Ionic Control of Settlement and Metamorphosis in Larvae of the Serpulid Polychaete, *Hydroides elegans* (Haswell)

Xuelei Zhang

Key Lab for Science & Engineering of Marine Environment & Ecology
First Institute of Oceanography, State Oceanic Administration, P.R. China
E-mail: zhang_xuelei@qingdaonews.com
*H. elegans*: Adults Distribution around Hong Kong, China

High salinity water with high occurrence frequency

(Qiu & Qian 1997)
**H. elegans** Life Cycle

- **Adults**: tube dwelling benthic foulers
- **Larvae**: meroplankton
*H. elegans*
Larval development at different salinities

(Qiu & Qian 1997)
Question/hypothesis

Does any ion(s) in high salinity seawater facilitate settlement & metamorphosis of *H. elegans* larvae?
<table>
<thead>
<tr>
<th>Ionic Composition (mM) in Different Seawaters</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="table.png" alt="Table of Ionic Composition" /></td>
</tr>
</tbody>
</table>
*H. elegans*: Morphology Change upon Settlement & Metamorphosis

(Carpizo-Ituarte & Hardfield 1998)
Result 1: Exposure to excess Na$^+$

**Figure 2.** IBMX: a cAMP effector & metamorphic stimuli

Result 1: Exposure to excess Na$^+$
### Result 2: Exposure to Other Ionic Increases

<table>
<thead>
<tr>
<th>Excess Ions</th>
<th>Metamorphic Induction</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>K⁺</td>
<td>+ abnormal</td>
<td>+KCl</td>
</tr>
<tr>
<td>Ca²⁺</td>
<td>no</td>
<td>+CaCl₂ or – MgCl₂</td>
</tr>
<tr>
<td>Mg²⁺</td>
<td>no</td>
<td>+MgCl₂ or – CaCl₂</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>+</td>
<td>+NaCl</td>
</tr>
<tr>
<td></td>
<td>+ (insignificant)</td>
<td>– SO₄²⁻</td>
</tr>
<tr>
<td>SO₄²⁻</td>
<td>no</td>
<td>+NaSO₄ &amp; – NaCl</td>
</tr>
</tbody>
</table>
Result 3: Antagonization between Na\(^+\) & K\(^+\)

Figure 4 A.
Conclusions

- Excess Na\(^+\) to normal seawater stimulates settlement & metamorphosis of *H. elegans* larvae

- Excess K\(^+\) to normal seawater inhibits the metamorphosis that would be induced by excess Na\(^+\)

- High salinity seawater might facilitate but does not induce settlement and metamorphosis of *H. elegans* larvae