Sample Preparation for Various Experiments Involving *Caenorhabditis elegans*

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ABSTRACT

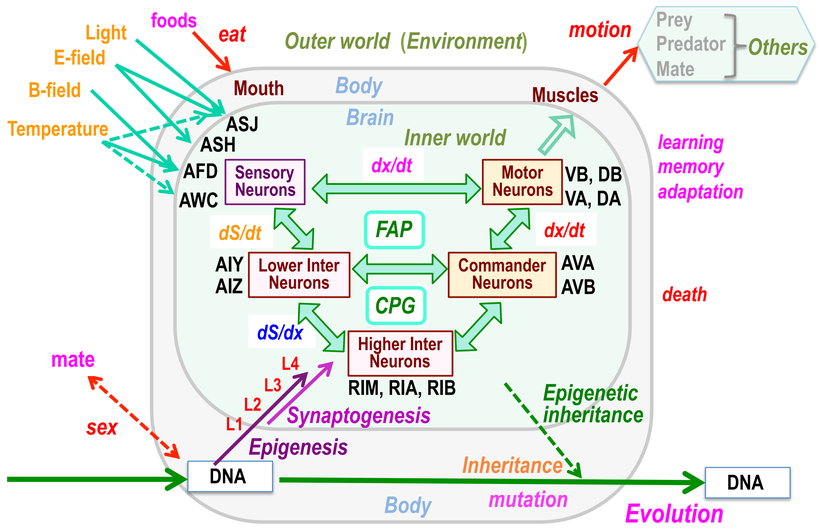
The focus of our laboratory is to take data on various aspects of *Caenorhabditis elegans* behavior. We experiment with our model organism by subjecting them to various stimuli, in various media, and at different stages of development. For each experiment, we design a different sample-making method to accommodate the features we wish to observe. Here, we have described the different types of samples we have made, and how that particular design allows us to observe the features we wish to focus on. In particular, we have described our general approach to sample-making for observing worm behavior in 2D, in 3D, and observing with a Bessel beam, in addition to more specific approaches in order to test worm behavior in response to stimuli from an electric field, a magnetic field, and a thermal field.

INTRODUCTION

Each of our experiments aims to observe how *C. elegans* is able to make decisions on how to navigate spaces based light, magnetic, thermal, and electric stimulation.

While other labs observe *C. elegans* only in two dimensions, our experiments are uniquely innovative because we have developed the technology to observe worms in 3D. We do so by observing the worms in gelatin, which worms can crawl in as they would in their natural soil environment. The parameters we observe in our experiments include the worms' perception of speed compared to actual wave speed in various concentrations of gelatin and agarose gel; the worms' behavior at the newly-hatched (L1) stage compared to behavior at fully grown (L4) stage; the worms' behavior when starved as compared to well-fed; worm habituation to prefer a certain temperature; etc.

We control the external stimuli, and observe worm motion before and after stimulation as well as the neurons involved in each process. By doing so, we are able to analyze the sensory-motor integration in the worms' responsive behavior.



MATERIALS AND METHODS

Gelatin
- Clear, with an index of refraction similar to that of liquid water
- Melting point ~ 20˚C
- *C. elegans* can survive in gelatin for several hours

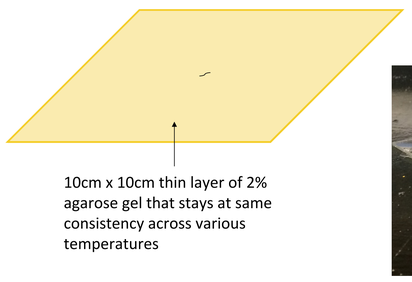
Agarose gel
- Opaque
- Melting point ~ 90˚C
- *C. elegans* can survive on top of agarose for several hours
- Standard procedure for *C. elegans* experiments

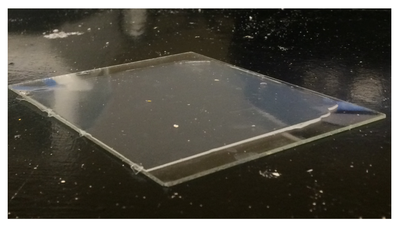
Copper tape
- 60 µm thick
- *C. elegans* tend to avoid copper

Clear glass plates

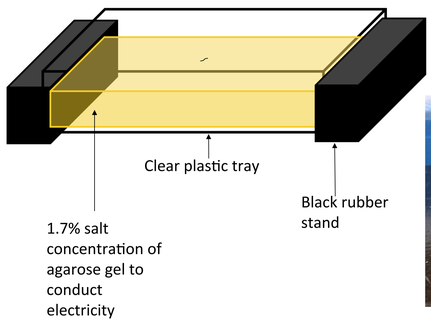
Glass and quartz cubic cuvets
- By filling the cuvets with gelatin, we can observe the motion of worms in 3D

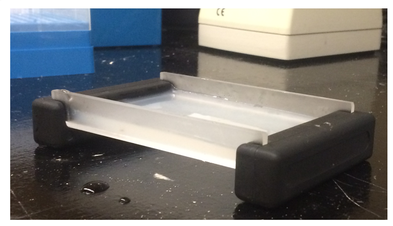
THERMOTAXIS



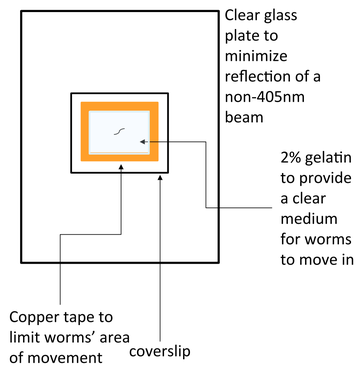


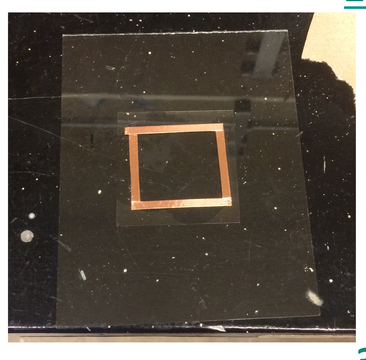
ELECTROTAXIS

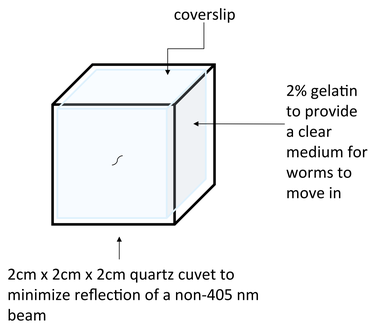


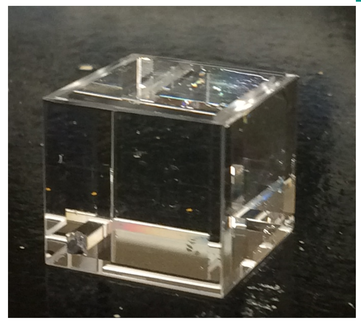


PHOTOTAXIS



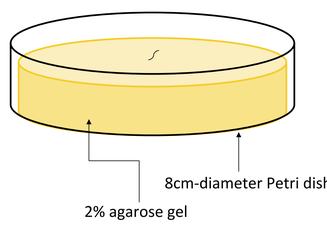


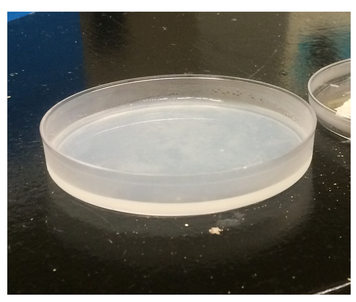




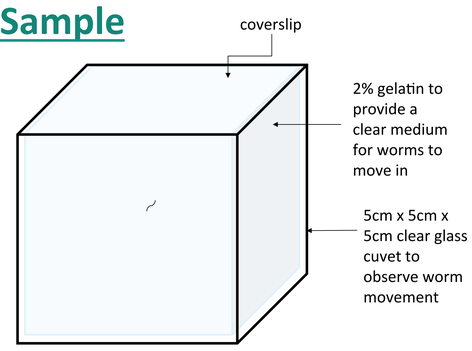
MAGNETOTAXIS

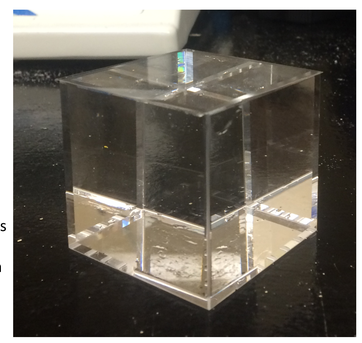
2D Sample





3D Sample





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