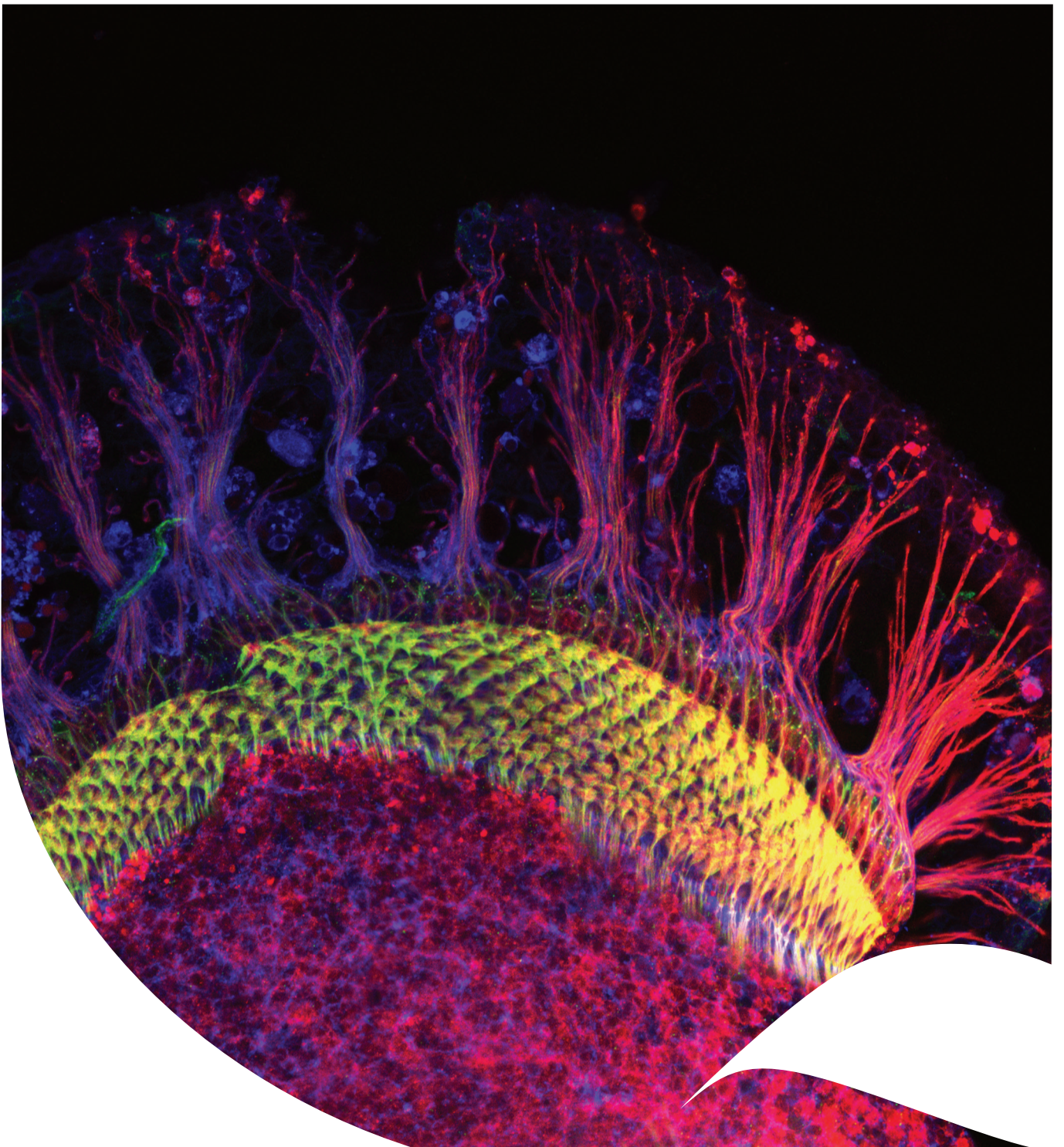




THE UNIVERSITY  
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# Biomedical Sciences Molecular Mechanisms for Wiring the Brain



## Projects in the lab

We use *Drosophila* molecular genetics to understand:

- how brain wiring proteins work at the molecular level.
- how brain structures and neural circuits form.
- how the brain generates sufficient protein diversity to specify its numerous synaptic connections - focus on alternative splicing.
- how cell surface proteins regulate synaptic physiology.

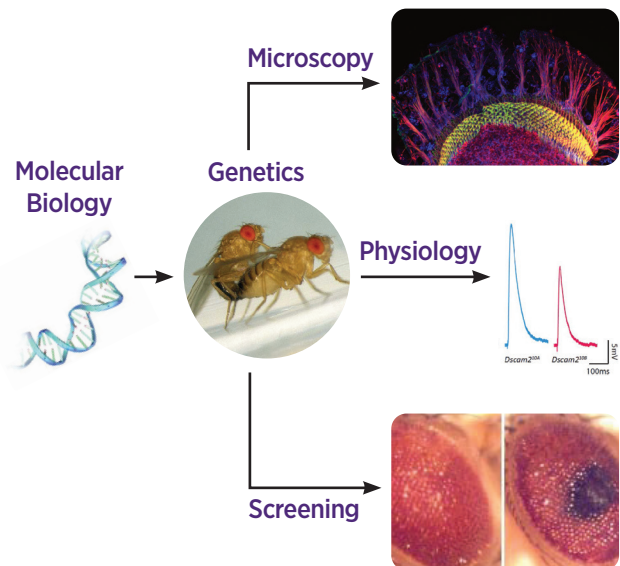
We also use flies to model human disease processes. ALS is our current focus.

- Modelling neurodegeneration in the fly eye using candidate ALS risk factors.
- Studying how ALS risk factors affect motor neuron morphology, synaptic makeup and physiology.

## Lab work flow and techniques

We use molecular biology to manipulate genes or the genome, perform genetics to generate animals of the appropriate genotype and then score the resulting phenotypes using confocal microscopy, electrophysiology or external phenotypes in the fly.

- CRISPR
- RNAi
- Cell-specific overexpression
- Mosaic experiments (single cells, rather than the entire organism, manipulated)
- High resolution imaging
- High-throughput screening in a whole animal model



## Publication examples

*Deterministic splicing of Dscam2 is regulated by Muscleblind.* Li JSS and **Millard SS**  
Sci. Adv. 2019; 5 eaav1678

*Cell-specific alternative splicing of Drosophila Dscam2 is crucial for proper neuronal wiring.*  
Lah GJ, Li JSS and **Millard SS**  
Neuron 2014 Sep 17; 82(6):1376-88

## UQ's School of Biomedical Sciences

The University of Queensland's School of Biomedical Sciences is making ground-breaking advances in modern medical science and providing students with the theoretical and practical skills for an exciting career in academia and industry.

Our innovative research encompasses the research spectrum from basic discovery through translational pathways to medical solutions, including:

- Investigation of cellular processes such as protein trafficking, cell signalling and organelle function.
- Study of how the dysregulation of bodily processes can cause serious human disorders such as infertility, Alzheimer's disease and autism.
- Musculoskeletal and neuromotor analyses to improve whole-body movement performance.
- Novel approaches to heal conditions such as spinal injury, motor neuron disease and cancer.

## Contact

S. Sean Millard, PhD  
Molecular mechanisms for wiring the brain laboratory  
Associate Professor of Physiology  
Faculty of Medicine, School of Biomedical Sciences  
The University of Queensland  
Brisbane Qld 4072 Australia

**T:** +61 7 3365 2991

**E:** [s.millard@uq.edu.au](mailto:s.millard@uq.edu.au)

**W:** [biomedical-sciences.uq.edu.au/research/groups/molecular-mechanisms-for-wiring-the-brain](http://biomedical-sciences.uq.edu.au/research/groups/molecular-mechanisms-for-wiring-the-brain)

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