



SCHOLAR RESEARCH PAPERS
STUDENTS AND TEACHERS AS RESEARCH SCIENTISTS

PROGRAM (STARS)

Friday, July 21, 2017

100/201/206/209/214/305/311/312 Clark Hall

Program Directors: Dr. Ken Mares, Dr. Charles Granger

Senior Program Advisor: Dr. Howard Granok

Student Advisors: Mr. Phil Berger, Dr. Barry Burnette, Dr. Bruce Hamper,

Dr. Heidi Hope, Mr. Michael Hope, Ms. Meghann Humphries,

Dr. Aparna Kaul, Dr. Ambrose Kidd, Dr. Elaine Krul,

Mr. Robert McCall, Ms. Jacquelyn Niederschulte,

Mr. Carl Oberle, Dr. Bob Pufahl, Ms. Lisa Snoderly Foster,

Dr. Marc Spingola, Dr. Lori Stillwell, Dr. Robin Weinberg,

Ms. Rhonda Woerndle, Ms. Emma Young

Jacob Adler, Yeshivat Kadimah High School. "Developing a MATLAB based program to track and study the movement of lambda shock feet in shock wave-boundary layer interactions." Dr. Mark McQuilling, Saint Louis University.

William An, Marquette High School. "The role of phospholipase D (PLD ϵ) and ribosomal S6 kinase (S6K) proteins in autophagy during nitrogen and phosphorous starvation in *Arabidopsis thaliana*." Dr. Xuemin Wang, University of Missouri-St. Louis.

Blake Andrews, Westminster Christian Academy. "The use of DNA aptamers as electrochemical biosensors for pesticides." Dr. Dana Baum, Saint Louis University.

Siddharth Balaji, Marquette High School. "Primed memory retrieval in healthy young adults." Dr. David Balota, Washington University.

Andrew Bergantz, Whitfield School. "Using dimensional analysis and curve fitting techniques to develop predictive models for corner shock systems in shock wave - boundary layer interaction." Dr. Mark McQuilling, St. Louis University.

Sophie Bernstein, Clayton High School. "Central Nervous System (CNS) projections of sodium sensitive renal pelvic afferent nerves in Spontaneously Hypertensive Rats (SHR)." Dr. Mark Knuepfer, Saint Louis University

Neha Bharadwaj, Marquette High School. "The relationship between feeding behavior and neurodevelopment in preterm neonates." Dr. Roberta Pineda, Washington University.

Atri Bhattacharyya, Mary Institute and Saint Louis Country Day School. "Correlating expression with phenotype: the role of G-protein in regulating plant architecture." Dr. Sona Pandey, Donald Danforth Plant Science Center.

Emily Bischoff, Metro Academic and Classical High School. "Haplotype analysis for founder studies in two common recessive hypophosphatasia mutations." Dr. Steven Mumm, Washington University.

Annie Bryan, Kirkwood High School. "Effects of porogen concentration and freezing time on polyacrylamide cryogel properties." Dr. Silviya Zustiak, Saint Louis University.

Sarah Butterfield, Parkway North High School. "The synergistic effect of Curcumin and Silymarin on G12 cancer cells." Dr. Uthayashanker Ezekiel, Saint Louis University.

Michael Cambron, McCluer North High School. "The characterization of mutants of the Sparse panicle1 (SPP1) gene and its family members in *Setaria viridis* for inflorescence development." Dr. Elizabeth Kellogg, Donald Danforth Plant Science Center.

Iva Cepele, Lindbergh High School. "Trajectory of Holter based HRV-derived measures during and after normal pregnancy." Dr. Phyllis Stein, Washington University.

Elias Chahoud, Saint Louis Priory School. "Expression of a plant iron-dependent histone demethylase in *E. coli*." Dr. Joseph Jez, Washington University.

Richik Chakraborty, Mary Institute and Saint Louis Country Day School. "Arylsulfatase A (ARSA): understanding its phylogeny." Dr. Adriana M. Montaña, Saint Louis University.

William Chen, Parkway South High School. "Evaluating the effect of varied pressure on the production of nano/sub-micron hydrogel particles through multiple apparatuses." Dr. Scott Sell, Saint Louis University.

Daniel Cho, Clayton High School. "Assessment of cellular accumulation patterns of amyloid imaging agents, PiB and IMPY, in human glioblastoma cells using live cell imaging." Dr. Vijay Sharma, Washington University.

Markus Cicka, Jr., Westminster Christian Academy. "The effects of Ferrostatin-1 on myocardial cell death after myocardial infarction in murine models." Dr. Kory Lavine, Washington University.

Jamie Connors*, Saint Joseph's Academy. "Analysis of type 3 immune response in diabetic and normal wound healing." Dr. Laurie Shornick, Saint Louis University.

Della Cox, University City High School. "Evolved higher memory capability corresponds to lower survival capability in experimentally evolved populations of *Drosophila melanogaster*, suggesting evolutionary tradeoff between cognitive processes and immune response." Dr. Aimee Dunlap, University of Missouri-St. Louis.

Isabella Critchfield-Jain, Mary Institute and Saint Louis Country Day School. "Assessing the mechanical strength of rodent aortic arteries." Dr. Michael Anch, Saint Louis University.

Olivia Crowell, Timberland High School. "The characteristics of CLE gene mutants." Dr. Elizabeth Kellogg, Donald Danforth Plant Science Center.

Leanne Dang, Lindbergh High School. "Lead release rates from pipe scale to tap water." Dr. Daniel Giammar, Washington University.

*Research and Engineering Apprenticeship (REAP) Participant

Tricia Denn, Lafayette High School. "An analysis of C-H coupling in hydromagnesite." Dr. Sophia Hayes, Washington University.

Avirath Dodabele, Parkway South High School. "Assessing the mechanical strength of rodent aortic arteries." Dr. Michael Anch, Saint Louis University.

Alexander Donovan, Mary Institute and Saint Louis Country Day School. "Bioinformatics analysis of fly cognition genes." Dr. Aimee Dunlap. University of Missouri-St. Louis.

Adrian Fedorko, Saint Louis Priory School. "The effect of geometry on Manuka honey impregnated tissue engineering scaffold efficacy." Dr. Scott Sell, Saint Louis University.

Ashwin Garlapaty, Eureka High School. "Identifying the signal pathway of vasopressin's facilitation effect on histamine and chloroquine induced itch." Dr. Zhou-Feng Chen, Washington University.

Kennedi Ginger*, Whitfield School. "Feeding coordination problems in preterm and full-term infants." Dr. Roberta Pineda, Washington University.

Shree Govani, Ft. Zumwalt West High School. "Factors that influence parent education in the NICU." Dr. Roberta Pineda, Washington University.

Samantha Hermann, John Burroughs School. "Mucopolysaccharidosis IVA: development of *in vitro* treatment with umbilical mesenchymal stem cells." Dr. Adriana M. Montaña, Saint Louis University.

Zachary Hoffmann, Ft. Zumwalt West High School. "The application of remote sensing techniques for water quality on river systems in Missouri." Dr. Abuduwasiti Wulamu, Saint Louis University.

Salomi Inje, Parkway West High School. "Visual stimulation of stress in mice and its effect on itching." Dr. Zhou-Feng Chen, Washington University.

Amanda Kalishman, Mary Institute and Saint Louis Country Day School. "Comparison of the type III immune response in adult and neonatal mice during respiratory viral infection." Dr. Laurie Shornick, Saint Louis University.

Sohan Kancherla, Saint Louis Priory School. "Trajectories of multiscale entropy HRV in newborns with hypoxic ischemic injury treated with hypothermia." Dr. Phyllis Stein, Washington University.

Krishny Karunanandaa, Parkway Central High School. "Improving micronutrient availability in peanuts using nanoscale minerals." Dr. Ramesh Raliya, Washington University.

Eleni Karyofylli, Anatolia College, Greece. "Fractal flames: a fascinating type of fractal art with applications on the modeling of tumors." Dr. Henry Kang, University of Missouri-St. Louis.

*Research and Engineering Apprenticeship (REAP) Participant
Saayli Khambekar, Parkway North High School. "The effect of geometry on Manuka honey impregnated tissue engineering scaffold efficacy." Dr. Scott Sell, Saint Louis University.

Yoona Kim, Missouri Academy of Science, Math, and Computing. "Determining the role of Puf proteins in regulating mRNA translation in yeast by RNA sequencing and ribosome footprinting methods." Dr. Wendy Olivas, University of Missouri-St. Louis.

Brendan King, Crossroads College Preparatory School. "The use of micro CT in analyzing the regeneration of segmental bone defects treated using the Masquelet technique." Dr. Sarah H. McBride-Gagyi, Saint Louis University.

Nikita Kohli, Parkway South High School. "The importance of cycled lighting in the NICU." Dr. Roberta Pineda, Washington University.

Erin Kotzbauer, Clayton High School. "Assessment of cellular accumulation patterns of amyloid imaging agents, PiB and IMPY, in human glioblastoma cells using live cell imaging." Dr. Vijay Sharma, Washington University.

Ramya Kumar, Pleasant Valley High School, Bettendorf, IA. "Mechanism of PALB2 interaction with various DNA substrates." Dr. Sergey Korolev, Saint Louis University.

Abdullah Kuziez, Parkway West High School. "Ruthenium functionalized nanoparticles for photothermal heating." Dr. Samuel Achilefu, Washington University School of Medicine.

Justin Lam, Ladue Horton Watkins High School. "Process simulations and optimization of chemical looping combustion for mixtures of coal and biomass using iron based oxygen carrier." Dr. Ramesh Agarwal, Washington University.

Benjamin Langton, John Burroughs School. "The synthesis and applications of Ag-Au core-shell nanowires." Dr. Srikanth Singamaneni, Washington University.

Unsun Lee, Fort Zumwalt South High School. "Assessing the mechanical strength of rodent aortic arteries." Dr. Michael Anch, St. Louis University.

Laurie Lee, Francis Howell High School. "The effect of floral complexity on speed-accuracy trade offs." Dr. Aimee Dunlap. University of Missouri-St. Louis.

Ynseo Lee, Westminster Christian Academy. "Haplotype Analysis of Hypophosphatasia Patients with Mutation p.Asp294Ala in the Tissue-Nonspecific Alkaline Phosphatase (TNSALP) Gene to Identify the Possibility of a Founder Effect." Dr. Steven Mumm, Washington University.

Michelle Li, Marquette High School. "Assessing the mechanical strength of rodent aortic arteries." Dr. Michael Anch, St. Louis University.

Sophia Li, Ladue Horton Watkins High School. "Comparing the neonatal feeding assessments scores of the NEO to the NOMAS." Dr. Roberta Pineda, Washington University.

Enoch Li, Parkway South High School. "Synthesis of a stable silylene." Dr. Peter Gaspar, Washington University.

Leda Liang, Ladue Horton Watkins High School. "Stroke-based Vector Field Visualization." Dr. Henry Kang, University of Missouri-St. Louis.

Annie Liu, Ladue Horton Watkins High School. "Development of a preclinical NF1-MPNST model suitable for drug discovery and evaluation." Dr. Angela Hirbe, Washington University.

Jaelyn Liu, San Mateo High School, Foster City, CA. "Glucose-derived serine synthesis is necessary for osteoblast differentiation *in vitro*." Dr. Fanxin Long, Washington University.

Joseph Lu, Lafayette High School. "The role of phospholipase D (PLD ϵ) and ribosomal S6 kinase (S6K) proteins in autophagy during nitrogen and phosphorous starvation in *Arabidopsis thaliana*." Dr. Xuemin Wang, University of Missouri-St. Louis.

Shirsha Majumdar, John Burroughs School. "Relationship between neurobehavior at discharge and long-term neurodevelopment at 3-5 years of age." Dr. Roberta Pineda, Washington University.

Anusha Manjunath, Parkway Central High School. "The effect of endotracheal tube tip position on unplanned extubations in the NICU." Dr. Amit Mathur, Washington University.

Saikushal Marri, Parkway South High School. "Analyzing the response of maize through the utilization of remote sensing technologies." Dr. Abuduwasiti Wulamu, Saint Louis University.

Akshay Mehta, Saint Louis Priory School. "Assessment of functional expression of ABC family of transporters in human pancreatic and leukemia cells using Galmydar." Dr. Vijay Sharma, Washington University.

Christine Moser, Mary Institute and Saint Louis Country Day School. "The prevalence of sleep-disordered breathing and its relationship to cardiovascular outcomes among depressed participants in the Cardiovascular Health Study." Dr. Phyllis Stein, Washington University.

Zeyad Moustafa, Carbondale Community High School, Carbondale, IL. "Investigating the effect of cryogel mold thermal conductivity rates on chitosan-gelatin cryogel freezing mechanics." Dr. Scott Sell, Saint Louis University.

Thomas Munsell, Saint Louis University High School. "Synthesis of nanoporous gold beads using polyacrylamide template beads and co-reduction." Dr. Keith Stine, University of Missouri-St. Louis.

Trisha Nair, Mt. Vernon Township High School, Mt. Vernon, IL. "Intracavity laser absorption spectroscopy of CuO: rotational analysis of the $\beta^2\Delta_{5/2}-X^2\Pi_{1/2}$ and the $\beta^2\Delta_{3/2}-X^2\Pi_{1/2}$ electronic state." Dr. James O'Brien and Dr. Leah O'Brien, University of Missouri-St. Louis, Southern Illinois University-Edwardsville.

Rakesh Natarajan, Jefferson City High School, Jefferson City, MO. "A comparison of the gas-phase structure and fragmentation behavior of singly and doubly-protonated N-terminal analog tetrapeptides by mass spectrometry." Dr. Benjamin Bythell, University of Missouri-St. Louis.

Shruti Natarajan, Lafayette High School. "Developing an assay for expression of recombinant serine proteases and substrates." Dr. Joel Eissenberg, Saint Louis University.

Hania Nuraini, Al-Salam College Prep. "Variations in auditory exposure in the NICU and Mother-Baby Unit." Dr. Roberta Pineda, Washington University.

Michael Onder, Chaminade College Prep. "An examination of the differences in molecular fragmentation between singly and doubly charged gaseous ions AAAAR and GGGGR through use of mass spectrometry." Dr. Benjamin Bythell, University of Missouri-St. Louis.

Sohana Pai, Parkway North High School. "The impact of hydrocortisone on neurodevelopmental outcomes in premature infants." Dr. Amit Mathur, Washington University.

Sudheesha Paladugu, Parkway South High School. "Relationship between sensory interventions given to premature infants in neonatal intensive care unit and maternal mental health." Dr. Roberta Pineda, Washington University.

Sophie Paul, Mary Institute and Saint Louis Country Day School. "Identification of hotbands in the photoelectron spectrum of CuF_2^- using anion photoelectron spectroscopy." Dr. Richard Mabbs, Washington University.

Nathan Phan, Thomas Jefferson School. "Phantom and headlamp design for fluorescence-guided surgery." Dr. Samuel Achilefu, Washington University.

Brett Phelan, Saint Louis Priory School. "The effect of oxalate on the adsorption of nickel to $\Delta\text{-MnO}_2$." Dr. Jeffrey Catalano, Washington University.

Prathishtha Pitchyaiah, Lafayette High School. "The effect of Genistein on Mucopolysaccharidosis IIIA." Dr. Adriana M. Montaña, Saint Louis University.

Stephanie Podgorny, John Burroughs School. "Applications of dynamic histology in the Masquelet technique." Dr. Sarah H. McBride-Gagyi, Saint Louis University.

Edward Quan, Saint Louis Priory School. "The importance of PACAP between the retina and SCN and how it affects imitation behavior in mice." Dr. Zhou-Feng Chen, Washington University.

Rithik Reddy, Lafayette High School. "Stimulating immune cells by factors released during ferroptosis." Dr. Kory Lavine, Washington University.

Nina Ruan, Lafayette High School. "The effect of frequency detuning on jet lag separatrix of an electrochemical oscillator." Dr. Istvan Kiss, St. Louis University.

Ryan Russell, Francis Howell High School. "Rotational analysis of the $\beta^2\Delta - X^2\Pi_i$ electronic transition of CuO using intracavity laser spectroscopy." Dr. James O'Brien and Dr. Leah O'Brien, University of Missouri-St. Louis, Southern Illinois University-Edwardsville.

Shruthi Sangameswaran, Lafayette High School. "The effect of CHOP deletion on PiZ accumulation in mouse liver." Dr. Dorota Skowyra, Saint Louis University.

Nikki Seraji, Clayton High School. "The effect of combining inhibitors on the cell signaling pathway." Dr. Barry Burnette, Confluence Life Sciences.

Deepa Shukla, Parkway North High School. "The effect of various conditions on the percentage porosity, swelling ratio, and macropore size of polyacrylamide cryogels." Dr. Silviya Zustiak, Saint Louis University.

Atul Srinivasan, Lafayette High School. "The degenerative process of Oxaliplatin induced peripheral neuropathy in mice." Dr. Mikhail Berezin, Washington University.

Sanath Srinivasan, Lafayette High School. "Assessing the effectiveness of a train-the-trainer program regarding the National Library of Medicine Disaster Information Management Research Center on first responders and librarians." Dr. Terri Rebmann, Saint Louis University.

Sruthi Sripada, Mary Institute and Saint Louis Country Day School. "Development of a preclinical NF-MPNST platform suitable for precision oncology drug discovery and evaluation." Dr. Angela Hirbe, Washington University.

Katherine Steinmeyer, Rockwood Summit High School, Fenton, MO. "The ironic influence of failures of control in older adults." Dr. David Balota, Washington University.

Elli Stogiannou, Anatolia College, Greece. "Assessing the mechanical strength of rodent aortic arteries." Dr. Michael Anch, St. Louis University.

Tiana Stussie, Visitation Academy. "The synthesis of silica nanoparticles and their potential to generate Reactive Oxygen Species." Dr. Ramesh Raliya, Washington University.

Nicole Tang, Lafayette High School. "Effects of priming on word retrieval in younger and older adults." Dr. David Balota, Washington University.

Preethi Tumati, Oakville High School. "Response variability to behavioral stress is not exaggerated in borderline hypertensive rats." Dr. Mark Knuepfer, Saint Louis University.

Sanya Vatwani, Ladue Horton Watkins High School. "Findings from an assessment and inventory of a regional, decentralized stockpile." Dr. Terri Rebmann, Saint Louis University.

Daniel Wang, Westminster Christian Academy. "The effectiveness of iron and ruthenium catalysts in the activation of propargylic alcohol reactions." Dr. Eike Bauer, University of Missouri-St. Louis.

Preston Willis, Westminster Christian Academy. "Fluorescent 2,7-disubstituted germa- and silafluorenes." Dr. Janet Braddock-Wilking, University of Missouri-St. Louis.

Bennett Woodard, Thomas Jefferson School. "The effect of instream structures on flow depth." Dr. Amanda Cox, Saint Louis University.

Michael Wu, Marquette High School. "Another dimension: automated protocol for discerning RNA sequence families and their 3D structures within secondary structure motifs." Dr. Brent Znosko, Saint Louis University.

Jerry Zhang, Marquette High School. "Mathematical modeling of a reactive absorption system for the removal of SO_x and NO_x from flue gas." Dr. Gregoriy Yablonsky, Washington University.

Tong Zhao, Clayton High School. "Shape control of electrodeposited copper oxide microcrystals to test the facet-dependence of copper nanowire growth." Dr. Bryce Sadtler, Washington University.

Arron Zheng, Saint Louis Priory School. "Effects of ionic strength on arsenate adsorption on Goethite." Dr. Jeffrey Catalano, Washington University.

Michael Zhou, Parkway Central High School. "Stiffness optimization of industrial robots in manufacturing processes using artificial neural network." Dr. Jianfeng Ma, Saint Louis University

STARS Associates

Daniel Berkowitz. Dr. Joseph Jez, Washington University.

Hadi Elmesky. Dr. Robert Marquis, University of Missouri-St. Louis.

Julie Gauthier. Dr. Toni Kutchan, Donald Danforth Plant Science Center.

Samantha Sansone. Dr. Patricia Cavazos-Rehg, Washington University.

Olivia Weddig. Dr. Richard Mabbs, Washington University.

Kyle Westendorf. Dr. Mark McQuilling, St. Louis University.