Michelle Krystyna Lupa

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EDUCATION

Michigan State University (MSU), East Lansing, MI College of Natural Science | Honors College Bachelor of Science, Genomics and Molecular Genetics Bachelor of Science, Neuroscience (Cognitive and Computational) Minor in Cognitive Science Major GPA: 3.474; Cumulative GPA: 3.453

AWARDS AND HONORS

Reproductive & Developmental Sciences Undergraduate Training Stipend May 2022-August 2022 Michigan State University, East Lansing, MI

One of three students selected to be trained in areas of reproductive biology and developmental sciences and participate in career development workshops aimed to prepare for graduate school. Also, funded by this program, I attended the annual Conference of the Society for the Study of Reproduction in Spokane.

National Society of Collegiate Scholars Award

Michigan State University, East Lansing, MI

Awarded by the MSU branch of the National Society of Collegiate Scholars to the top 10% of students in the College of Natural Science and Honors College.

Dean's List

Michigan State University, East Lansing, MI Awarded to full-time students who maintain a grade point average of 3.50 or higher.

Best Blog in Class Award

Michigan State University, East Lansing, MI

Wrote a blog post of a study which finds that 80-year-old "super-agers" seem to escape the deterioration in cognitive function that affects most of the elderly due to stronger functional connectivity in salience networks; this project was selected and posted on MSU's Cognitive Neuroscience social media pages.

Poster Session Display

Michigan State University, East Lansing, MI Poster presentation of final research in Honors Cell & Molecular Biology was selected by the department to be displayed near the Honors laboratories until the following semester.

Polish Language School Student Award

Wayne State University, Detroit, MI

Awarded for being valedictorian and top student for 13 consecutive years at the Adam Mickiewicz School of Polish Language as well as earning high ranks in national Polish Language Competitions.

August 2017 – July 2022, All Semesters

December 2017, May 2020

October 2019

he

April 2017

Aug 2017 - Dec 2022

April 2018

RESEARCH EXPERIENCE

Molecular Neurogenetics Laboratory

University of Colorado, Boulder, CO; Mentor: Dr. Jerry Stitzel

Since joining the Molecular Neurogenetics (Stitzel) Lab, I have applied my dual-degree in genetics and neuroscience to explore genetic factors that influence drug dependence and co-morbid psychiatric disorders, focusing specifically on nicotinic receptor genes and their roles in nicotine addiction. Initially, I contributed to a developmental nicotine project, where I conducted brain dissections, managed mouse colonies, performed mitochondrial isolations, and maintained cell cultures. Currently, as a full-time PRA, I lead and expand on my responsibilities in the developmental nicotine exposure project and am involved in a new initiative investigating astrocytic responses to nicotine exposure. This project aims to elucidate how genes associated with nicotine behaviors impact astrocyte morphology and function. My role now encompasses managing complex cell culture systems, including astrocyte-specific cultures with siRNA transfections for gene expression studies, and conducting mouse behavioral experiments to assess nicotine-related behaviors, such as conditioned place preference and voluntary intake models. Additionally, I utilize fluorescence microscopy, flow cytometry, and immunohistochemistry to analyze molecular and cellular changes in response to nicotine. I also contribute to the ongoing development of genetic models, examining gene-environment interactions in nicotine addiction through both in vitro and in vivo experimental design and execution.

Arora Laboratory

Michigan State University, East Lansing, MI; Mentor: Dr. Ripla Arora

My time in Arora Lab began during MSU's Reproductive and Developmental Science summer training program. I shadowed lab members, attended weekly lectures, and conducted literature reviews on uterine and developmental biology. My first project investigated the effect of NSAIDs on pre-implantation embryo movement and prostaglandin synthesis. A mouse pregnancy model injected with indomethacin was used. Several doses were titrated and injected, then the uterus was imaged with confocal microscopy. Images were analyzed in Imaris software to locate and make 3D reconstructions of embryos and the uterine horn. Embryo location and uterine horn length were exported into Excel to calculate distances between each embryo and the distance between the oviduct and each embryo; these final data points were then statistically analyzed and plotted.

My second project involved studying uterine neuronal development, the effects of innervation on uterine contractions, and hormonal effects on nerve fibers. I independently took on this project due to my desire of applying my background in Neuroscience to the Arora Lab. This research aimed to quantify the neuronal changes occurring with fluctuations in ovarian hormones and further study uterine contractility.

Neuroscience Laboratory Course Research Manuscript

August 2022 – December 2022

Michigan State University, East Lansing, MI; Mentor: Dr. Cameron Prigge I carried out a research project looking at the effect of *Withania somnifera* (Ashwagandha) extract on an animal model of Parkinson's disease. This project uses *Drosophila* (fruit flies) treated with rotenone, a drug that destroys dopaminergic neurons, to induce locomotor deficits. Working with a team, I conducted an experiment to quantify locomotor changes in various groups of fruit flies. Various experimental conditions were tested using a compound to attempt to rescue the PD phenotype, locomotion. To further this research, I prepared a protocol for testing, collected data to analyze in Excel, and wrote results in a manuscript-style paper.

May 2022 – December 2022

Medical Anthropology Course Research

Michigan State University, East Lansing, MI; Mentor: Abigail Buchanan

I studied the medical anthropology of cerebral palsy for my summer-long research in Medical Anthropology. I analyzed various illness experiences that come together to make up a definition of a complex disorder, like cerebral palsy. Through this, I was able to gather a multitude of perspectives to explain cerebral palsy and thus help health professionals and scientists further the conversation towards discovering a long-term cure/treatment.

Honors Cognitive Psychology Course Research

Michigan State University, East Lansing, MI; Mentor: Dr. Jan Brascamp This project was a collaboration between the MSU Psychology Department and the MSU Broad Art Museum for the museum's exhibit: "The Art of Psychology and Perception". I analyzed artwork optical illusions, focusing specifically on the principles and laws of Gestalt psychology. A formal research analysis was written then translated into a more digestible format and coded onto a "smart label" (an experimental new technological platform in development at the museum), allowing museum visitors to engage more deeply with different ways of looking at and understanding the works on view.

Honors Cell and Molecular Biology Laboratory Course Research August 2017 – December 2017 *Michigan State University, East Lansing, MI; Mentor: Dr. John Urbance*

I conducted a research project studying causes of mastitis disease in cows from the MSU Dairy Farm by looking at detection of resistance genes in the Red Cedar River. I obtained water samples from various river locations then isolated, amplified, and identified DNA using PCR and gel electrophoresis.

MMSTC Senior Research

Macomb Mathematics Science Technology Center, Warren, MI; Mentor: Jamie Hilliard This project was the final iteration of annual research at MMSTC combining math, science, and computational sciences. My final senior research looked at the effect of nicotine on embryo development by comparing various concentrations and forms of the drug. A *Hydra littoralis* model was used to find data, which was then analyzed via a series of descriptive statistical tests. By understanding the effect of nicotine, the health of mothers and their children alike may be improved and general knowledge may be gained regarding the safety of E-cigarettes compared to regular cigarettes.

PROFESSIONAL EXPERIENCE

Stitzel Molecular Neurogenetics Laboratory

Professional Research Assistant, University of Colorado, Boulder, CO

- Conducting adult mouse brain dissections (whole-brain and specific regions) for mitochondrial isolation, as well as dissecting brain of mouse pups for astrocyte isolation
- Preparing brain samples into mitochondrial isolation and cytosolic fractions
- Managing mouse colonies, communicating on pregnancies, pups, health status
- Maintaining complex cell culture systems, including astrocyte-specific cultures
- Utilizing fluorescence microscopy, flow cytometry, and immunohistochemistry for analysis
- Conducting mouse behavioral experiments such as conditioned place preference and voluntary intake models

May 2024 - present

May 2021 - August 2021

August 2016 – May 2017

August 2018 – December 2018

February 2024 - present

January 2023 - present

Outlier AI

Training AI Models - Molecular Biology

- Expertise using AI machine-learning techniques to solve complex problems in molecular biology
- Ability to curate, preprocess, and analyze large-scale biological datasets to train and optimize AI models for accurate prediction and insightful discovery

• Skills in utilizing Python, R, and LaTeX languages for data manipulation, statistical analysis, and implementation of machine learning algorithms, showcasing strong problem-solving abilities

• Effective at presenting research findings and collaborating with multidisciplinary teams, bridging the gap between molecular biology and AI expertise.

• Driven to leverage AI's potential in advancing molecular biology research and AI modeling

Private Tutoring/Advising

Independent Tutor and College Preparatory/Transfer Advisor, Virtual

- Curating personalized study plans guides tailored to individual students' needs, ie. GED exam
- Facilitating dynamic and engaging virtual instruction using Zoom to foster learning experiences
- Providing guidance in college transfer processes, encompassing MTA requirements, FAFSA assistance, strategic major selection, and coursework scheduling
- Demonstrating communication skills to effectively relay information to students and their families
- Employing astute problem-solving abilities and adaptability to overcome obstacles in students' academic endeavors through various stages (high school, college, transferring between institutes)

Arora Laboratory

Undergraduate Researcher, Michigan State University, East Lansing, MI

• Using developmental genetics, 3D imaging, computational image analysis and gene expression analysis to study and understand uterine architecture and modulation of embryonic events

- Collaborating with other lab members to progress current projects, specifically on the effects of NSAIDs on embryo localization by collecting and analyzing data
- Attending and presenting at weekly lab meetings to discuss current lab affairs and projects

• Employing a multidisciplinary approach through a neuroscience-based independent project researching uterine innervation, neuronal development throughout pregnancy, and hormonal effects

PSY209H: Brain and Behavior

Undergraduate Teaching Assistant, Michigan State University, East Lansing, MI • Helped transition class from physical into online format during COVID by setting up a Google Drive,

Zoom sessions, converting and uploading lectures, and maintaining the class D2L page

• Converted PowerPoint presentations into a lecture video with narrations, ensuring to provide various formats and a transcript, as well as accommodating for any student needs due to technology

• Led class discussions and debates on various current topics in bioethics and neuroscience by asking engaging questions and making sure each student is participating

• Helped prepare students for exams by making interactive study guides and leading multiple Zoom study sessions to go over material

• Tracked attendance and participation on an Excel, also ensuring all present students are engaging properly to receive full participation credit

May 2022 – December 2022

August 2020 – December 2020

Amerpol Travel Agency

Polish-American Office Clerk/Lead-Translator, Sterling Heights, MI

- Served as primary translator and oversaw all translations for documents between Polish and English
- Wrote and verified legal documents for inter-country affairs (such as Power of Attorney)
- Fluent in unique coding language used in Worldspan GDS Travel Agent software
- Processed large money transfers to Europe and collected cash payments, credit cards, bank deposits
- Ordering and tracking inventory for packages/documents; inputting data into QuickBooks software

• Responsible for taking incoming calls in English or Polish and providing strong customer service skills; handling any emergencies during travel

- Lead all advertising and marketing; created graphic designs and campaigns
- Managed office while office manager was away on leave; oversaw all office affairs

• Trained and mentored incoming employees on software used and all office protocols by developing instruction manuals and training presentations of sample interactions that are still being used today

MSU Greenline

Student Caller, Michigan State University, East Lansing, MI

- Responsible for contacting MSU affiliates and alumni to build relationships and inform them on current MSU news and projects
- Responsible for updating alumni contact and career information to better MSU's database
- Responsible for soliciting funds from potential donors for the benefit of various programs at MSU
- Communicated the importance of monetary support for university efforts

PRESENTATIONS

Arora Lab – Lab Meeting

In a presentation titled "Transcriptomic effects of early geometric confinement in human cerebral organoids", I presented a new technique for manipulating cellular development to the Arora Lab.

Honors Medical Anthropology Course Research

In a presentation titled "Fertility and birth rate in Polish (Caucasian) women", I presented my findings from my semester research in honors ANP204.

General and Allied Health Microbiology Lab Research June 2021

In a presentation titled "Antibiotic resistance of methicillin-resistant staphylococcus aureus", I presented my findings from my semester research.

Honors Brain and Behavior Wrap-Up Class Sessions September 2020-December 2020 Gave two presentations a week at the end of class sessions to summarize course content, assign learning objectives, and stimulate discussion about current news in the field.

MSU Department of Religious Studies Non-Profit Business Research Event April 2020 In a presentation titled "Mask up!" I presented a business plan for a potential non-profit organization; also collaborated with Akira Collection to help donate and deliver facemasks using a one-for-one business approach.

MSU Spanish Department Final Presentations

In a presentation titled "Conectando culturas con TalkAbroad (Connecting cultures with TalkAbroad)" I presented results from a semester-long project working with a student in Argentina via TalkAbroad software, discussing new ways to connect cultures.

May 2018 – May 2021

January 2018 – May 2018

July 2022 ebral

August 2021

May 2018

Honors Cell and Molecular Biology Final Presentation

In a presentation titled "CRISPR-Cas9 knockin mice for genome editing and cancer modeling" I presented research conducted within the BS181H course (Cell and Molecular Biology).

Macomb Mathematics Science Technology Center Annual Research Symposium May 2017 In a presentation titled "Effects of vaping nicotine on embryo development" I presented results from semester-long research I conducted as my Senior Research project to graduate from MMSTC.

LEADERSHIP, SERVICE, MEMBERSHIP

EXPAND Program, East Boulder Community Center September 2024 - present *Volunteer*; enhancing the lives of people with disabilities and creating a community of all abilities through recreational activities while promoting development and growth through programs.

Friends of Returning Citizens (FORC), St. John's Church May 2023 – December 2024 Volunteer; assisting people on probation, paroled, or recently discharged from prison with incorporating change and success into their lives; attending meetings, preparing/delivering groceries, communicating.

MSU Neuroscience Club

August 2020 - May 2021

Full Member; attended meetings about various topics in the field of Neuroscience

American Society of Microbiology, MSU Chapter August 2017 – May 2020 General Member; utilized resources for being more involved with Microbiology community

MSU Microbiology and Molecular Genetics Club August 2017 – December 2019 Full Member; attended meetings about various topics in the fields of Microbiology and Genetics

MSU Psychophysiology Lab - Brain Cycle Study January 2019 – April 2019 Volunteer; attending weekly visits to help conduct EEG trials as well as participate in EEG trials while performing various cognitive laboratory tasks.

Cru Ministries "Big Break" Mission Trip

May 2018 Spent Spring Break on a mission trip to help with community outreach; I spent a lot of my time talking to people suffering from addiction, helping them find new insights in recovery.

MSU Greenline Full Court Support Dodgeball Participator and Donator; raising money for MSU's Counseling & Psychiatric Services

Spartans Rebuilding Michigan

August 2017 – December 2017 *Volunteer*; helped partner with local non-profit organizations and sign up new members

MSU Fall Welcome Team

Volunteer; assisting new students and families with the move-in process by moving belongings, directing parking, and hosting welcome activities to help ease new students into their transition.

LANGUAGES

-English (fluent) -Polish (fluent) -Romanian (conversational) -Spanish (conversational)

August 2017

April 2018

April 2018