



The Elegant Mind Club: Undergraduate Research Club to Explore the Minds of *C. elegans*

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INTRODUCTION

Here at the Elegant Mind Club at UCLA, founded by Dr. Katsushi Arisaka in 2013, we provide undergraduate students a unique hands-on experience to work with *C. elegans* and present their own scientific methods of interest, allowing them to explore the nature of scientific research and understand the conclusions drawn from their data.

Different model organisms allow students to learn different science and research disciplines. We chose to use *Caenorhabditis elegans*, an excellent model organism to study neuroscience and biophysics due to its availability, tractable nervous system, and its observable behavior.

GOALS

Provide students the environment and opportunity to:

- Utilize published papers and online resources to propose new hypothesis and experimental procedures. WormBook, WormAtlas, and *Caenorhabditis* Genetics Center allow students to seek guidance from well-established methods.
- Independently maintain, culture, and prepare live *C. elegans* samples for their own experiment. Direct involvement with the biological samples taught students the discipline of working with chemicals and maintaining sterility.
- Manual practice in hardware permits students to strive for the most controlled and reproducible system for their experiment. This promotes individual problem-solving.
- Apply Matlab and various programs to conduct data analysis for biophysical characteristics and neuronal imaging.

MEMBERS

Since summer of 2013, Dr. Arisaka recruits about 30 new members every quarter and older members personally train them to assimilate quickly into the environment. By summer of 2014, we have 89 students, including international students and students from out-of-state universities. We are still growing!



Figure 1 (left): The core members of the Elegant Mind Club. Front: Karen Jiang (treasurer), Michelle Kao (president), Shirley Cheng (secretary), Guillaume Trusz. Middle: Leonard Haller, Nathaniel Nowak, Steve Mendoza (technical advisor), Blake Madruga (technical advisor). Back: Taejoon Kim (vice president), Sean Atamdede (education coordinator), Edward Polanco, Christopher Carmona, Alexey Lyashenko.

BEHAVIOR EXPERIMENTS

After proposing a project, leaders conduct groups of students to assemble the appropriate apparatus for the experiment. Each of our systems are designed to generate data consistently. As of now we have built systems for imaging worms under the absence of external stimuli, electric field, magnetic field, thermal gradients, light stimulation, and humidity. We also developed an advanced freely-moving real-time worm-tracking microscope capable of imaging neural activities.

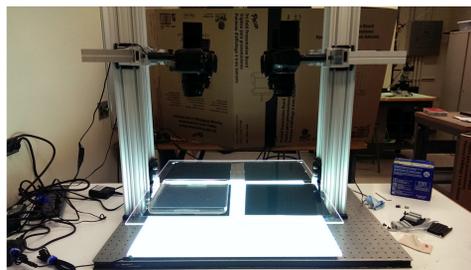


Figure 3: Setup to image any number of worms on up to four agar plates using four Canon T3i, polarized sheets, and bottom-illuminating light source.

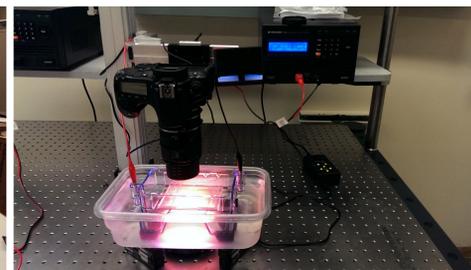


Figure 4: The electrotaxis system utilizes two electrodes connected to a power supply and a gel electrophoresis chamber, imaged by Canon 60D.

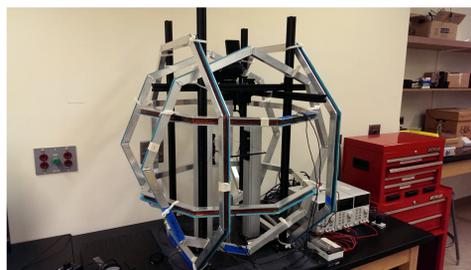


Figure 5: The Helmholtz cage for applying magnetic field on the worms. The system consists of copper coils in three dimensions.

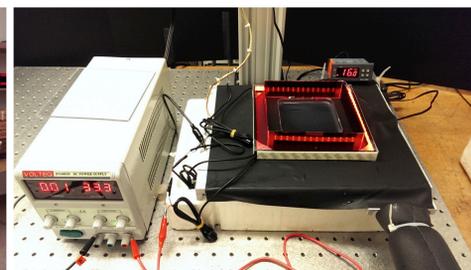


Figure 6: A temperature gradient is established with a Tungsten heater and a cooling system attached to an aluminum plate. LED lights provide illumination.

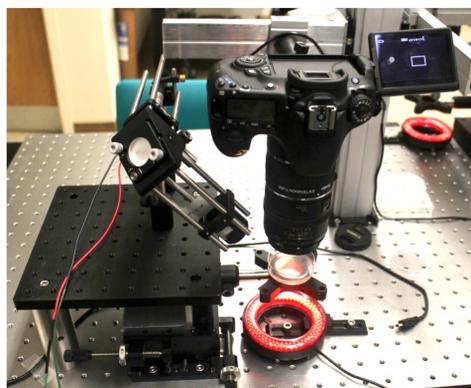


Figure 7: The phototaxis setup uses optical components to direct various laser beams at the sample with great precision on parts of the worm.

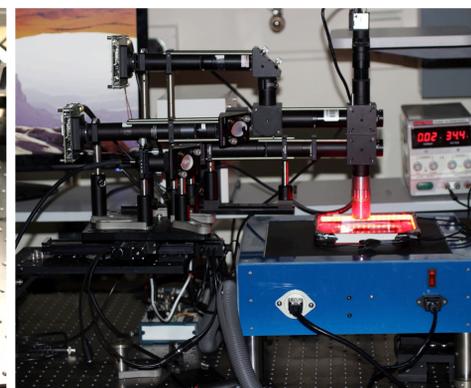


Figure 8: The real-time worm tracking fluorescent microscope allows simultaneous recording of the worms' movement and neural activities.

OUR LABORATORY

Our laboratory is composed of five rooms in Knudsen Hall, UCLA:

Central Lab

Knudsen 4-173

- Meetings, discussions, and article presentations
- Data analysis using Matlab
- New member training
- Social space



Biology Lab

Knudsen A-154

- *C. elegans* cultures maintenance in incubators
- Sample preparation for all experiments
- Biology and chemical stock



Tracker Lab

Knudsen A-166

- Development of Real-time worm-tracking microscope
- Observation of neural activities under various external stimulations



Behavior Lab

Knudsen A-142

- Controlled environment for *C. elegans* behavioral studies
- Free motion system, electric field, magnetic field systems, and humidity system



Microscope Lab

Knudsen B-171

- Development of advanced microscopes
- Light field microscopy of neural structures
- Scanning 3D brains of zebrafish and mouse



Figure 9: The Elegant Mind Club presented nine posters at UCLA Science Poster Day on May 14, 2014.

JOIN US!!

Elegant Mind Club at UCLA

Knudsen Hall 4-173

www.elegantmind.org

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Figure 10: Members of Elegant Mind Club giving an open house tour on May 30, 2014.