

**Comparison of leaf samples from mapped tropical and temperate forests:
Implications for interpretations of the diversity of fossil assemblages**

Beth Ellis^{1*} and Kirk R. Johnson²

¹*Denver Museum of Nature & Science, 2001 Colorado Blvd., Denver, Colorado 80205, USA, Beth.Ellis@dmns.org; ²*National Museum of Natural History, Washington, D.C. 20013, USA, JohnsonKR@si.edu**

**Corresponding author.*

Keywords: paleobotany, plant taphonomy, leaf litter, depositional environment, GIS

ABSTRACT

We characterize forest floor leaf litter and transported leaf samples from several depositional environments in both a temperate and a tropical forest to provide well-characterized modern analogs for the evaluation of fossil leaf localities. We compare the low-diversity, deciduous, temperate Wharton Brook forest (Connecticut, United States) with the high-diversity, evergreen, tropical Noah Creek Rainforest (Queensland, Australia) by mapping one half-hectare of each forest, collecting 25–29 leaf litter samples from four to five depositional settings in each forest and analyzing the relative abundance of species based on >31,750 leaves. In both studies, we analyze the samples as if they were fossil sites, evaluating floral composition, numerical diversity measures, rarefied richness, and climate estimates based on leaf physiognomy. We compare this analysis with data from the standing mapped forest to evaluate the biases inherent in the data derived from fossil assemblages from different depositional settings. In both forests, sample sites that were revisited over multiple years produced different species on subsequent visits, suggesting that fossil sites with close stratigraphic spacing and different composition may actually represent the same source forest. In both forests, species diversity in laterally transported samples appears to increase as the distance of transport increases. Because the species richness of a leaf sample is impacted by the diversity of the original forest, the amount of time the leaf sample spent accumulating, and the effect of transport distance, it is not possible to interpret the diversity of ancient forests without also evaluating the sedimentary facies of the fossil collections.