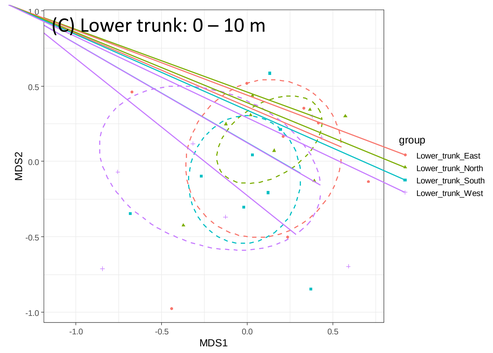


Figure 2. NMS of epiphyte species composition for (A) upper trunk (12 – 16 m), (B) branches, and (C) lower trunk (0-10 m). Overlapping circles indicate similarity.

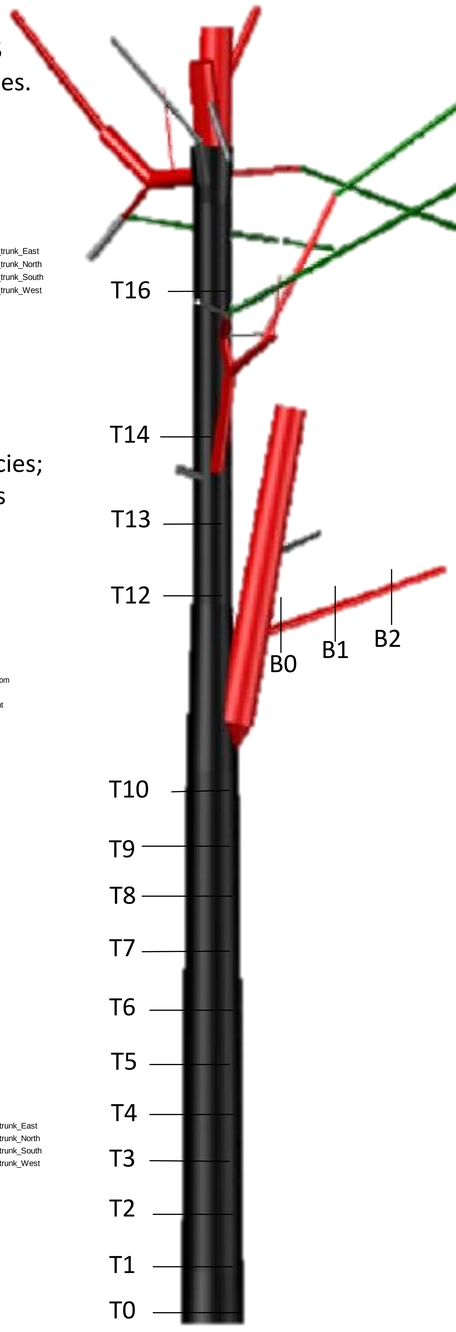


Figure 3. 3-D model of the tree surveyed in this study. Model by Russell Kramer with help from Carrie Woods

Discussion

- Species richness varied with structural heterogeneity, indicating that some epiphytes are specialized to distinct structural features which likely generate unique microhabitats
  - Tree orientation also had an effect, particularly in the upper trunk and branches
- Species distributions varied among zones, suggesting height-related preferences among mosses
- Since epiphytes are biological indicators of ecosystem health, knowing their normal distributions is beneficial for conservation
- The tree model can be used to show these patterns in diversity using 3-D printing and virtual reality.

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