

San Miguel Lab at NC State

Principal Investigator: Dr. Adriana San Miguel

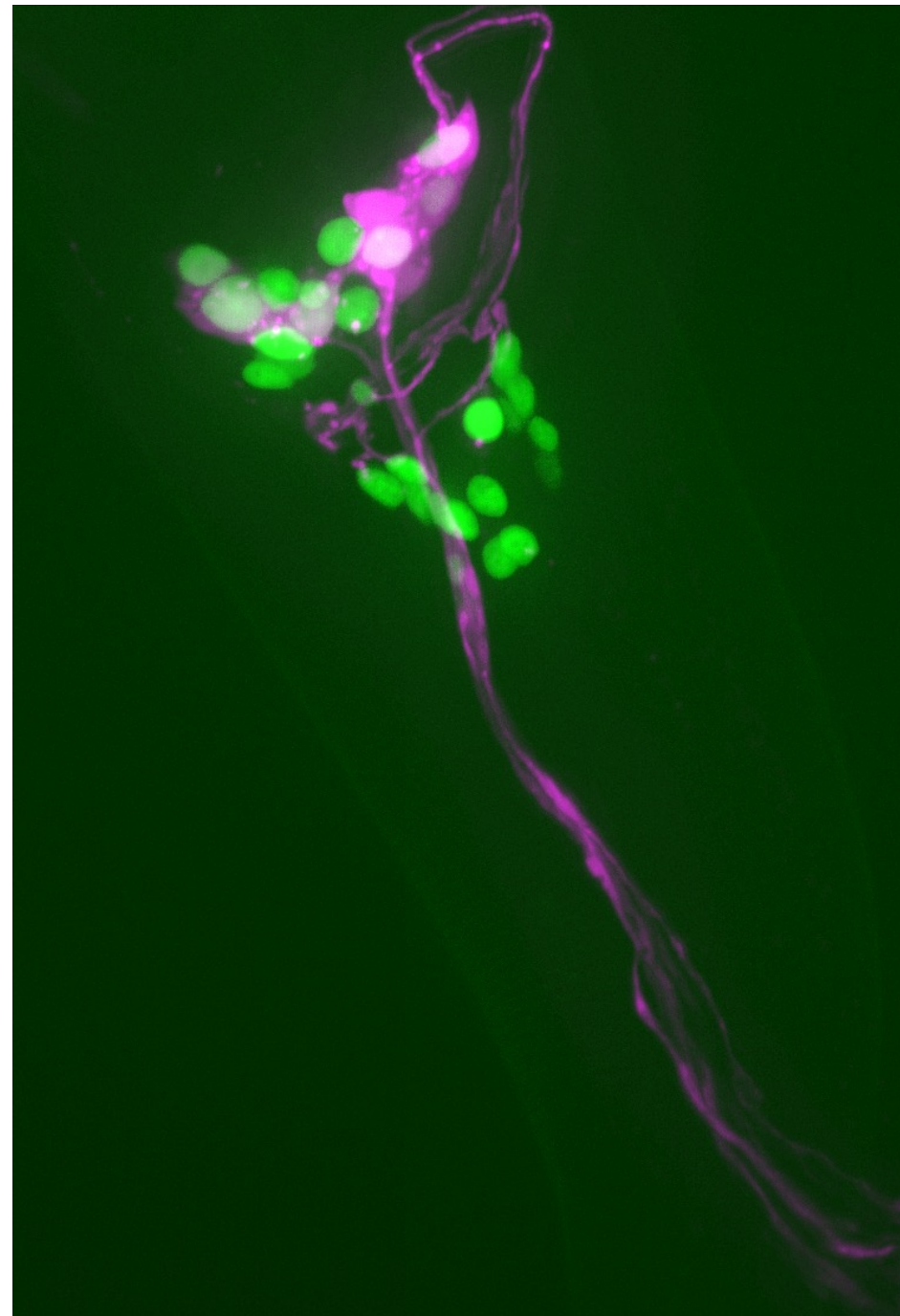
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Undergrad Students: Morgan Stephens, Daisy Aguilar, Jaclyn Kenzel, Noah Torreyson, Bhargav Vengala

NC STATE
UNIVERSITY



Neurodegeneration

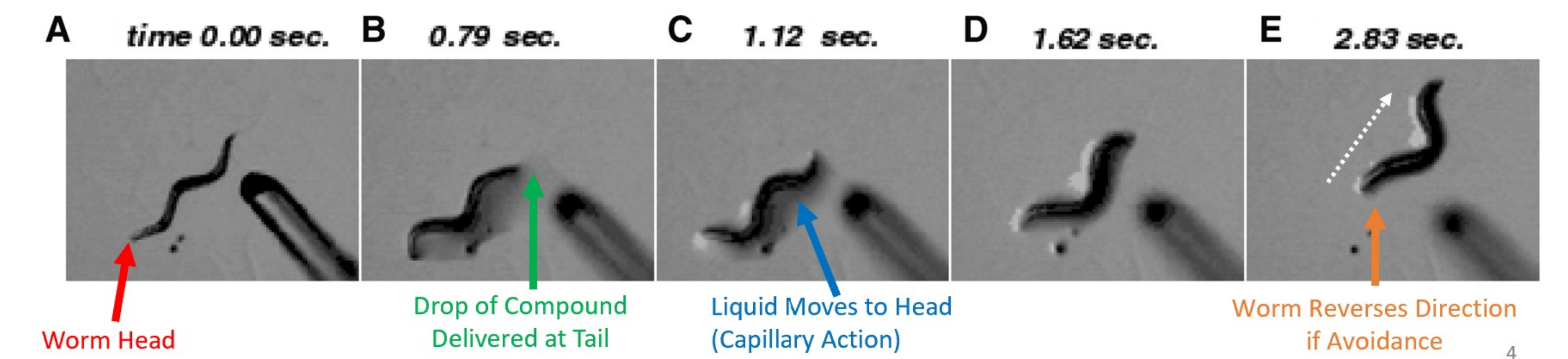


We use the neurons of *C. elegans* to model diseases that affect the central nervous system in humans. We can **visualize their neurons firing** using a technique called **calcium imaging**. This helps us understand how diseases act at the single cell level in vivo.

Our Vision

We use *C. elegans* as a model organism to uncover major biological phenomena. We strive to develop **high-throughput experimental platforms** using **microfluidics, image analysis, behavioral assays, and genetic engineering**. As we expand our abilities as scientists and engineers, we seek to develop solutions for the benefit of humanity.

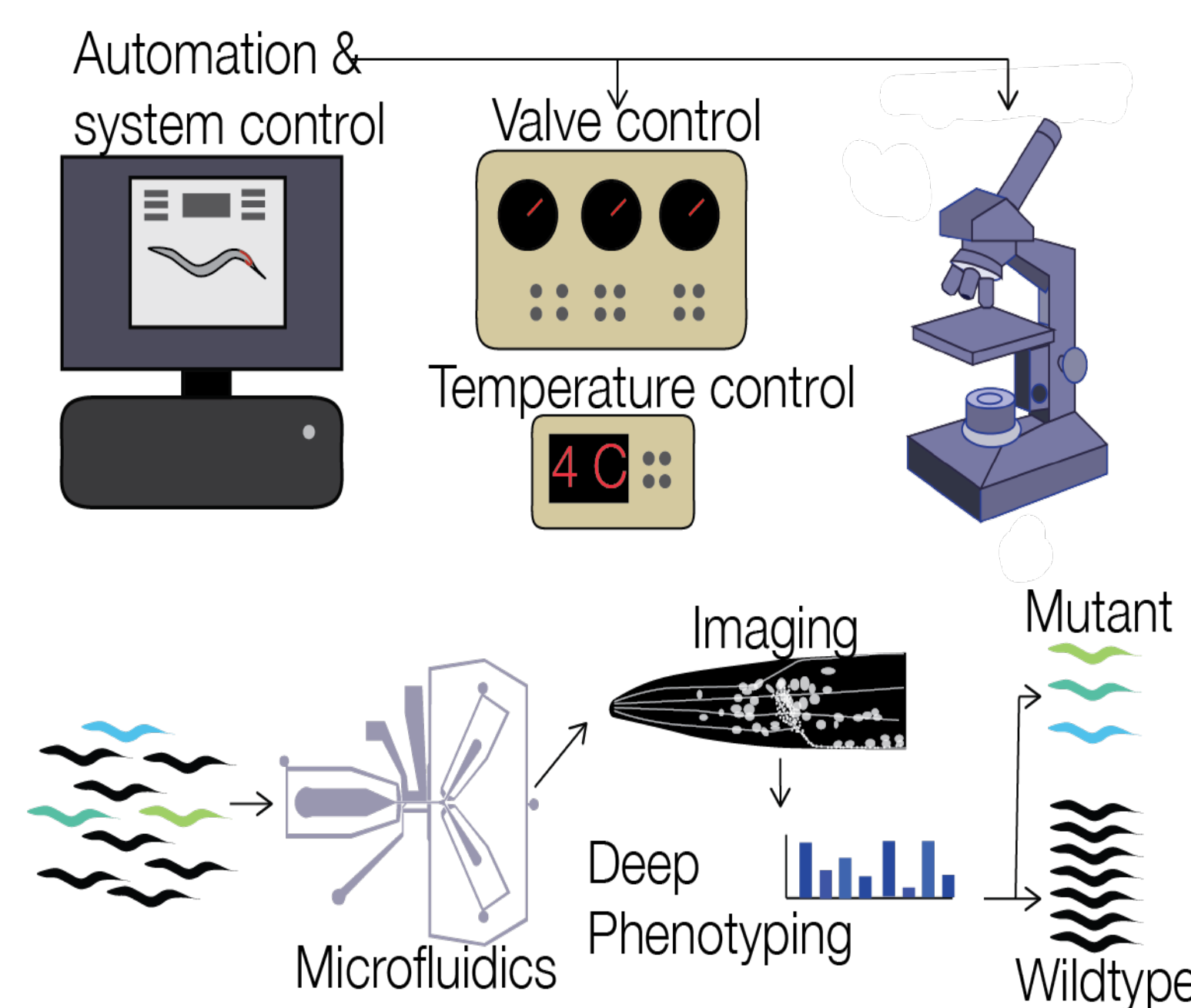
Behavioral Studies



Behavioral studies are often linked with neurodegenerative/genetic studies. **Behavioral assays** allow us to continue to determine the physical capabilities of *C. elegans*, along with how certain **behaviors** are related to their **genetic** and **epigenetic** conditions.

High-throughput Technologies

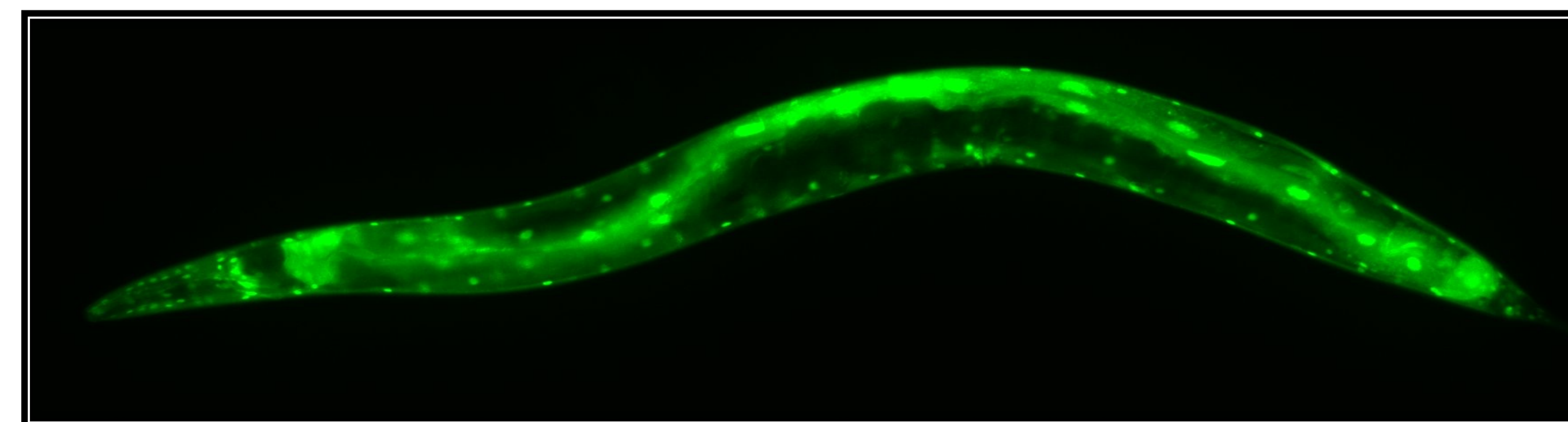
Biological research is inherently multivariate. Determining causality requires use of large data. We use automated control systems through computer programming (**MATLAB, Python**) and high-power instrumentation (**Microfluidics, Confocal Microscopy**) to uncover hidden correlations in systems.



Our Team



Why *C. elegans*?

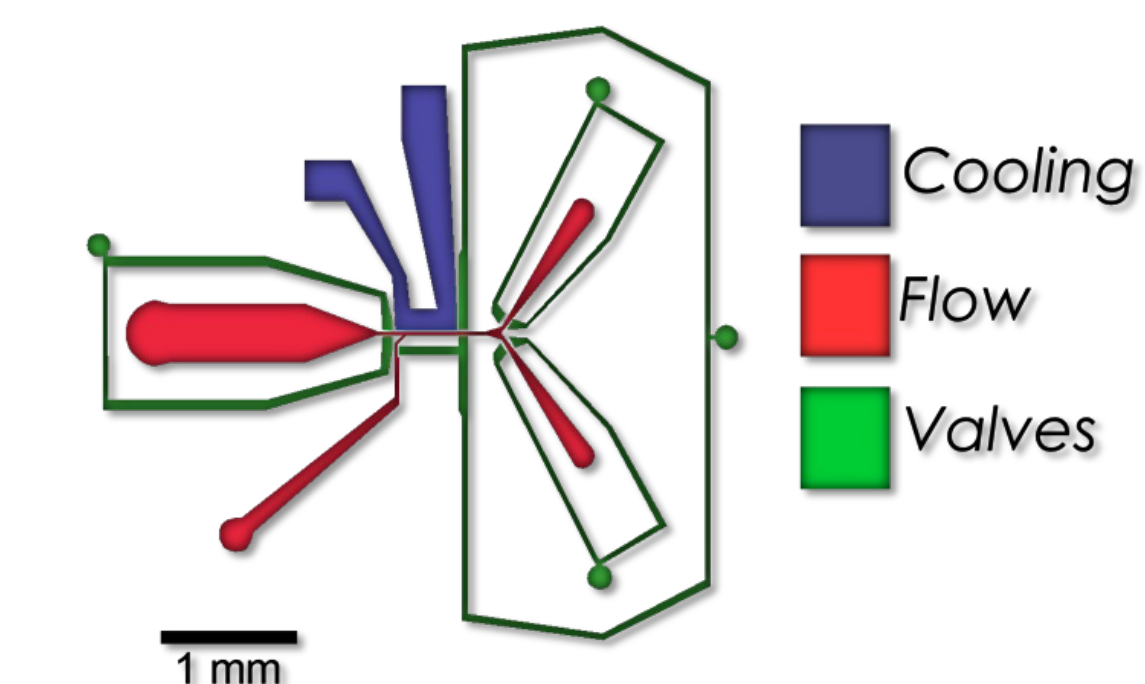


Easy to culture All neurons mapped
Short life-cycle Transparent

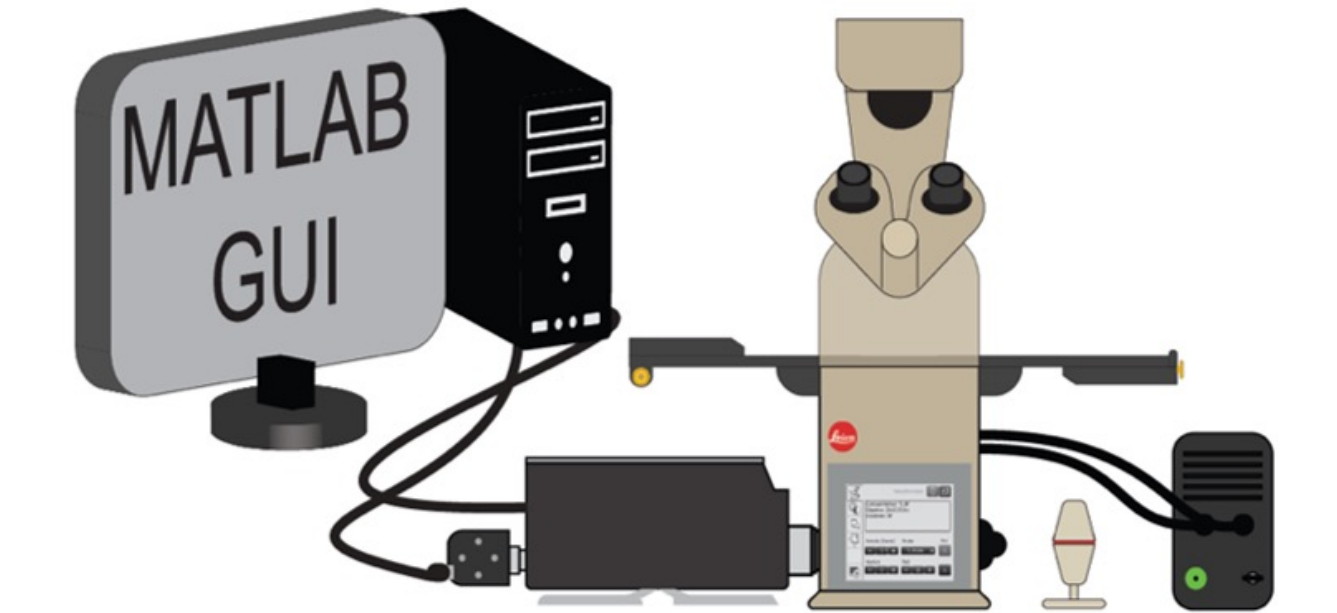
Caenorhabditis elegans are **microscopic** nematodes that naturally live in soil. They have a short growth cycle of approximately 96 hours and are simple to work with. With a **fully mapped neuronal system, full genetic sequencing, and transparent bodies**, *C. elegans* are ideal for systems-level biological research.

Our Tools

Not only do we implement processes already developed, but we also develop tools, techniques, and methods!



Microfluidics



Confocal fluorescence microscopy

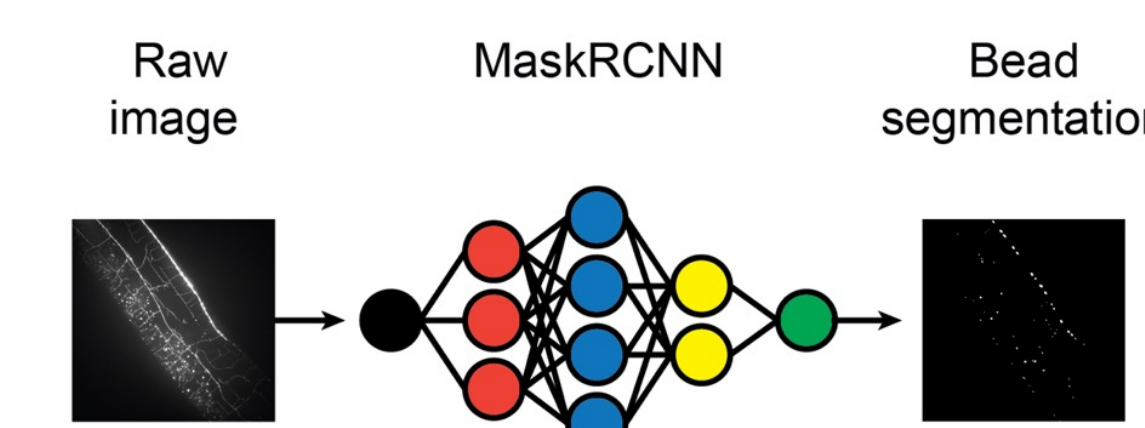
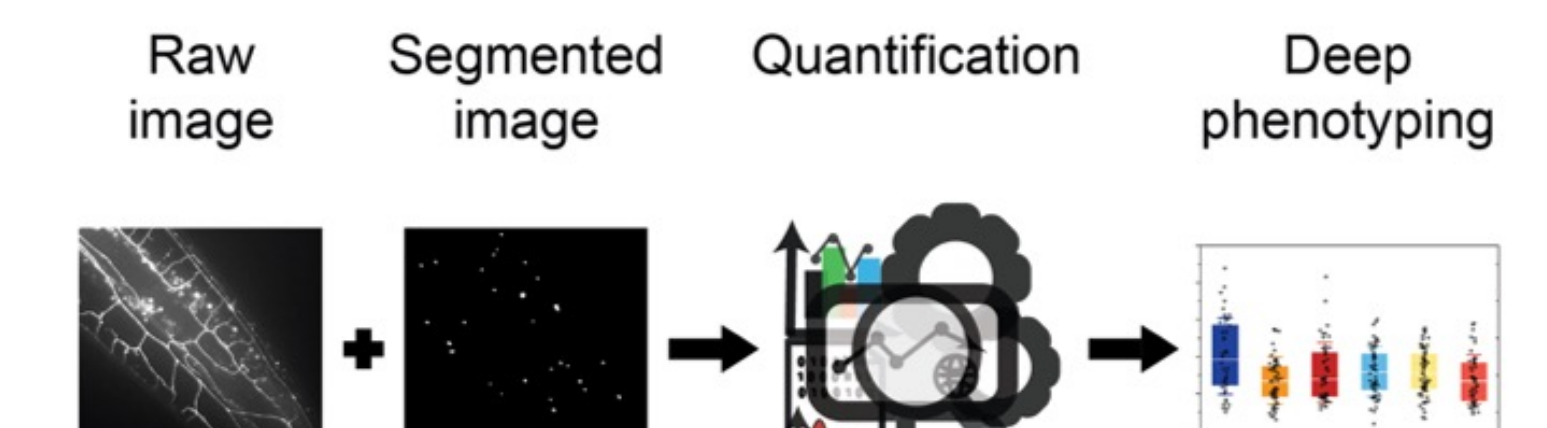


Image segmentation using Convolutional Neural Network technique (MaskRCNN)

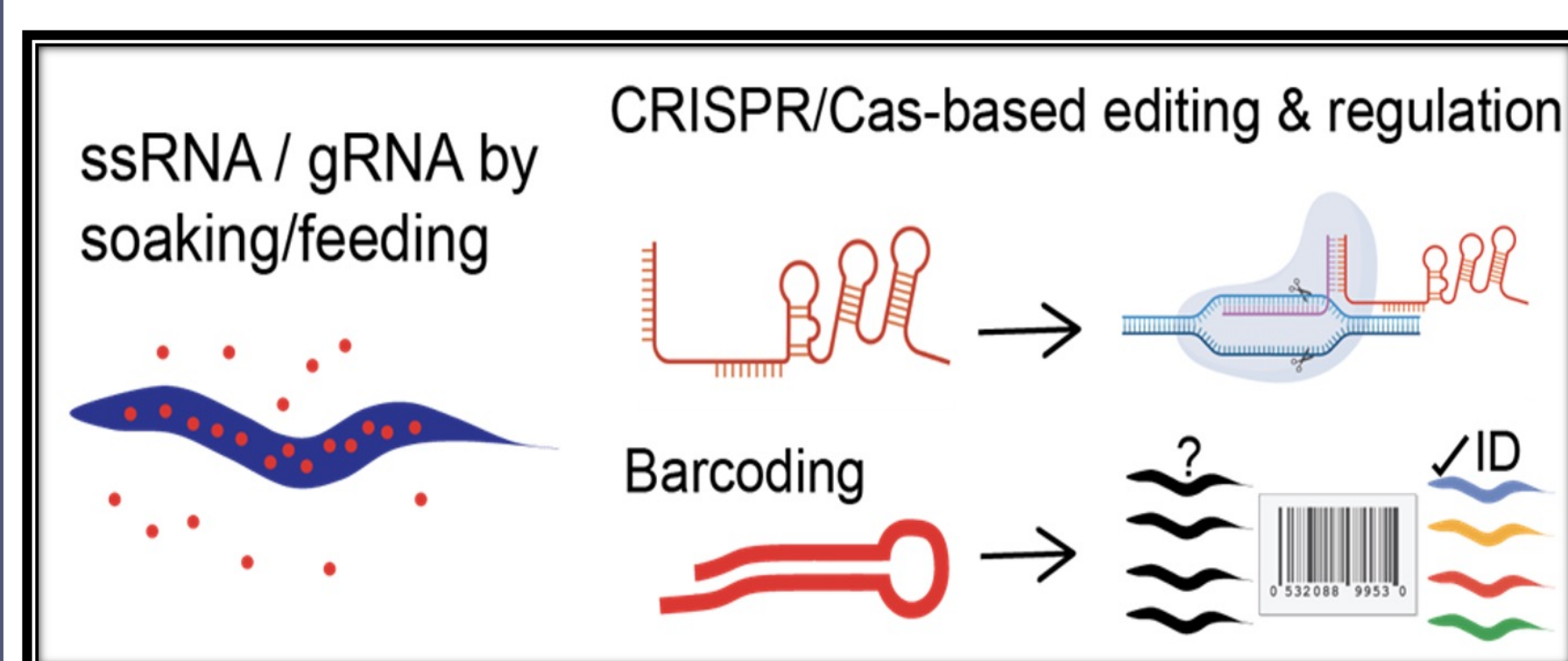


Feature extraction and quantitative analysis

Genetic Engineering

The underlying cause of many diseases lies in genetic defects.

Our efforts focus on various approaches including **CRISPR** to understand underlying **genetics** and develop methods to investigate analogous diseases in *C. elegans*.



Contact Us!



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<https://sanmiguel.wordpress.ncsu.edu/>