The ability of *Musca domestica* to sequester zinc into their prestomal teeth

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Fly Proboscis

- Labellum
- Prestomal Teeth
- Pseudotracheae
Feeding Fly
Purpose:
- Determine if *Musca domestica* sequester metals into their prestomal teeth.

Hypothesis:
- When larvae are fed higher concentrations of zinc, the adult flies will sequester more zinc into their prestomal teeth, which will improve their ability to access fluids and therefore increase their fitness.
Experimental Design

- Oviposition
- Larval Rearing
- Prestomatal Tooth Preparation
- Imaging and Quantification
Fly Life Cycle

Ovipositing

Components
- Protein (Powdered Milk)
- Moist Surface
- Ammonium
Diet and Larvae Rearing

- The third time is the charm
- Ingredients: Calf Manna, Wood Chips, Wheat Bran, Water, Methylparaben, and Zinc Sulfate
Prestomal Tooth Preparation and Imaging

- Froze flies at -80ºC
- Dehydrated heads with alcohol and HMDS
- Dissected out Prestomal Teeth
- Imaged with SEM and ran EDS for 5 minutes
Results

- Correlation between the time required for development and the concentration of zinc

- Amount of zinc found in prestomal teeth
EDS
Statistical Analysis

Table 1: Percent of zinc in 1 prestomal tooth for three samples for each trial

<table>
<thead>
<tr>
<th></th>
<th>(A) Control (% of Zn)</th>
<th>(B) 0.5 mg/g (% of Zn)</th>
<th>(C) 1 mg/g (% of Zn)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.04</td>
<td>0.05</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>0.05</td>
<td>0.08</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>0.08</td>
<td>0.06</td>
<td>0.07</td>
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</tbody>
</table>

Table 2: P-values of post-hoc ANOVA test, which tests for significance between all trial combinations

<table>
<thead>
<tr>
<th>Post-hoc ANOVA Test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A vs B</td>
<td>0.88</td>
</tr>
<tr>
<td>A vs C</td>
<td>0.75</td>
</tr>
<tr>
<td>B vs C</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Figure 1: Bar graph comparing the three trials with with the standard errors shown
Thoughts Moving Forward...

- Would a different form of zinc be more effective?
- Would results vary between species of Diptera?
- Is the ability to sequester metals heritable?
- Do prestomal teeth with sequestered metals have increased functionality?
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