

Drosophila Meeting Report

Mathieu Norrcross

Lake Forest College
Lake Forest, Illinois 60045

The 62nd *Drosophila* conference tied different research themes together using the model organism *Drosophila*. This talk was attended by professors and students from across the world, with my attendance following my research using *Drosophila* looking at iron supplementation effects on fertility and developmental timing. I attended talks centered around topics discussed in class and ones I found personally interesting. The conference consisted of five talks, four posters, an undergraduate platform, and interviews/questions with presenters. The topics/themes I focused on were diversity in STEM, factors affecting oogenesis & ovarian cell migration, stem cells in organogenesis, bacteria in the gut microbiome, dealing with physical/mental traumas, and new databases determining gene expression patterns. All of the talks throughout this conference demonstrated the depth of research that can be performed with *Drosophila*. Each talk presented potential uses for *Drosophila* in solving complex scientific research questions. Many of the presentations discussed novel findings and methodologies that could help inspire an informed scientific audience to pursue the research further or incorporate these novel methodologies into other experiments. The general format of the conference consisted of live presentations and poster halls. Talks lasted for 15-30 minutes, while posters were open for two weeks. The theme of diversity in STEM was demonstrated in the undergraduate platform session, where students showed the diversity in research using *Drosophila*. There were a total of four undergraduate researchers from across the country presenting research on everything from gene regulation of histones to basolateral polarity and Bisphenol A's role in neurodevelopment. All of these talks demonstrated the extreme breadth of research using *Drosophila* to study all sorts of mechanisms within biology and beyond. The second talk surrounding diversity was titled *Managerial Engagement to Promote DEI in STEM* by Mala Htun. This talk addressed the promotion of diversity in STEM, stating current procedures like harassment training are unproductive in promoting diversity and inclusion. Htun instead proposed three projects, including institutional change in faculty hiring processes, team projects focused around solving issues of DEI, and the creation of a curriculum designed to fight against microaggressions and sexual assault in STEM. Another theme focused on factors affecting oogenesis and ovarian cell migration in *Drosophila*. The first talk titled *Obesity and Drosophila Oogenesis* asked the question on how obesity affects oogenesis. Flies were fed a high sugar diet (HSD) causing them to become obese, which led to increases in germline cyst and vitellogenic follicle death along with decreased egg production and quality. Obesity alone, however, was not sufficient to elicit these effects. Knockouts of lipase Brummer showed that no stage of oogenesis was affected by obesity alone, and only egg production was decreased, indicating that an HSD has other mechanisms that led to detrimental oogenetic outcomes. How oogenesis was affected by different levels of chronic temperature stress (18, 25, and 29 C) was discussed in a separate poster presentation. Both cold and hot stress saw a decrease in egg laying, with the heat effect being a reversible phenomenon. In cold temperatures, GSCs underwent more cell maintenance, while more GSCs died in heat. Heat also showed increased follicle death and decreased hatching rates. The effect of Ferritin on Ovarian cell migration was presented in a poster by Susan Afolabi. This talk was particularly interesting because Ferritin is an important player in iron sequestration, which is important to my previous research. Ferritin is an important downstream molecule in migration pathways and RNAi was used to determine if Ferritin is important to border cell migration. Results indicate Ferritin is important for border cell migration as misexpression delayed migration. I interviewed Susan and asked her about the potential of feeding flies a high/low iron diet, which I performed in my study. Susan discussed how oversupplementing iron would likely disable Ferritin, affecting cell migration negatively. I also asked her to clarify results she found, and she stated she wanted to perform further imaging studies to help clarify phenomena demonstrated in her results.

The final developmental biology session I attended was a talk titled *Positioning a stem cell niche during organogenesis*, which analyzed how anterior niche assembly was regulated in gonads. Through lineage tracing and knockout experiments, the visceral mesoderm was determined to be important for niche placement as it used paracrine signals (Slit & FGF) to influence E-cadherin polarity and expression of islet transcription factors necessary for niche assembly in the embryo. All of this is dependent on the proximity of the niche to the visceral mesoderm surrounding the gut of the *Drosophila*. On the topic of the *Drosophila* gut, I attended a poster session discussing the gut bacteria defending against invasive microbes. The study looked at interactions between gut bacteria *Lactobacillus plantarum* (Lp) and *Escherichia coli* Nissle. Plating the bacteria together showed that Lp inhibits EcN due to Lp's antimicrobial secondary metabolites. Looking at the bacteria interactions in vivo in *Drosophila* showed similar inhibition of EcN, demonstrating gut bacteria possess a defense mechanism against invaders. Another theme surrounding talks I attended is centered around repairing physical/mental damages. The repairing of physical damages was discussed by the talk *Cell wound repair: Dealing with life's daily trauma*. The presentation wounded *Drosophila* in multiple areas and used microarrays and FlyTrap screens to isolate RNA 5 minutes and 30 minutes following the wound. No transcriptional response was found after 5 minutes, but 30 minutes showed 80 upregulated and 172 downregulated genes. The top 16 up and downregulated genes were shown to be important to wound healing processes such as wound expansion, and accumulation of internal actins through RNAi studies. The study was able to quantify the genes upregulated and downregulated during wound closure. I also look at a poster titled *The psychedelic drug psilocybin has long lasting antidepressant-like effects in male Drosophila*, which demonstrated the effectiveness of psilocybin as an antidepressant by analyzing flies using Forced Swim Test (FST) and *Drosophila* activity monitoring system (DAMS). Results suggest pulsed dosing (1x) of psilocybin leads to increased mobility function, while constant dosing leads to reduced function, demonstrating the drug's potential use for combatting depression. The final talk focused on a new methodology, particularly a database of gene expression surrounding the *Drosophila* embryo. There are many spatial/temporal images of gene expression in *Drosophila* embryos. The presenters have been developing an imaging database that is easily accessible to researchers. This would help approximate the dorsal gradient and WntD mutant phenotype in the developing *Drosophila* accurately through an easily accessible database built from JSON trees. This conference provides valuable insight for future scientific research. There were many talks focusing on current important scientific topics such as the effects of obesity and the importance of the gut microbiome, among other topics. There were other talks that focused on other issues within STEM, such as the lack of diversity, and how we should combat these issues. The talks presented future studies that should be investigated further in order to make progress on the many issues the scientific community faces. For this reason alone, undergraduates like myself should be required to attend this conference. The conference introduced me to what sorts of research is being done on the major biological issues of today while also introducing me to new issues I originally didn't know about. The conference also introduced me to new methodologies I could incorporate into future research designs while also allowing me to work on talking to professionals. Attending networking events and interviewing participants helped me think critically about the materials being presented, leading to the development of critical thinking questions. All of these skills are important for future interactions within the scientific community and for future success in academia, which is yet another reason more undergraduate students should attend events like these. Personally, the conference provided me with new knowledge about topics I'm personally passionate about, while also reinforcing topics discussed in class, which made the talk a scientifically educational event. The talks also presented research topics that I would be interested in joining potentially in the future, while helping me understand areas I need to work on when networking and asking critical thinking questions.