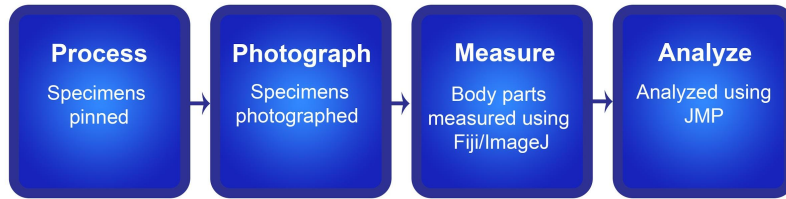


Black Queen Hypothesis



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.

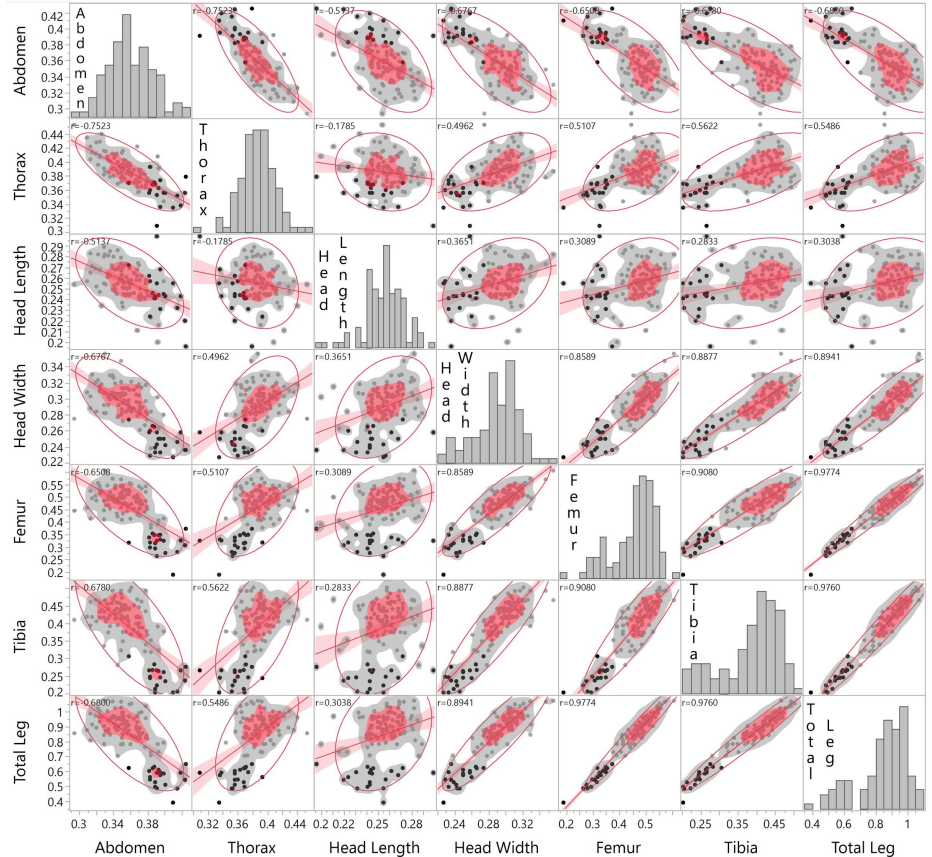
The Black Queen Hypothesis predicts that co-operation in animal societies could be a result of genetic/functional trait losses, as well as polymorphism of workers in eusocial animals such as ants and termites. Our Data+ project worked on finding evidence of this pattern in four different eusocial insect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



Analysis

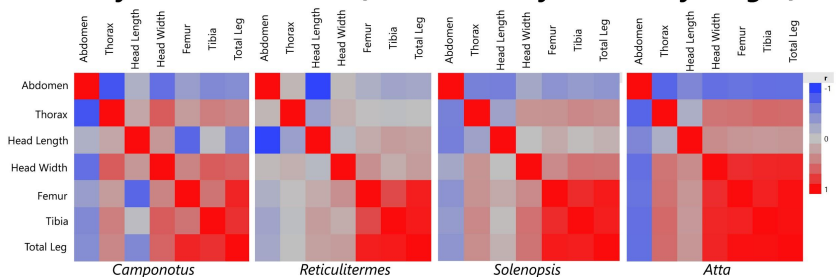
- Our main analytic tool was JMP
- We were mainly interested in the distribution of our data and the correlation matrices from species to species
- Correlation matrices were used to look at the relationships between body part proportions (raw measurements normalized by total body length)
- Clusters were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

Atta Worker Body Part Relationships Normalized to Body Length



Summary of results

Body Part Correlations (Normalized by Total Body Length)

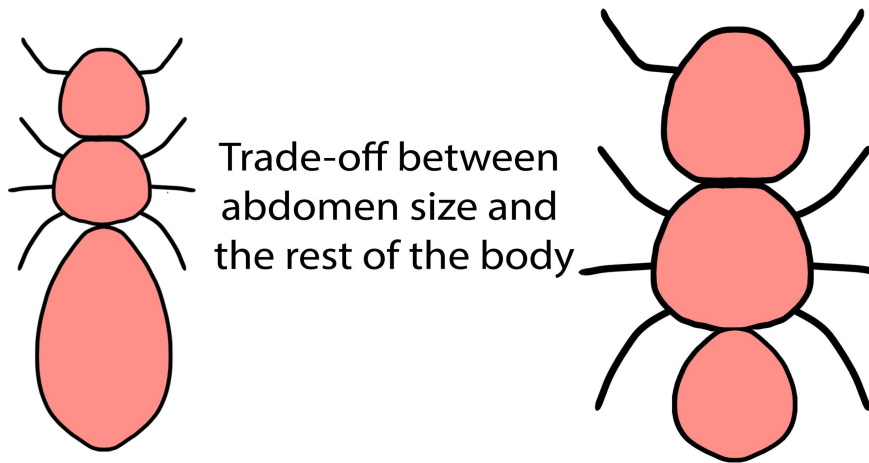


Red = Positive

Blue = Negative

- 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

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



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