DISCOVAR paper plan outline

Evolutionary dynamics across *Heliconius*

**Introduction**

- Adaptive radiation

- specifically, the idea of key innovations

-advantages of whole genome sequencing

-identify large-scale chromosomal rearrangements

-use as a resource for population-level work

-Heliconius, and why they are a good system

-DISCOVAR, and why it is a good tool

**Materials and Methods**

-DNA extraction

(supplementary – get extraction protocols from all labs involved)

-Sequencing and Assembly

-DISCOVAR – ask Wiesenfeld or Jaffe? Alternatively site forum?

-Possibly TAGC scaffolding

-haplomerger

-Multiple alignment

-progressiveCactus

-use Kozak tree to prior topology

-Data Analysis

**Results**

Table 1: Assembly statistics for all species

-from Davey: N50, length, largest scaffold, BUSCO

Figure 1: Example of a DISCOVAR assembly

-Use the figure design from Lepbase

Figure S1: All of the DISCOVAR assemblies in Lepbase format

Figure S2: Alignment quality control for H. melpomene DISCO to Hmel2

Figure 2: Whole genome tree

Possible Supplementaries: CDS tree, 4D sites tree, non-coding tree, UCE tree, non-UCE tree

Figure 3: Genome structure conservation

-show syntenic breaks

-This might be a messy figure with so many genomes/comparisons, so maybe we can just look for major differences and think of a way to display them well

Figure 4: Genome sequence conservation

-proportion conserved across group

-proportion conserved within heliconius

-proportion conserved within clades

-For statistical interest, compare random subsets

-for all groups, look at coding vs non-coding

Figure 5: Evolutionary rates/Positive Selection

-dN/dS along all branches

-substitution rate

-comparison as above

Figure 6-X: Candidate loci exploration

Next paper? - fine-scale phylogeny and introgression

* use SOM/HMM models or mosquito paper technique to get trees along genome
* How old are the trees?
* How much of the genome does each tree represent?
* How large are the genomic blocks that represent each tree type?