85th Annual Meeting of the
Minnesota Academy of Science
&
31st Winchell Undergraduate
Research Symposium

Celebrating 31 Years of Excellence in
Undergraduate Research

University of St. Thomas, St. Paul, MN
April 21, 2018
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About the Annual Meeting & Winchell Undergraduate Research Symposium

The Annual Meeting & Winchell Undergraduate Research Symposium provides a forum for undergraduate students to present research in the sciences, learn from professionals in fields they aspire to enter, and receive recognition for their accomplishments.

The first Annual Meeting of the Minnesota Academy of Science was held on April 15, 1933 at the University of Minnesota. Over the years, the annual meeting took on several forms, ranging from lectures to archaeological excursions. In 1981, the Board of Directors decided to add an undergraduate research symposium hosted in conjunction with the Annual Meeting.

There are four main components of the meeting and symposium – a keynote lecture, poster presentations, oral presentations, and breakout sessions. More than 125 students, research advisors, members of MAS, faculty members, and other interested members of the community attend the symposium each year.

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University of St. Thomas

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<td>University of St. Thomas, Departments of Chemistry and Health and Human Performance; Undergraduate Research Opportunities Program</td>
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Schedule of Events – April 21, 2018

8:00 – 8:45 a.m.  Registration  Anderson Student Center (ASC) 3rd Floor

8:45 – 9:00 a.m.  Welcome Remarks  Woulfe Alumni Hall (ASC 378)
Dr. Josh Layfield & Dr. Bill Heidcamp

9:00 – 10:00 a.m.  Keynote Address  Woulfe Alumni Hall
Dr. Christy Haynes

10:00 a.m. – 12 p.m.  Oral Presentations  Woulfe Alumni Hall
Chemistry and Physics
Ecology and Environmental Science  ASC 364
Cell Biology and Physiology  ASC 365
Biochemistry and Molecular Biology  ASC 366

12:00 – 12:30 p.m.  Break / Pick up Box Lunch  Woulfe Lounge (ASC 380)

12:30 – 1:30 p.m.  Breakout Sessions  Woulfe Alumni Hall
Workshop on Salaries in the Sciences  ASC 365
Tour of UST Gardens  Gather in Woulfe Lounge
Panel on Options after College  Woulfe Alumni Hall

1:30 – 2:00 p.m.  Poster Session Set-up / Networking Break  Woulfe Alumni Hall

2:00 – 2:45 p.m.  First Poster Session (Odd Numbers)  Woulfe Alumni Hall
2:45 – 3:30 p.m.  Second Poster Session (Even Numbers)  Woulfe Alumni Hall

3:30 – 4:00 p.m.  Closing Remarks, Thanks, and Awards  Woulfe Alumni Hall
Keynote Speaker

Dr. Christy Haynes

Professor Christy Haynes completed her undergraduate work at Macalester College in 1998 and earned a Ph.D. in chemistry at Northwestern University in 2003. Before joining the faculty at the University of Minnesota in 2005, Haynes performed postdoctoral research at the University of North Carolina, Chapel Hill.

Among many honors, Haynes was named a 2010 Alfred P. Sloan fellow and a National Institutes of Health "New Innovator," won the Royal Society of Chemistry's Joseph Black Award as well as the 2015 Sara Evans Faculty Woman Scholar/Leader Award sponsored by the University of Minnesota Office for Faculty and Academic Affairs and the Women’s Center. Haynes has recently been awarded a prestigious 2018 Guggenheim Foundation Fellowship based on prior achievement and exceptional promise. Haynes is one of only 173 scientists, scholars, and artists in the United States and Canada to receive the highly competitive national fellowship.

Haynes is currently associate department head of the Department of Chemistry and the Elmore H. Northey Professor of Chemistry at the University of Minnesota. She is also associate director of the Center of Sustainable Nanotechnology, and an associate editor of Analytical Chemistry.

Haynes will speak about her research on the “Design and Redesign of Sustainable Engineered Nanomaterials.” Even Richard Feynman would be impressed with how engineered nanoparticles are increasingly being incorporated into devices and products across a variety of commercial sectors. However, this means that engineered nanoscale materials will either intentionally or unintentionally be released into the ecosystem. The long-term goal of the presented work is to understand the molecular design rules that control nanoparticle toxicity using aspects of materials science (nanoparticle design, fabrication, and modification), analytical chemistry (developing new assays to monitor nanotoxicity), and ecology (monitoring how nanoparticles enter and accumulate in the food web through bacteria and how these nanoparticles influence bacterial function). Taken together, these data suggest that careful consideration of engineered nanoparticle surface chemistry will likely allow design of safe and sustainable nanoscale materials.
Oral Session Schedule (10:00 a.m. – 12:00 p.m.)
Woulfe Auditorium: Chemistry and Physics

10:00  EXPLORATION FOR NEW, FACILE SYNTHETIC APPROACHES TO BISPHOSPHINE MONOXIDES  
Safa Aiyana Mahina and Joseph Kent West (Advisor)  
Department of Chemistry  
Winona State University, Winona, MN  

10:15  GCMS DETERMINATION OF TERPENE CONCENTRATION IN THE CONTEXT OF THE MOUNTAIN PINE BEETLE  
Kate J. Rynders¹, Kevin D. Chase², Mitchell P. Maddox¹ (Advisor), and Brian H. Aukema² (Advisor)  
¹ Department of Chemistry  
Bethel University, St. Paul, MN  
²Department of Entomology  
University of Minnesota, St. Paul, MN  

10:30  NOVEL SYNTHESIS OF NEW OXAZOLIDINONE ANTIMICROBIAL AGENT  
Ashley Roux and J. Thomas Ippoliti (Advisor)  
Department of Chemistry  
University of St. Thomas, St. Paul, MN  

10:45  BREAK  

11:00  SYNTHESIS OF NEW BISFERROCENYL-SCHIFF BASE COMPOUNDS AND THEIR PT(II) COMPLEXES  
Robert J. Walters and Joseph K. West (Advisor)  
Department of Chemistry  
Winona State University, Winona, MN  

11:15  ZIRCONIUM PHOSPHATE BEHAVIOR DURING WASHING  
Mark Mitmoen and Ken Rohly (Advisor)  
Department of Chemistry  
Bethel University, St. Paul, MN  

11:30  FEASIBILITY OF PELTIER CHIPS AS THERMOELECTRIC GENERATORS ON HEATSINKS  
Matthew Choquette, Dillon Ranstrom, and Bruce Bolon (Advisor)  
Department of Physics  
Hamline University, St. Paul, MN
Oral Session Schedule (10:00 a.m. – 12:00 p.m.)

ASC 364: Ecology and Environmental Science

10:00  CHARACTERIZATION OF GRAY SQUIRREL (Sciurus carolinesis) LEAF
       NESTS ON AN URBAN COLLEGE CAMPUS
       Brooke Maruska and Joseph Whittaker (Advisor)
       Department of Biology
       Concordia College–Moorhead, Moorhead, MN

10:15  LEAD CONTENT IN THE LIVERS OF SOUTHEASTERN MINNESOTA
       MALLARDS (Anas platyrhynchos)
       William Grillo and Raymond Faber (Advisor)
       Department of Biology
       St. Mary's University of Minnesota, Winona, MN

10:30  SELECTIVE TREE USAGE IN BARK-FORAGING BIRDS: IMPLICATIONS
       FOR EMERALD ASH BORER
       Abigail Valine and Dale Gentry (Advisor)
       Department of Biology & Biochemistry
       University of Northwestern–St. Paul, St. Paul, MN

10:45  BREAK

11:00  A MATHEMATICAL MODEL OF SOLAR ENERGY, TEMPERATURE, AND
       ALTITUDE: AN APPLICATION FOR HIGH-ALTITUDE BALLOONS
       Akshay Naik and James Flaten (Advisor)
       Department of Aerospace Engineering
       University of Minnesota–Twin Cities, Minneapolis, MN

11:15  IDENTIFYING Peromyscus leucopus AND P. maniculatus USING SALIVARY
       AMYLASE
       Gift Ben-Bernard, Elli Strand, and Joseph Whittaker (Advisor)
       Department of Biology
       Concordia College–Moorhead, Moorhead, MN
Oral Session Schedule (10:00 a.m. – 12:00 p.m.)

ASC 365: Cell Biology and Physiology

10:00  EFFECT OF TBX2 EXPRESSION ON GROWTH AND APOPTOSIS OF SKBR3 CELLS TREATED WITH HER2 NEUTRALIZING ANTIBODY
Tabitha Hanson and Matthew Rowley (Advisor)
Department of Biology
St. Mary's University of Minnesota, Winona, MN

10:15  INHIBITION OF TBX2 EXPRESSION IN THE T47D BREAST CANCER CELL LINE REDUCES CELL MOBILITY
Kathryn Frye and Matthew Rowley (Advisor)
Department of Biology
St. Mary's University of Minnesota, Winona, MN

10:30  OVEREXPRESSION OF TBX2 AND EPIREGULIN HAVE NO EFFECT ON INVASION OF SKBR3 CELLS IN A BOYDEN CHAMBER ASSAY
Kaitlin Kling and Matthew Rowley (Advisor)
Department of Biology
St. Mary's University of Minnesota, Winona, MN

10:45  BREAK

11:00  MI IS IN THE AIR: CHARACTERIZING THE ALLERGIC RESPONSE TO INHALED METHYLISOTHIAZOLINONE IN MICE
Rachel Poli, Ruby Kinnamon, and Devavani Chatterjea (Advisor)
Department of Biology
Macalester College, St. Paul, MN

11:15  ALTERNATIVELY SPLICED PLAKOGLOBIN ACTIVATES WNT/BETA-CATENIN SIGNALING IN AN IPSC MODEL OF ARRHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY
Rosemary Cobb and Randy Daughters (Advisor)
Department of Biology
Macalester College, St, Paul, MN

11:30  CONTRACTILE EFFECTS OF BLUE COHOSH ON Mus musculus DISTAL COLON
Hayley Cermin and Teresa DeGolier (Advisor)
Department of Biology
Bethel University, St. Paul, MN

11:45  CONTRACTILE RESPONSE OF Mus musculus STOMACH TISSUE AFTER APPLICATION OF BLUE COHOSH AND TWO OF ITS CONSTITUENTS
Andrew Kremer and Teresa Degolier (Advisor)
Department of Biology
Bethel University, St. Paul, MN
Oral Session Schedule (10:00 a.m. – 12:00 p.m.)

ASC 366: Biochemistry and Molecular Biology

10:00  GLUTATHIONE S-TRANSFERASE EXPRESSION IN EMBRYONIC LIVERS OF *Gallus gallus* EXPOSED TO ATRAZINE IN OVUM
Haley Colton and Debra Martin (Advisor)
Department of Biochemistry
Saint Mary’s University of Minnesota, Winona, MN

10:15  VEGF-B AND FABP4 EXPRESSION IN MICE (*Mus musculus*) EXPOSED *in utero* TO ATRAZINE
Jeremy Heinle and Debra Martin (Advisor)
Department of Biology
Saint Mary’s University of Minnesota, Winona, MN

10:30  BIOPHYSICAL CHARACTERIZATION OF G-QUADRUPLEX DNA LIGAND BINDING FOR A FLUORESCENT PROBE N-METHYL MESOPORPHYRIN IX
Patrick Brennan and Thomas Marsh (Advisor)
Department of Chemistry
University of St Thomas, St. Paul, MN

10:45  BREAK

11:00  COMPARISON OF ANTIMICROBIAL PROPERTIES OF THE CIS AND TRANS ISOMERS OF DICHLOROBIS(ETHYLENEDIAMINE)COBALT(III) CHLORIDE
Angela Messer, Jeanne Minnerath¹ (Advisor), and Brett Bodsgard² (Advisor)
¹Department of Biology
²Department of Chemistry
St. Mary’s University of Minnesota, Winona, MN

11:15  THE PEPTIDE THAT BROKE THE MOUSE’S BACK: ASSESSING THE ROLE OF THE NEUROPEPTIDE TLQP-21 AND ITS IMMUNE RECEPTOR C3AR1 IN SPINAL CORD INJURY PAIN
Amy Chan and Lucy Vulchanova (Advisor)
Department of Neuroscience
University of Minnesota–Twin Cities, Minneapolis, MN

11:30  ANTI-INFLAMMATORY EFFECTS OF *Helichrysum italicum* ON RAW 264.7 MACROPHAGES
Stephanie Peterson and Joyce Doan (Advisor)
Department of Biology
Bethel University, St. Paul, MN
Breakout Sessions (12:30 – 1:30 p.m.)

Participants are asked to pick up a box lunch in the Woulfe Lounge (ASC 380) between 12:00 and 12:30 p.m. and then proceed to the breakout session they selected during registration. You are welcome to continue eating during the sessions!

Salaries in the Sciences: What Can You Expect?  

Dr. Ishuan Li, Associate Professor of Economics, Minnesota State University-Mankato

Tour of the Medicinal Garden, Pollinator Path, and Science Artwork at the University of St. Thomas  

Dr. Amy Verhoeven, Professor of Biology, University of St. Thomas

Exploring Options After College with Recent Graduates  

Woulfe Alumni Hall

Moderator:

Dr. Afshan Ismat, Assistant Professor of Biology, University of St. Thomas

Panelists:

Brian Bustom, Research Chemist at Microtrace Solutions  
Kiersten Idzorek, First-year law student at the University of St. Thomas  
Ryan Merry, Third-year graduate student at the University of Minnesota  
Quinn Niederluecke, Graduate student at the University of Minnesota and the Minnesota Department of Agriculture
1 IDENTIFYING PROTEINS IN ALCOHOLIC FATTY LIVER DISEASE
Sunny Vuong and Laura Listenberger (Advisor)
Departments of Chemistry and Biology
St. Olaf College, Northfield, MN

2 ANNOTATION OF Drosophila eugracilis CHROMOSOME 3L Contig 65
Hinsoukpo Dagan and Tamara L. Mans (Advisor)
Department of Biology
North Hennepin Community College, Brooklyn Park, MN

3 “GREENER” METHOD FOR THE SYNTHESIS OF PHOSPHINE SELENIDES
Der Vang and Joseph Kent West (Advisor)
Department of Chemistry
Winona State University, Winona, MN

4 ATTAINING HIGH SPECIES DIVERSITY IN PRAIRIES WITH LOW INITIAL RESTORATION INVESTMENT
Wesley Braker¹ and Stuart Wagenius² (Advisor)
¹Department of Biology
St. Olaf College, Northfield, MN
²Program in Plant Biology and Conservation
Northwestern University, Evanston, IL

5 CRANIAL PROSTHESIS FOR CHRONIC, PAN-CORTICAL TWO-PHOTON IMAGING IN BEHAVING MICE
Nahom Mossazghi, Leila Ghanbari, Mathew Ryans, Russell Carter, Judith Dominguez, Jay Jia Hu, Suhasa Kondandaramaiah¹ (Advisor) and Timothy Ebner² (Advisor)
¹Department of Mechanical Engineering
²Department of Neuroscience
University of Minnesota–Twin Cities, Minneapolis, MN

6 LIPOTOXICITY: UNDERSTANDING THE MECHANISM THAT LEADS FROM SATURATED FATTY ACID TO CELL DEATH
Margaret Brown, Hannah Nilsson, and Laura Listenberger (Advisor)
Departments of Chemistry and Biology
St. Olaf College, Northfield, MN

7 CHARACTERIZING AMMONIUM TRANSPORTERS OF THE CYANOBACTERIUM Anabaena
Livianna K. Myklebust and Tami R. McDonald (Advisor)
Department of Biology
St. Catherine University, St. Paul, MN

8 A THREE-STEP SYNTHESIS OF AVOBENZONE
Tanifa Nguyen, Ashley Wilke, and James Wollack (Advisor)
Department of Chemistry
St. Catherine University, St. Paul, MN
9 COMPARISON OF SMALL MAMMAL COMMUNITIES ON RESTORED AND REMNANT PRAIRIES IN NORTHWESTERN MINNESOTA
Chloe Whitten, Emma Detloff, and Joseph Whittaker (Advisor)
Department of Biology
Concordia College–Moorhead, Moorhead, MN

10 DEVELOPMENT AND TESTING OF AUTOMATED ELECTROMECHANICAL ICE THICKNESS MONITORING SYSTEM
Charles A. Lundquist, Tyler Holmes, Thomas G. Shepard (Advisor), and Thomas Rodengen (Advisor)
School of Engineering
University of St. Thomas, St. Paul, MN

11 THE EFFECTS OF MORPHOLOGY ON THE LUMINESCENT PROPERTIES OF UPCONVERTING LANTHANIDE DOPED PHOSPHORS
Cecelia Kinane, J. Thomas Ippoliti¹ (Advisor), and Brittany Nelson-Cheeseman² (Advisor)
¹Department of Chemistry
²School of Engineering
University of St. Thomas, St. Paul, MN

12 DIFFERENTIAL PROTEIN EXPRESSION OF FIBROLAMELLAR HEPATOCELLULAR CARCINOMA (FL-HCC)
Tierra Bender¹, Rondell Graham², Linda Hasadsri², Adam Hildebrandt¹, Lauren Magnuson¹, Desiree A. Reding¹, Michael Torbenson² and Mary Ann Yang¹ (Advisor)
¹Department of Biology
Concordia University–St. Paul, St. Paul, MN
²Mayo Clinic, Rochester, MN

13 AIR-SENSITIVITY PREDICTION OF AMIDE-STABILIZED PRIMARY PHOSPHINES VIA INEXPENSIVE COMPUTATIONAL METHODS
Taylor Bell and Joseph Kent West (Advisor)
Department of Chemistry
Winona State University, Winona, MN

14 EFFECTS OF LITTER SIZE AND GENDER IN JUVENILE EASTERN CHIMPUNK (Tamias striatus) SURVIVAL
Jacob Carson, Kaitlin Marsaa, and Pamela Freeman (Advisor)
Department of Biology
The College of Saint Scholastica, Duluth, MN

15 LOCALIZED SURFACE PLASMON SPECTROSCOPY ON SELF-ASSEMBLED Au@SILICA–PD HETERODIMERS
Sihoon Moon, John Caputo, and Vivian E. Ferry (Advisor)
Department of Chemical Engineering and Materials Science
University of Minnesota–Twin Cities, Minneapolis, MN
16 SELF-ASSEMBLY OF PENTAMERIC MACROCYCLES THROUGH ALKENE METATHESIS OF BIS(4-VINYLBENZENE)METHYL DERIVATIVES
Joseph A. Romo and Dennis D. Cao (Advisor)
Department of Chemistry
Macalester College, St. Paul, MN

17 PHOSPHORYLATION PATTERNS IN MOSS WITH VARYING DEGREES OF DESICCATION TOLERANCE
Brenna Walton and Amy Verhoeven (Advisor)
Department of Biology
University of St. Thomas, St. Paul, MN

18 HOX TRANSCRIPTION FACTOR REGULATION OF NEURONAL DEVELOPMENT IN Caenorhabditis elegans
Taylor Olin and Andrea Kalis (Advisor)
Department of Biology
St. Catherine University, St. Paul, MN

19 BIOPlastic: Combining seaweed and lobsters to create a new general chemistry laboratory pedagogy
Alexandra Ward and Graeme R. A. Wyllie (Advisor)
Department of Chemistry
Concordia College–Moorhead, Moorhead, MN

20 SYNTHESIS OF Gd-DETA-MAM FOR THE RECYCLING OF PHOSPHATE
Austin L. MacRae,1 Amanda S. Tran,1 Katie L. Peterson1 (Advisor), and Valerie C. Pierre2 (Advisor)
1Department of Chemistry
Bemidji State University, Bemidji, MN
2Department of Chemistry
University of Minnesota–Twin Cities, Minneapolis, MN

21 FINDING FOSSILS AND THE PALEOENVIRONMENT OF MONTANA’S HELL CREEK FORMATION
Breann Adamek, Ron Nellermoe (Advisor), and Joseph Whittaker (Advisor)
Department of Biology
Concordia College–Moorhead, Moorhead, MN

22 NOVEL SHELL-LESS CHICK EMBRYO CULTURE VESSEL FOR THE APPLICATION OF NEURONAL TISSUE ENGINEERING
Colton Baumler, Laurel Carlson, Brianna Holtmeier, Nicholas Ziebell, and Mary Ann Yang (Advisor)
Department of Biology
Concordia University, St. Paul, MN
USE OF C-18 SEP-PAK COLUMN with LC-MS TO DETECT MICROCYSTIN-LR IN WATER FROM CYANOBACTERA-RICH STREAMS IN ICELAND
Ange-Gabrielle M. Holm, Paula C. Furey¹ (Advisor), and James W. Wollack² (Advisor)
¹Department of Biology
²Department of Chemistry
St. Catherine University, St. Paul, MN

Staphylococcus aureus SUPERANTIGENS: DON'T YOU KNOW THAT YOU'RE TOXIC?
Darian Wisecup, Taylor Mach (Advisor), and Amanda Brosnahan (Advisor)
Department of Science
Concordia University, St. Paul, MN

THE EFFECT OF CANDIDATE GENE CTNNB1 ON HEPATOBLASTOMA
Jocelyn Ricard and Logan Spector (Advisor)
Department of Pediatrics, Division of Epidemiology
University of Minnesota–Twin Cities, Minneapolis, MN

ISOMORPHISM IN HETEROPENTACYCLES: CRYSTAL STRUCTURE OF A 1,2,4-OXADIAZOLE AND COMPARISON TO ITS ISOTERIC ANALOGUES
Maria Neuzil and William Ojala (Advisor)
Department of Chemistry
University of St. Thomas, St. Paul, MN

PRIMARY PHOSPHINES: NEW SYNTHETIC METHODS AND NEW TARGETS
Bethany A. Palen, Emily Landgreen, and Joseph K. West (Advisor)
Department of Chemistry
Winona State University, Winona, MN

ITASCA IN A BOTTLE: UNDERSTANDING THE ROLE OF BACTERIA IN WOOD DECOMPOSITION REACTIONS
Samuel Willard and Jonathan Schilling (Advisor)
Department of Plant and Microbial Biology
University of Minnesota–Twin Cities, Minneapolis, MN

FEASIBILITY OF PEITIER CHIPS AS THERMOELECTRIC GENERATORS ON HEATSINKS
Matthew Choquette, Dillon Ranstrom, and Bruce Bolon (Advisor)
Department of Physics
Hamline University, St. Paul, MN

EXTRACTION AND PURIFICATION OF SAPONINS FROM BLUE COHOSH ROOT
Caleb Wenck and Mitchell Maddox (Advisor)
Department of Chemistry
Bethel University, St. Paul, MN
INVESTIGATION OF ENZYME ACTIVITY
Corbin Ketelsen and Heather Sklenicka (Advisor)
Department of Chemistry
Rochester Community and Technical College, Rochester MN

TUNNELING NANOTUBE FORMATION IS UPREGULATED IN PANCREATIC CANCER AND MEDIATES A NOVEL LONG-DISTANCE INTERCELLULAR DRUG EFFLUX
Akshat Sarkari and Emil Lou (Advisor)
Department of Hematology and Oncology
University of Minnesota–Twin Cities, Minneapolis, MN

DETECTION OF HYDROGEN SULFIDE WITH A COUMARIN-BASED FLUORESCENT PROBE
Zachary Baker and Katie Peterson (Advisor)
Department of Chemistry
Bemidji State University, Bemidji, MN

TREE GROWTH AND MORTALITY IN A 27-YEAR-OLD MAPLE-BASSWOOD FOREST RESTORATION PROJECT
Robert Holmes and Kathleen Shea (Advisor)
Department of Biology
St. Olaf College, Northfield, MN

SHIFTS IN ANTIMICROBIAL GENE EXPRESSION IN MOUSE MODEL OF SELF-ANTIGEN-DRIVEN INFLAMMATORY BOWEL DISEASE
Ryan T. Cook and Christopher G. Mayne (Advisor)
Department of Biology
Viterbo University, La Crosse, WI

STUDYING POLIO TITERS IN INTERNATIONALLY ADOPTED CHILDREN
Priya George, Guillaume Onyeaghala, Cynthia Howard (Advisor), and Judith Eckerle (Advisor)
Division of Global Pediatrics
University of Minnesota–Twin Cities, Minneapolis, MN

EFFECT OF SURFACE TREATMENTS ON THE ELECTROCHEMICAL BEHAVIOR OF NiCr
Samuel Wiita and Kenneth Rohly (Advisor)
Department of Chemistry
Bethel University, St. Paul, MN

UNDERSTANDING THE RELATIONSHIPS BETWEEN GRAIN YIELD AND POTENTIAL, REALIZED GRAIN YIELD, AND THE ENVIRONMENT USING MAIZE AS A MODEL SYSTEM
Haleigh Ortmeier-Clarke and Candice Hirsch (Advisor)
Department of Agronomy and Plant Genetics
University of Minnesota–Twin Cities, Minneapolis, MN
39 SYNTHESIS AND CHARACTERIZATION OF 1,2,5,6-TETRAMETHYLNAPHTHALENE
   Nhu Nguyen and Dennis Cao (Advisor)
   Department of Chemistry
   Macalester College, St. Paul, MN

40 COMPUTATIONAL INVESTIGATION OF SUBSTITUENT EFFECTS ON THE PREDICTED AIR-SENSITIVITY OF ARYL PRIMARY PHOSPHINES
   Emily Landgreen, Bethany Palen, and Joseph Kent West (Advisor)
   Department of Chemistry
   Winona State University, Winona, MN

41 INVESTIGATION OF FIRST ROW TRANSITION METAL COMPLEXES USING NITROGEN PHOSPHORUS HYBRID DONOR LIGANDS
   Andrew Reuter and Elodie Marlier (Advisor)
   Department of Chemistry
   St. Olaf College, Northfield, MN

42 RICE-INOCULUM DECOMPOSITION AFFECTS VARIETY RESPONSES IN SOYBEAN RESISTANCE TRIALS
   Andres Felipe Trujillo Cosme, Grace M. Anderson (Advisor), and James E. Kurle (Advisor)
   Department of Plant Pathology
   University of Minnesota, St. Paul, MN

43 TECHNIQUES FOR BETTER VISUALIZATION OF TLC
   Lul Sharif and Heather Sklenicka (Advisor)
   Department of Chemistry
   Rochester Community and Technical College, Rochester MN

44 IS Phytophthium boreale A PATHOGEN OF SOYBEANS?
   Nathaniel Beckman, Grace M. Anderson (Advisor), and James E. Kurle (Advisor)
   Department of Plant Pathology
   University of Minnesota, St. Paul, MN

45 NMR DETERMINATION OF KETO-ENOL EQUILIBRIUM CONSTANTS
   Joseph Bockover and Wade Neiwert (Advisor)
   Department of Chemistry
   Bethel University, St. Paul, MN

46 SOLID-STATE STUDIES OF HALOGENATED BENZONITRILE OXIDES AND THEIR DIMERS
   Mike Stodolka and William Ojala (Advisor)
   Department of Chemistry
   University of St Thomas, St. Paul, MN
SYNTHESIS AND CHARACTERIZATION OF NAPHTHALENE TETRAIMIDE AND MELLOPHANIC DIIMIDE
Kellie Stellmach and Dennis Cao (Advisor)
Department of Chemistry
Macalester College, St. Paul, MN

SYNTHESIS OF A NOVEL OXAZOLIDINONE ANTIMICROBIAL AGENT
Tyler Ogorek and J. Thomas Ippoliti (Advisor)
Department of Chemistry
University of St. Thomas, St. Paul, MN

SYNTHESIS OF HO-farnesyl-OTHP
Elizabeth Sperry and James Wollack (Advisor)
Department of Chemistry
St. Catherine University, St. Paul, MN

THREE-CARTRIDGE PORTABLE DIALYSIS SYSTEM
Jasmin Bretoi and Kenneth Rohly (Advisor)
Department of Chemistry
Bethel University, St. Paul, MN

DEVELOPMENT OF CONJUGATE VACCINES FOR TREATMENT OF OPIOID ABUSE USING E. coli-EXPRESSED CARRIER PROTEINS FOR GMP MANUFACTURING AND SCALE-UP
Ajinkya Limkar and Marco Pravetoni (Advisor)
Department of Medicine and Pharmacology
University of Minnesota–Twin Cities, Minneapolis, MN

UTILIZING PROTEIN PRENYLATION TO MODIFY EpCAM-TARGETING DARPinS WITH AN AZIDE-CONTAINING ISOPRENOID ANALOG
Shelby Auger¹ and Mark Distefano² (Advisor)
Department of Chemistry
¹St. Catherine University, St. Paul, MN
²University of Minnesota–Twin Cities, Minneapolis, MN

Full abstracts may be found in the
Journal of Abstracts of the
Minnesota Academy of Science
available online at www.mnmas.org.
Poster Session by Category

**Biochemistry**
Posters 1, 6, 17, 24, and 31

**Cellular and Molecular Biology**
Posters 2, 7, 12, 18, 25, 32, 35, 36, 42, 44, and 51

**Chemistry**
Posters 3, 8, 11, 13, 16, 19, 20, 23, 26, 27, 28, 30, 33, 37, 39, 40, 41, 43, 45, 46, 47, 48, 49, 50, and 52

**Ecology and Environmental Science**
Posters 4, 9, 14, 21, 28, 34, and 38

**Engineering and Physics**
Posters 5, 10, 15, 22, and 29

Oral Presentations by Last Name

- **Aiyana Mahina**, Safa 10:00, Woulfe
- **Ben-Bernard**, Gift 11:15, ASC 364
- **Brennan**, Patrick 10:30, ASC 366
- **Cermin**, Hayley 11:30, ASC 365
- **Chan**, Amy 11:15, ASC 366
- **Choquette, Matthew** 11:30, Woulfe
- **Cobb**, Rosemary 11:15, ASC 365
- **Colton**, Haley 10:00, ASC 366
- **Frye**, Kathryn 10:15, ASC 365
- **Grillo**, William 10:15, ASC 364
- **Hanson**, Tabitha 10:00, ASC 365
- **Heinle**, Jeremy 10:15, ASC 366
- **Kling, Kaitlin** 10:30, ASC 365
- **Kremer**, Andrew 11:45, ASC 365
- **Maruska, Brooke** 10:00, ASC 364
- **Messer**, Angela 11:00, ASC 366
- **Mitmoen, Mark** 11:15, Woulfe
- **Naik, Akshay** 11:00, ASC 364
- **Peterson, Stephanie** 11:30, ASC 366
- **Poli, Rachel** 11:00, ASC 365
- **Roux, Ashley** 10:30, Woulfe
- **Rynders, Kate** 10:15, Woulfe
- **Strand, Elli** 11:15, ASC 364
- **Valine, Abigail** 10:30, ASC 364
- **Walters, Robert** 11:00, Woulfe
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