

Questions Generated by Beatty and Provan 2011

Sampling Issues

- It is interesting that the authors only use one specimen from WI, and it's from a population that could be considered disjunct within the state (from the central sand counties) considering that the majority of collections of *Monotropa hypopitys* in WI are from the northern tier of counties. How can that be considered a "good enough" representation of the variability of a taxon for a study like this?
- Isn't the high number of unique haplotypes the result of the very low number of individuals sampled?
- As *Monotropa* seeds are winged and very small, it seems prone to long distance dispersal. However, I feel that the map and extant range of *Monotropa hypopitys* as represented in Figure 1 is misleading. Flora of North America, USDA Plants Database, and The Biota of North America Program all show a wider range for *M. hypopitys*, including populations in MN, IL, TX, IA, OK, MO, AR, and AZ. Some of the populations listed in these sources are extirpated (NE, OK, KS, IA). I feel it would have been informative if the authors could have included samples of these populations into their study, which may have helped clarify the origin of extant populations in NM, Ontario, WI and Quebec.

Haplotype Networks and Diversity

- We've briefly discussed the make up of figures like the haplotype relationships in figure 3. How does one transition from the phylogenetic relationship diagrams in Figures 3&5, and Figure 6?
- Based on fig 4, and last paragraph in the results section of "Nuclear microsatellite genotyping" (p1590) were you surprised that authors found higher gene diversity with rps2 and ITS than expected heterozygosity in nuclear microsatellites?
- Given the fact that *Monotropeoideae* are nonphotosynthetic, could the higher diversity of chloroplast rps2 haplotypes of *Monotropa hypopitys*, when compared to ITS, be reflecting an ancient diversity? How can a chloroplast gene of a nonphotosynthetic species show a higher haplotype diversity than the nuclear ITS?
- How are the differences in the molecular data manifested morphologically? Is there any west to east pattern in any differences (if there are any?)

Dispersal and Gene Flow

- Why do central populations have to be taken out of the analysis for checking possible gene flow under an isolation-with-migration scenario?
- If the populations in NM could have served as a stepping-stone between western and eastern populations, why were they left out of the isolation-with-migration scenario? Could you explain the basic principles of isolation-with-migration?
- I found very interesting the presence of some populations in New Mexico. However, the authors did not discuss too much about it. They said that maybe populations from this region could have recolonized the Wisconsin area. What is the evidence for that hypothesis? Also they excluded New Mexico populations of the iMA analysis due to their central location. Why does the central location affect the analysis?
- What are the dispersal mechanisms for pinesap? The authors talk a lot about long-distance dispersal, and I was stricken by the distance between the pink/white clade (fig 6) found only in Alaska, New Mexico, and Rhode Island.

Ecological Niche Modeling

- Do you agree with the authors' way of selecting the BIOCLIM variables to run their Maxent model? Are there other variables that should have been selected that are not included in BIOCLIM?

The 19 variables are:

BIO1 = Annual Mean Temperature

BIO2 = Mean Diurnal Range (Mean of monthly (max temp - min temp))

BIO3 = Isothermality (BIO2/BIO7) (* 100)

BIO4 = Temperature Seasonality (standard deviation *100)

BIO5 = Max Temperature of Warmest Month

BIO6 = Min Temperature of Coldest Month

BIO7 = Temperature Annual Range (BIO5-BIO6)

BIO8 = Mean Temperature of Wettest Quarter

BIO9 = Mean Temperature of Driest Quarter

BIO10 = Mean Temperature of Warmest Quarter

BIO11 = Mean Temperature of Coldest Quarter

BIO12 = Annual Precipitation

BIO13 = Precipitation of Wettest Month

BIO14 = Precipitation of Driest Month

BIO15 = Precipitation Seasonality (Coefficient of Variation)

BIO16 = Precipitation of Wettest Quarter

BIO17 = Precipitation of Driest Quarter

BIO18 = Precipitation of Warmest Quarter

BIO19 = Precipitation of Coldest Quarter