Black Queen Hypothesis

The Black Queen Hypothesis predicts that co-operation in animal societies could be a result of genetic/functional trait losses, as well as polymorphism of workers in eusocial animals such as ants and termites. Our Data+ project worked on finding evidence of this pattern in four different eusocial insect species.

The four species studied were from *Atta* (Leaf-cutter ants), *Reticulitermes* (Termites), *Solenopsis* (Fire ants), and *Camponotus* (Carpenter ants).

*Atta* and *Reticulitermes* show worker polymorphism (division of workers and soldiers), while *Solenopsis* and *Camponotus* have monomorphic workers.
Analysis

- Our main analytic tool was JMP
- We were mainly interested in the distribution of our data and the correlation matrices from species to species
- Correlation matrices were used to look at the relationships between body part proportions (raw measurements normalized by total body length)
- Clusters were highlighted (see black data points on the right) to see where individuals fell in every bivariate scatter
Summary of results

- The correlation comparison of all the body parts normalized by total body length shows a negative relationship for the abdomen value compared to the rest of the body parts.

- As abdomen gets bigger proportional to body, the other body parts get smaller proportionally.

- May be a pre-adaptation towards the evolution of worker polymorphism, splitting the worker castes further into specialized foraging castes with long legs, and a nursing caste with large abdomens.

**Trade-off between abdomen size and the rest of the body**