Sex but not social position predicts immune function in *Bolitotherus cornutus*

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Introduction

- Various environmental factors ranging from genotype to sex have been shown to predict immune function.
- Social dominance hierarchies, but not more complex measures of social environment, have been shown to predict immune function in vertebrates (Bernard et al., 1998; Hawley et al., 2007).
- Social environment can be described by observing social interactions and creating social networks.
- An individual's social network position can be quantified by considering strength (a measure of centrality), number of social partners, and clustering coefficient (a measure of cliquishness).
- *Bolitotherus cornutus*, a highly social beetle living on top of shelf fungus, is ideal for studying social networks because of its easily observable social interactions.

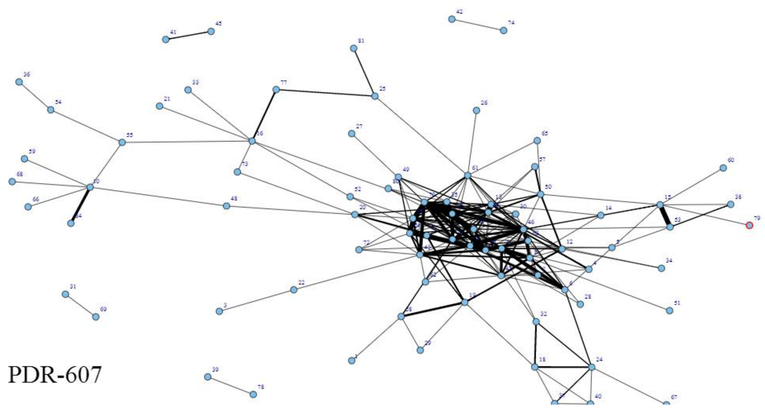

Figure 1. Sample social network from population PDR-607.

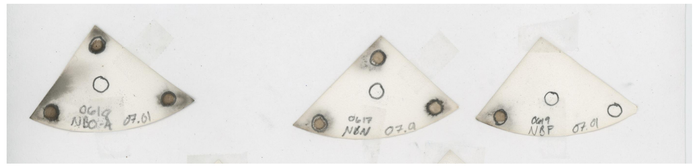

Figure 2. Filter paper phenoloxidase assay.

Methods

- 254 beetles were collected from 15 populations .
- Hemolymph was collected via a nonlethal method and phenoloxidase activity, a measure of insect immune function. was quantified using a filter paper assay developed by Nelson et al. (2002).
- Populations were observed each morning and evening and the location and social interactions of each beetle were recorded.
- Unweighted, non-directional social networks were created from this survey data and social network attributes were calculated.
- General linear mixed models were used to determine which factors predicted immune function.

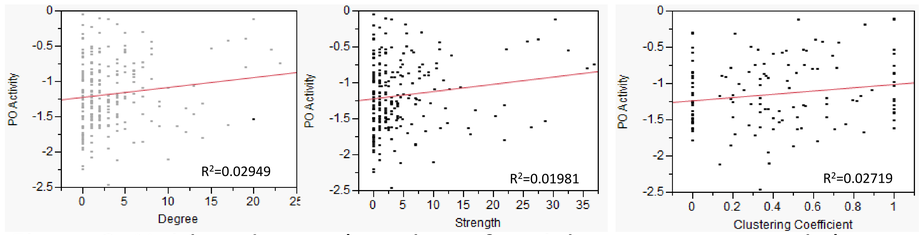

Figure 3. Neither degree (number of social partners, strength (a measure of centrality), or clustering co-efficient (a measure of cliquishness, predict phenoloxidase (PO) activity.

Results

- No relationship was found between any social network variable and PO activity (Figure 3).
- Sex strongly predicted immune response, with male beetles showing higher PO activity (p=0.0018).

Discussion and Future Direction

- As previous data did not find a relationship between sex and immune function, further research should explore whether year or host species impact the relationship between sex and PO activity (Formica & Chan in revision).
- These results suggest that immune function in *Bolitoherus cornutus* is sexually dimorphic and point to differing pressures on the immune systems of male and female beetles.

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