



Caenorhabditis elegans Sample Preparation Techniques



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ABSTRACT

The Elegant Mind Club studies and analyzes the behavior of *Caenorhabditis elegans*. By introducing stimuli and altering their environment, the nematodes' responses throughout development can be observed. Several experiments are performed concurrently within the lab. The stimuli include:

- Thermal gradient
- Chemical gradient
- Electric field
- Light
- Magnetic field

Adapted sample preparation techniques were implemented for these stimuli based on our available resources. They include:

- Fluorinated Ethylene Propylene (FEP) tubes
- Synchronization

Preparing uncontaminated, healthy, and specialized biological samples is vital for the production of accurate and reliable data. Continuously striving to make higher quality samples and developing methods of sample preparation is essential for advancing the field of biological research.

Bio Sample Preparation Room – Knudsen A-154



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 cuvetts

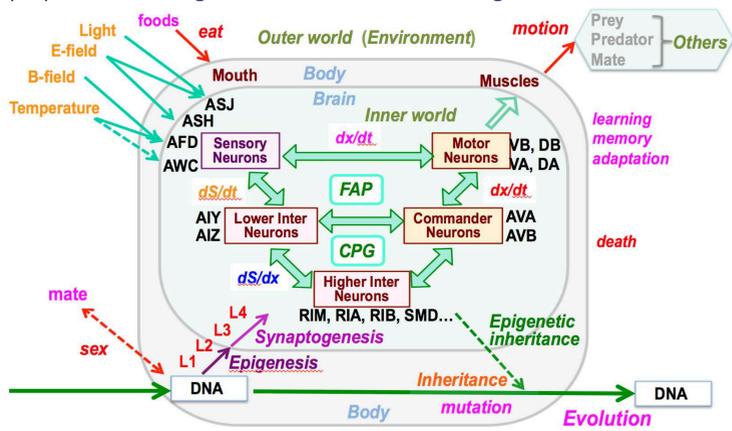
- By filling the cuvetts with gelatin, we can observe the motion of worms in 3D

INTRODUCTION

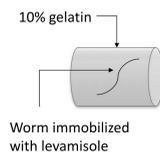
The Elegant Minds Club has been performing undergraduate research since 2013. As our research progresses, our techniques become more complicated and advanced. The Elegant Mind Club applies principles of physics to the biological world to better understand our consciousness. We study the behavior and neural behavior of a model organism, and our namesake, *Caenorhabditis elegans*.

Their response to external stimuli is observed with microscopes built in our lab. We record and analyze their movement using software adapted to our equipment. We observe their movements and neural activity in early development and adulthood. We predict and examine their behavior when presented with stimuli.

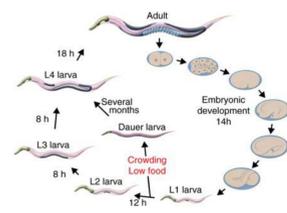
Working with a living organism requires their maintenance and preparation for use in experiments. Agar and gelatin are poured into containers designed for the stimuli and microscope used. Good sample preparation is integral to the research of the Elegant Mind Club.



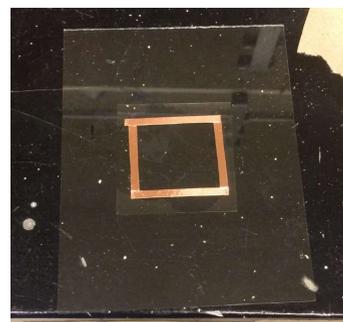
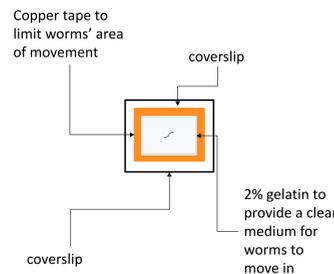
FEP tube



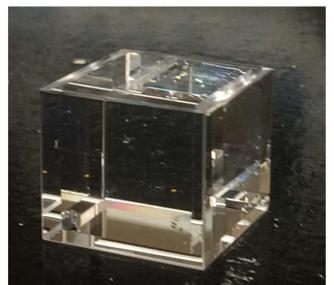
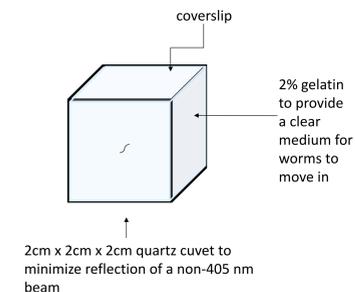
Synchronization



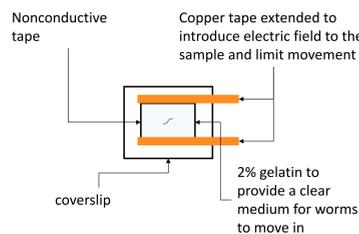
2D Sample



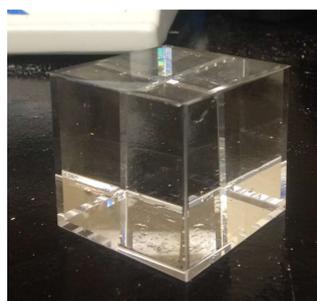
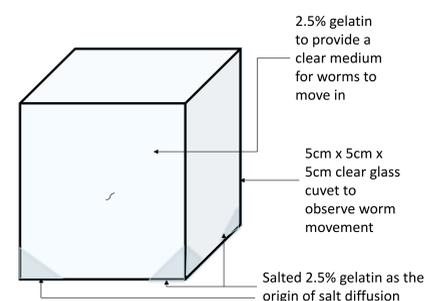
PHOTOTAXIS



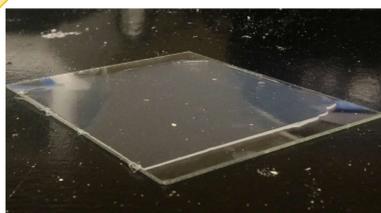
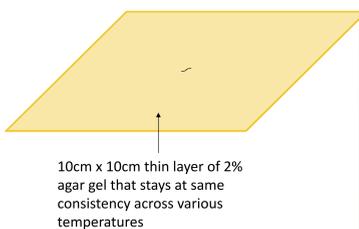
ELECTROTAXIS



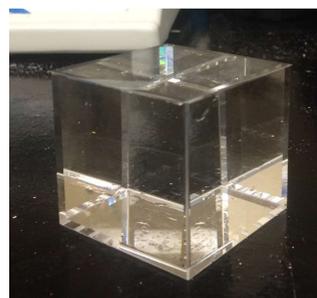
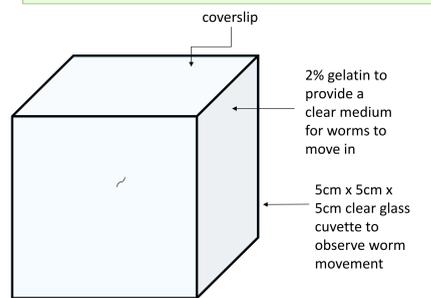
CHEMOTAXIS



THERMOTAXIS



MAGNETOTAXIS



REFERENCES

- Kwon, N., Pyo, J., Lee, S.-J. & Je, J. H. 3-D Worm Tracker for Freely Moving *C. elegans*. *PLOS ONE* 8, e57484 (2013).
- Stiernagle, T. Maintenance of *C. elegans*. *WormBook*(2006). doi:10.1895/wormbook.1.101.1

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