

TRiO

McNair Scholars Program
ST. OLAF COLLEGE

Summer Research 2011 Abstract Booklet



<http://www.stolaf.edu/services/mcnair>

The TRiO McNair Scholars Program is a graduate school preparatory program funded by the U.S. Department of Education and sponsored by St. Olaf College. The TRiO McNair Scholars Program was founded in 1989 and initiated at St. Olaf College in 2007. This program identifies students who have high academic potential and meet eligibility criteria. The goal of the program is to support Scholars' aspirations and preparation for graduate study. The program is further described on our website: <http://www.stolaf.edu/services/mcnair>. For a student perspective on the TRiO McNair program check out this article: <http://www.stolaf.edu/magazine/2010fall/OTH.pdf>

Program Goals

The federal goal of the TRiO McNair Scholars Program is to increase the rate of doctoral program applications, degree attainment and participation in the professoriate by low-income, first-generation college students who are underrepresented in graduate programs. The TRiO McNair Scholars Program provides opportunities for participants to develop graduate school level academic skills necessary to gain admission to and successfully complete graduate study.

Participants

Annually, 27 undergraduates who are interested in pursuing graduate studies and careers as college faculty participate in the St. Olaf McNair Scholars Program.

- Two-thirds of the participants meet federal income guidelines and are from a family in which neither parent graduated from a four-year postsecondary educational institution.
- One third of the participants may be from groups that are traditionally underrepresented in graduate studies and the professoriate.
- Participants have completed at least 2 courses in their area of research interest and have a GPA of 2.75 or higher.

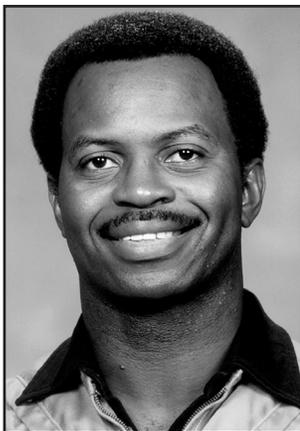
Services

McNair Scholars receive assistance with:

- Internships - summer sophomore year to explore viable fields of academic study
- Research Writing Course - summer junior year to learn how to write an effective proposal, conduct research and present results
- Research experience - summer junior year. Participants are paired with a faculty mentor whose research interests match those of the McNair Scholar.
- Preparation for graduate school admissions tests
- Graduate school applications/completion assistance
- Financial aid, fellowship and scholarship applications/completion assistance

Highlights

During the summer of 2011, eleven students were paired with a Faculty Mentor who guided their participation in an intensive summer research experience. Faculty Mentors provide information and guidance about graduate school and support the McNair Scholars as they make the transition to their post-baccalaureate education. Working with their Faculty Mentors, students produced professional quality posters and presented their research at the St. Olaf College Summer Research Symposium. This Abstract Booklet highlights the St. Olaf TRiO McNair Scholars' summer research.



Biography of Ronald E. McNair

“Before you can make a dream come true, you must first have one.”

Dr. Ronald E. McNair

In 1986, in memory of Ronald Ervin McNair, the U.S. Congress established the Ronald E. McNair Post-Baccalaureate Achievement Program, commonly known as the McNair Scholars Program.

Dr. Ronald E. McNair’s career as a scholar and astronaut stands as an inspiration to all McNair Program participants. Ronald McNair, the second African American to fly in space, was born on October 21, 1950 in Lake City, South Carolina. He was named the valedictorian of his high school class and went on to graduate magna cum laude from North Carolina A&T State University.

In 1976 McNair completed all requirements for the Ph.D. degree in Physics at the Massachusetts Institute of Technology (MIT) and joined the Hughes Research Laboratories in Malibu, California as a scientist. Dr. McNair received multiple honorary doctorates of Science and of Law. In 1979 McNair was named Distinguished National Scientist by the National Society of Black Professional Engineers.

Ronald McNair completed the training and evaluation course for shuttle mission specialists and began working at the Shuttle Avionics Integration Laboratory and later worked for NASA. Even though Dr. McNair’s awards and special recognitions are numerous, he will be best remembered as being among those who died on January 28, 1986 when the Space Shuttle Challenger exploded after the launch. Dr. Ronald E. McNair was a mission specialist on that flight.

His lifelong commitment to scholarship lives on in the McNair Scholars who are selected each year to participate in the many McNair Programs across the United States.



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Pictured from left to right: Heather Campbell, Janis Johnson, and Melissa Hinderscheit



Faculty Mentor:
Dr. Steve McKelvey

Dr. McKelvey is a full-time professor at St. Olaf College. He graduated from Brown University

where he received a Sc.M. and a Ph.D. in Applied Mathematics. Dr. McKelvey's interests lie primarily in Variational Inequalities problems. Dr. McKelvey's Ph.D. dissertation was on the topic of Partionable Variational Inequalities. He has continued this interest and has conducted research on similar problems. He is also interested in natural resource modeling. Dr. McKelvey held the president's position and now is the treasurer at the Resource Modeling Association. Throughout the years, Dr. McKelvey has written numerous papers and participated in colloquiums. His peer-reviewed paper on the Probabilistic Technique used in SODBuster was included in the Forest Service publication of forest health research in 2009. Dr. McKelvey has given talks at colleges in Pennsylvania, California and other states across the United States. Finally, Dr. McKelvey's primary passion lies in teaching and being surrounded by students. His talent to help students has earned him a Hilleboe Award for excellence in student advising.

Olya Borichevska

Major: Mathematics & Statistics

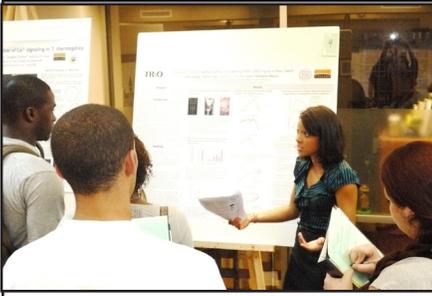
"The highlight of the TRiO McNair summer for me was the end of the research when I solved the problem. It felt very good knowing that what I spent so much time on was worth it. I learned that some problems can only be solved when the right amount of time is taken to solve them. Good work requires time. In the future, I hope to gain further experience and explore my interests in graduate programs in Economics and Mathematics. I enjoy school very much and love being in an academic environment."



Research Title:

Market Equilibrium and Variational Inequalities

With increased globalization, the world's economy is becoming more and more complex. Market equilibrium problems are a point of interest for many economists. One valuable mathematical method for dealing with and solving market equilibrium problems is the Variational Inequality. Variational Inequalities arise from a set of defined equilibrium conditions that must be met in the solution to the market equilibrium problem. In economics, a market system where the suppliers have an effect on the price of a homogeneous commodity is called an oligopoly. In an oligopoly, commodities are exchanged between two markets if the price in the market that receives the commodity is higher than the production cost in the sending market plus the transportation cost. The sufficient conditions that allow a commodity shipment between a supplier and a demand market give rise to the construction of the equilibrium conditions. In this study, new equilibrium conditions were formulated for an oligopolistic market. New formulations of the equilibrium conditions simplify the sufficient criteria for an existence of a unique solution to the market equilibrium problem. In this paper we develop equilibrium conditions by considering first some simple special cases and progressing to the full general model. In the end, we solve some examples of market equilibrium problems.



Gina Colling

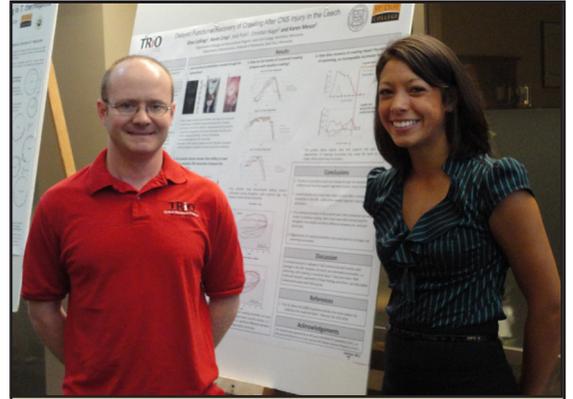
Major: Exercise Science

“The highlight of McNair research was printing

my research poster for the St. Olaf Summer Research Symposium. It was a great feeling to see an entire summer’s work come together. My experience taught me how to stay organized and use my time management skills. I also learned that I am very interested to have research be a part of my future profession. This was an amazing opportunity that guided me in a direction for life after St. Olaf. I plan to apply to the UMN Kinesiology and Rehabilitation Science Ph.D. programs and also to DPT programs at the UMN and St. Kate’s. I hope to pursue a career as a physical therapist or professor in Kinesiology.”

Research Title: The Neurobiology of Dopamine in the Leech & the Modulation of Locomotor Behaviors

Although much research has explored anatomical repair (e.g. growth of damaged axons, etc.) in damaged central nervous system (CNS), functional recovery has received less attention. Similar to their vertebrate counterparts, the medicinal leeches, *Hirudo verbena/medicinalis*, can respond to CNS injuries through regenerative processes, (e.g. microglial chemotaxis and laminin secretion). Leech nervous systems regenerate much better than those in humans, therefore research in the field of regeneration in impaired leech nervous tissue can lead to advancements of knowledge in human CNS injuries, such as Parkinson’s disease or hydrocephaly, simply due to a better model in the repaired leech CNS. To investigate functional recovery after CNS injury in the leech, rhythmic crawling behavior was observed in juvenile leeches before and multiple times after the CNS injury. Analysis of crawling kinematics was obtained through pre- and post-lesion videos that were recorded and converted to individual frames. The recorded data was represented through phase portrait plots, the change in movement over time. Similar crawling kinematics with minute variation were observed between pre- and post-lesion. Despite no definite re-connection in the nervous system, the data may suggest that functional recovery may depend on re-wiring of preserved tissue elements rather than regeneration of the pre-lesion anatomy.



Faculty Mentor: Dr. Kevin Crisp

Dr. Crisp received a Bachelor of Arts degree in Psychology with departmental honors from Haverford College. He had a concentration in brain and behavioral sciences which lead him to receive his Ph.D. in neuroscience from the University of Minnesota. His research interests include invertebrate neurobiology, motor control, and computational modeling of neuronal biophysics and circuits. In particular, his interest in repair and regeneration of injured nervous tissue has guided Dr. Crisp to receive a grant for his research in “neurobiology of dopamine in the leech and the modulation of locomotor behaviors.” Throughout his years in the field of neurobiology, Dr. Kevin Crisp has published numerous articles and book chapters. He has also been invited to speak at lectures and workshops, including one talk about “Cellular and Behavioral Properties of Learning in the Leech” at St. John’s University in 2010. Besides being a St. Olaf Associate Professor in the Biology department, Dr. Kevin Crisp continues to give back to the St. Olaf community through being a Health Professions Committee Member and the Higher Learning Commission Quality Initiative Committee. Dr. Crisp has also been a TRiO McNair faculty mentor since 2008.

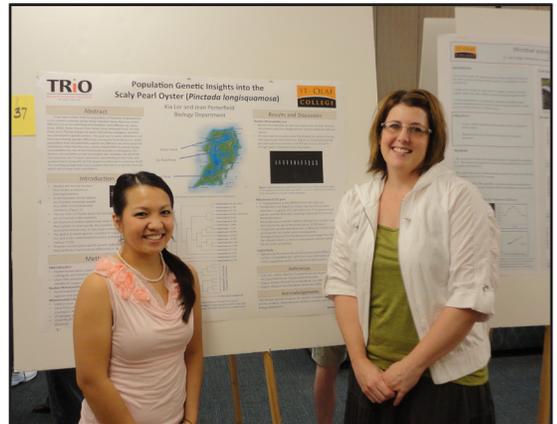


“The highlights of the TRiO McNair summer for me were working with Bahamian oysters and extracting DNA from oyster tissues. During my summer research experience, I learned that I really enjoy working in a team. I plan to apply to the UMN Biological Studies program and Public Health program and am interested in studying maternal and child health. For my future career goals, I hope to be involved in medicine and provide care for patients. Graduate school is important because it will help pave my path to work with patients and provide care.”

Kia Lor
Major: Biology

Research Title: Population Genetic Insights of Sex Switching Patterns in the Bahamian Oysters

The scaly pearl oyster *Pinctada longisquamosa* is a sessile marine bivalve that exhibits protandrous hermaphroditism, maturing as male and switching to female later in the life history. This species can be found in isolated saltwater ponds of San Salvador Island, Bahamas. The oyster populations of different ponds have been found to exhibit different size at sex-switching and therefore, different sex ratios. Oyster tissues from Oyster Pond, Mermaid Pond, Six-Pack Pond, and a Florida coastal site were collected by colleagues, and DNA was extracted for genetic analysis. Our goal was to assess whether or not there are evolved, genetic differences among the three Bahamian oyster populations that can potentially explain the different sex ratios observed. Polymerase Chain Reaction was used to amplify DNA at several nuclear microsatellite loci and of the mitochondrial protein-coding gene, cytochrome c oxidase I (COI). Nuclear microsatellite loci did not amplify well, perhaps because the primers used were designed from a closely related yet different species. However, we obtained COI sequences for 37 oyster specimens representing all four sites, and analyzed them along with 22 COI sequences obtained in a previous study. The resulting phylogenetic tree provided information on genetic diversity within and among oyster populations.



Faculty Mentor:
Dr. Jean Porterfield

Dr. Jean Porterfield received a B.S. in Zoology from Duke University and a Ph.D. in Biology from the University of Illinois. Her research interests include phylogenetic systematics, molecular evolution, evolutionary genetics, reproductive behavior, sexual selection and freshwater fishes. Throughout the years, she has published numerous articles and has supervised undergraduate research students multiple times. Dr. Porterfield enjoys helping undergraduate students explore types of health careers. She is the director of the Biomedical Studies concentration and is a faculty of the Health Profession Committee. In addition, she is the advisor of several Honor Houses, and assists students with student organizations that have a health focus like the St. Olaf Pre-Dental club.

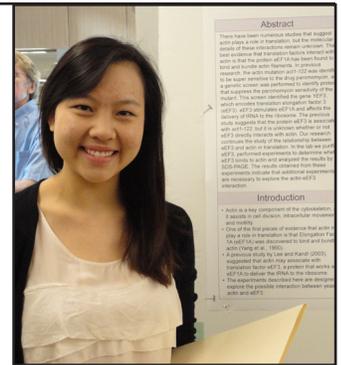




Faculty Mentor: Dr. Kim Kandl

Dr. Kim Kandl graduated from Grinnell College with honors and a B.A. in Biology. While she was completing her undergraduate degree, she went abroad to Scotland for a semester. Her experience overseas led her to appreciate the various study abroad programs offered at St. Olaf College. After obtaining her undergraduate degree she worked for Johnson & Johnson as a research assistant in a clinical pathology and histology lab for one year. This experience convinced her that she wanted to return to school to pursue a Ph.D. She received her Ph.D. from Purdue University in Biological Sciences with an emphasis in Cell and Molecular Biology. In graduate school she studied paramecium dynein, a protein that powers cilia and flagella. As a postdoctoral research associate, she shifted to analyzing actin in *Saccharomyces cerevisiae*, also known as budding yeast. Her research to date continues to examine the role of the actin cytoskeleton in protein synthesis, and she also supervises undergraduate research looking at the interaction between actin and translation factors. She has been at St. Olaf College since 2000 and in 2006 she was awarded tenure and promoted to Associate Professor. As of this year, she is the new Chair of the Biology Department. Earning a doctorate degree was of great significance because it allows her to do what she loves most – teaching.

Virginia Ma
Major: Exercise Science
 & Asian Studies



“The highlights of the TRiO McNair summer for me were conducting research with Dr. Kandl and visiting the U of MN graduate school programs. In 2012, I will be applying for a Fulbright grant to conduct research with a professor at the Chinese University of Hong Kong on “The Asia-fit Study: Cross-cultural Comparison on Physical Fitness, Physical Activity and Obesity of Youth Among Major Cities in Southeast Asia.” In the future, I hope to attend graduate school at the U of MN Public Health Program in Epidemiology. I am also looking at Public Health programs at Columbia and John Hopkins. I plan to pursue a career in public health and ideally work internationally one day. Graduate school is important in helping me achieve this goal.”

Research Title: Does eEF3 and Actin Interact?

There have been numerous studies that suggest actin plays a role in translation, but the molecular details of these interactions remain unknown. The best evidence that translation factors interact with actin is that the protein eEF1A has been found to bind and bundle actin filaments. In previous research, the actin mutation act1-122 was identified to be super sensitive to the drug paromomycin, and a genetic screen was performed to identify proteins that suppress the paromomycin sensitivity of the mutant. This screen identified the gene YEF3, which encodes for the translation elongation factor 3 (eEF3). eEF3 stimulates eEF1A and affects the delivery of tRNA to the ribosome. The previous study suggests that the protein eEF3 is associated with act1-122, but it is unknown whether or not eEF3 directly interacts with actin. Our research continues the study of the relationship between eEF3 and actin in translation. In the lab we purified eEF3, performed experiments to determine whether eEF3 binds to actin and analyzed the results by SDS-PAGE. The results obtained from these experiments indicate that additional experiments are necessary to explore the actin-eEF3 interaction.



Faculty Mentor:

Dr. Tomoko Hoogenboom

Dr. Hoogenboom is a Visiting Assistant Professor of Japanese and Asian Studies at St. Olaf College. She received her B.A. in English and American Literature from Tsurumi University in Japan and her M.A. and Ph.D. degree in Japanese and Linguistics at the UMN. Her specialties are in Japanese language and culture, Bilingual Language Acquisition, Second Language Acquisition, and use of Content Based Instruction. She is also interested in repetition in conversation, multilingual and multicultural identities, language loss in bilingual seniors, and oral language versus textual language. Dr. Hoogenboom has taught Japanese language courses in several Minnesota colleges, including Gustavus, Macalester and Carleton. She first came to St. Olaf in 2001 to teach Japanese language classes and returned to teach language and Japanese linguistics courses in 2008. Before coming back to St. Olaf in 2008, she was a lead teacher for the Japanese language program in the department of Asian Languages and Literature at the UMN. Dr. Hoogenboom has presented several papers and studies throughout her professional career, one being part of her Ph.D. work, "Bilingual and monolingual Japanese children's utterance direction; functions of repetition of utterances addressed to a third person."

Casey Skeide

Major: Asian Studies

"One of the most invigorating parts of the summer research was being able to wake up every day and work on something that I was truly interested in and be around others who have the same passion for their research as I do. My primary goal after graduation is to gain more teaching experience, teaching English for the JET program. In the future, I hope to obtain a Ph.D. in Linguistics and apply to UC-Santa Barbara, UW-Madison, UM-Ann Arbor, and the UMN. Ultimately, I wish to teach at the post-secondary level. Thank you to the McNair staff for believing in the importance of education."



Research Title: Differences in use of repetition by Bilingual Japanese-English speaking children in comparison to Monolingual Japanese speaking children

In this study, I analyze how English-Japanese bilingual speakers use repetition to indicate their cultural identities. Repetition allows bilingual speakers to contribute to a conversation and communicate with others with minimal effort. An overwhelming amount of research has been done on the topics of repetition, language, and culture, but no studies thus far have correlated the three. The design of this case study is based on previous research conducted in the fields of Japanese and English second language acquisition, sociolinguistics, and discourse analysis. I focus on how bilingual Japanese-English speakers utilize repetition depending on the language they speak. I also examine the forms of repetition, including repetition of another person's utterance or self-repetitions, as well as the various functions of repetition in English and Japanese conversations. Because bilingual speakers' speech patterns reflect their cultures, I investigate how they repeat utterances and in which situations. Based on this analysis, like the effects of language transfer on a second language learner, culture affects the type and frequency of repetition that bilingual speakers use in both linguistic environments. With bilingual Japanese-English speakers, a need for each conversation participant to follow the conversation topic causes the frequent occurrences of repetitions that highlight, reference, and create cohesion among utterances in both languages. This study, along with other evidence, indicates that bilingual speakers form their cultural identities by utilizing the different repetition structures of two languages so that they can converse and contribute to conversation in both linguistic and social environments.



Althea Speaks

Major: Political Science & Economics

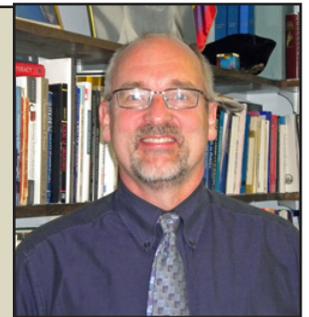
"The highlights of the TRiO McNair summer for me were establishing strong connections with my faculty mentor as well as living and working alongside my peers. I am endlessly grateful for the opportunity to participate in the TRiO McNair Scholars program. Thank you to everyone involved this summer who has helped make this one of the most enriching opportunities in my life. I hope to continue my research next year in preparation for Law School and apply to UW Madison, Emory Law, American University, Loyola, UMI, and Northern Illinois University. Long-term, I hope to work at the U.S. Department of Housing and Urban Development lending legal services in housing projects. Gaining knowledge of our legal system will assist me in creating effective housing programs that aid the homeless."

Research Title: Towards a Post-Racial Society?

Separately, race, class, and religion have served as important political indicators as well as sources of political division in American politics. This research focuses on the specific voting patterns of religious African American citizens and analyzes the interplay of race, class, and religion. This study seeks to discover if America is progressing towards a post-racial society by looking at whether or not race issues are more important than economic issues in the voting patterns of religious blacks. Using 2009 survey data from the Pew Research Center, this project examines the way blacks have voted and whether or not it is related to their class status. Crosstabs were conducted to examine the relationships between race, the amount of times the participants frequent church, and their income. In addition to quantitative research, exploratory interviews of black congregants from North Minneapolis were conducted. The congregants were asked about the extent to which they believed themselves to be religious, their political identities, as well as their class statuses. The main goal of the interviews was to gain an understanding of what constitutes class and racial interests. The analyses revealed that the political ideologies and party preferences of blacks were not significantly influenced by their personal income. The data also showed that the amount of religious observance did not have an effect on the ideology and party preference of voting blacks.

Faculty Mentor: Dr. Dan Hofrenning

Dr. Dan Hofrenning received his B.A. degree and graduated magna cum laude from Concordia College in Moorhead, Minnesota as well as a M.A. of Divinity from Luther Seminary. Later he went on to receive a M.A. degree in Public Policy from Duke University and finally a Ph.D. in Political Science from the University of Minnesota. His academic and research interests are in American politics and religion in American Politics. Dr. Hofrenning has been awarded many grants and honors such as the Lilly Teaching Fellowship, the Hubert Humphrey Fellowship, and the St. Olaf Release-Time grant. Most recently, Dr. Hofrenning was named a Lilly Vocational Scholar for 2007-2008. He began teaching at St. Olaf College in 1988 as an instructor of Political Science. He also worked at the UMN as an instructor during the summer of 1989. In 1992, Dr. Hofrenning became an Assistant Professor in the department of Political Science, which lasted until 1996 when he became an Associate Professor. Finally in 2007, he became a full Professor in the department. He has also had administrative experience as the Chair of the Political Science Department from 1998-2004 and has been the Associate Dean of the Social Sciences since 2009. Dr. Hofrenning has published numerous journal articles and chapters in edited volumes throughout the years as well as the book, *In Washington But Not of It: The Prophetic Politics of Religious Lobbyists*. Dr. Hofrenning has been a great supporter of undergraduate research, often collaborating with undergraduate students on his publications and his convention papers.



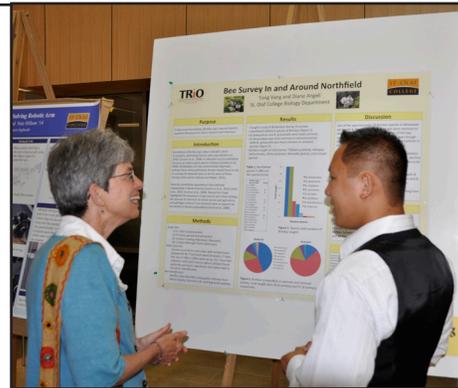


Faculty Mentor: Dr. Diane Angell

Dr. Diane Angell is an Assistant Professor in the Biology Department at St. Olaf College. She received her Ph.D. in Ecology and Evolutionary Biology from Brown University, in Providence, Rhode Island. Growing up Dr. Angell knew she had an interest in Biology but was uncertain in what field. During her undergraduate years she worked with an ornithologist in North Dakota and then with prairie dogs in South Dakota. Her interest in ecology and conservation biology grew from there and she entered Brown University in their Ecology and Evolutionary Biology program. Moving from the Midwest to the East coast, her subject of interest altered from prairie dogs to other small mammals. She continued her research career in graduate school by studying red squirrels in New York and eventually an endangered species, the Mt. Graham red squirrel in Arizona. Dr. Angell’s knowledge of this species is recognized by other researchers as she was asked to write a chapter in the book “The Last Refuge of the Mt. Graham Red Squirrel.” Today Dr. Angell still continues her research with small mammals by monitoring the types of mammals in local prairies and teaching student researchers what she knows through summer research programs. Dr. Angell is a pleasant, joyful, and wonderful professor who is easy to talk to and is more than willing to help any student who comes through her door.

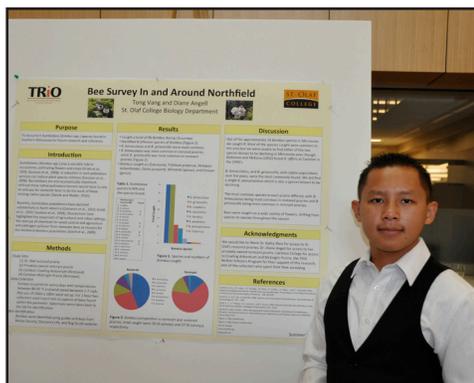
Tong Vang
Major: *Biology*

“The highlights of the TRiO McNair summer for me were catching my first bumblebee and getting to know the other TRiO McNair Scholars. I enjoyed learning about the bumblebee populations. This summer confirmed that I really enjoy conducting research and higher education is necessary for me to pursue my future goals of continuing research. Next year, I plan to continue searching and visiting graduate school programs and faculty. In the future, I plan to apply to graduate school in the area of Public Health, Ecology, or Biomedical Sciences. I love to learn, that is why I wanted to participate in McNair and why I hope to continue on to graduate school.”



Research Title:

Bee Diversity in and around Northfield

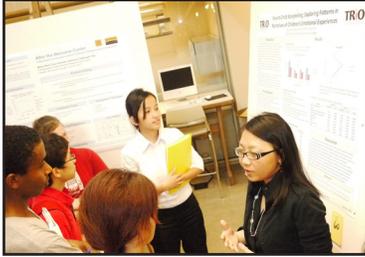


Bumblebees (*Bombus* spp.) serve a valuable role in our ecosystem, pollinating flowers and crops. Recently researchers have discovered *Bombus* populations have declined significantly

in North America, with one species believed to be extinct. Despite extensive research nationwide, there has been little research done on *Bombus* species richness in southern Minnesota. In order to document *Bombus* species we collected samples from two restored and two native remnant prairies in and around Northfield. We found eight different species of bumblebees with *B. bimaculatus* and *B. griseocollis* being the most common. Our research helps document local bumblebee diversity and provides a baseline for future research.

Chue Vue
Major: Psychology

"The highlight of McNair was the research experience. It allowed me to think critically about research. I worked collaboratively in a research team, exchanging ideas and questions, and drew upon my coursework in statistics and research methods. This summer I also got to know other McNair Scholars; I not only learned about their projects but about their personal ambitions. I intend to apply to graduate programs in School Psychology, Counseling, or Child Development at the University of Minnesota, University of Wisconsin, and the University of St. Thomas."

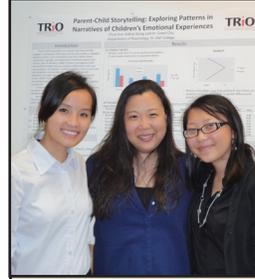


Kabao Xiong
Major: Psychology

"The highlight for me was dinners with the McNair students and staff, bowling, playing games at the McNair House, and presenting at the St. Olaf Summer Research Symposium. This summer I learned how to run SPSS analyses and worked in a research team. I also learned a lot about myself as I developed my personal statement for graduate school. I plan to apply to graduate programs in Ed Psychology, specifically School Psychology, and considering Industrial & Organizational Psychology. A graduate degree will provide me the opportunity to study a focused topic and have more work opportunities in the future."

Research Title: Parent-Child Storytelling: Exploring Patterns in Narratives of Children's Emotional Experiences

The ways mothers engage in emotion talk during storytelling contributes to children's emotion development. However, few studies have analyzed fathers' narratives and the content of their conversations with children. This study examined the storytelling patterns of forty-eight parents discussing a happy and not-so-happy experience with their preschool aged children. Specifically, we investigated whether emotion talk varied by parent-child gender and whether mothers and fathers narrated emotion-related themes differently. Furthermore, we examined the extent to which these patterns were influenced by parents' emotion socialization beliefs. We expected parents reported beliefs to be related to their observed practices. Overall, mothers used more emotion talk than fathers. Moreover, mother-daughter narratives contained the greatest emotion talk. Mothers and fathers shared similar story themes with sons and daughters in the happy story; however themes in the not-so-happy stories differed by gender. Whereas the thematic content of mother-child narratives was comparable across both child genders, fathers narrated more stories about Conflict with sons and stories about Scary events with daughters. Finally, parents' beliefs about emotions correlated with their observed emotion talk, suggesting that parents' interactions with children were guided by their childrearing beliefs. These results support the significant role of parents in the emotion and gender socialization of children.



Faculty Mentor:
Dr. Grace Cho

Dr. Cho received her M.A. and Ph.D. in Developmental Psychology from the UIL at Urbana-Champaign. Dr. Cho has been recognized for her outstanding teaching and research accomplishments and received numerous awards and grants. Her research interests include emotion and gender socialization, and she is particularly fascinated by the role parents' beliefs and practices play in shaping children's socio-emotional, self, and narrative development. Dr. Cho recognized a lack of father participants and cross-cultural samples in studies that explored the role of parents in children's development and she made it a primary goal to involve diverse groups in her research. The findings from her research have been presented at numerous professional conferences and appeared in many publications. She is currently working on a book discussing parental ethnotheories about childrearing and how families cultivate self-esteem in children. In addition, her cross-cultural work on emotion socialization in American and South Korean families has received international attention. As a Psychology professor at St. Olaf College, Dr. Cho has advised many student researchers and received the Magnus the Good Award, an endowed fund that supports student-faculty collaborative research. Her wide-ranging research and collaborative work exemplify her passion to study, teach and disseminate issues concerning human development.



Faculty Mentor:
Dr. Heather Campbell

Dr. Heather Campbell received her M.Ed. in Special Education from the University of St. Thomas and a Ph.D. in Educational Psychology, with a subfield in Special Education from the University of Minnesota. She currently has teaching licenses in Physical Science-Physics and Chemistry (7-12); English as a Second Language (K-12); Reading Specialist (K-12); and Special Education-Learning Disabilities (K-12). Her areas of expertise and special interests include: literacy development and assessment of English learners, special education-learning disabilities, urban education, and educational opportunity. In the last several years, Dr. Campbell has published and co-published several articles, as well as chapters in books. Also of significance, Dr. Campbell has co-written several grants and is writing several TRiO grants, including: Student Support Services, McNair, Upward Bound, Educational Talent Search, and GEAR UP. Dr. Campbell presents and leads many workshops for education professionals and is currently serving as St. Olaf College Education Department's Director of Assessment.

Phoua Xiong

Major: Sociology/Anthropology

"The highlight of the TRiO McNair summer for me was conducting research. This summer I enhanced my writing skills and gained experience working with Microsoft Excel at a higher level. During my senior year, I plan to apply to University of Minnesota Social Work and Family Social Sciences Programs. I am also looking to apply for the MSW program at Augsburg College and Washington University. In the future, I hope to work with families in the area of adoption."



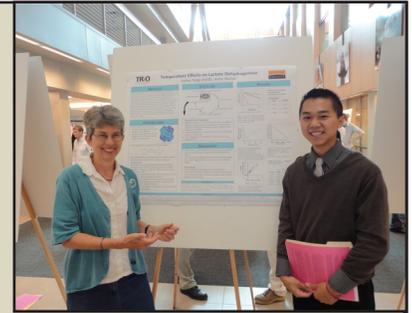
Research Title:

Metacognitive Strategies in Undergraduate Biology

College students are often unable to regulate study strategies across disciplines and rarely change their study habits. Metacognitive strategies are designed to help students become self-regulated learners. The purpose of this study was to determine whether students who use metacognitive strategies study more effectively, perform better on exams, and more accurately predict exam scores. Most participants were in their first two years of college, and half of the students participated in TRiO, a federally-funded program providing support to students who are first generation, low-income or with disabilities. Students in four Biology classes were randomly assigned to either an experimental or a control group. Prior to each exam, the experimental group answered metacognitive questions about study methods, questions with which they tended to struggle, and the length of time spent studying; they also predicted their exam grades. The control group defined terms and predicted their exam grades. A subset of the participants also took the Motivated Strategies for Learning Questionnaire (MSLQ) which measures students' use of metacognitive strategies. While results revealed that the metacognitive strategy intervention had no significant impact on exam grades, students who scored high on the MSLQ text anxiety measure tended to have lower exam scores. Additionally TRiO students had difficulty predicting their first two exam scores, but by the third exam, they predicted with the same accuracy as their non-TRiO peers. Further research should be conducted on how the regular use of metacognitive strategies impact academic success for different groups of students.

Faculty Mentor: Dr. Anne Walter

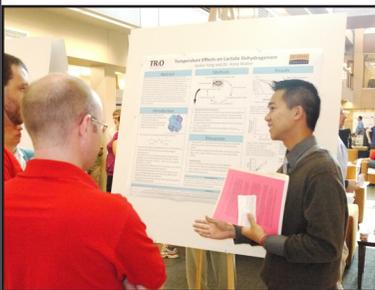
Dr. Anne Walter received her B.A. from Grinnell College in Biology, her M.S. in Zoology from the University of British Columbia, and her Ph.D. in Physiology and Pharmacology from Duke University. Her research interests include membrane biophysics, enzyme activities, and permeability as a function of lipid composition. Dr. Walter has published numerous articles throughout her career. Her most recent publication titled, The Vesicle to Micelle Transition of Phosphatidylcholine Vesicles Induced by Nonionic Detergents: Effects of Sodium Chloride, Sucrose and Urea, was published in 2000. Dr. Walter has taught at St. Olaf College since 1994 and earned the title as Paul & Mildred Hardy Distinguished Professor of Science. As a Distinguished Professor, Dr. Walter is in charge of organizing the annual Science Symposium at St. Olaf College. She was also the Chair of the Biology department from 2002-2010. In 2009, as a Fulbright-Nehru visiting lecturer, she spent a year at Madras Christian College in India sharing her knowledge about zoology. Aside from biology, from 1994 to 2008, Dr. Walter was a part of the committee that planned and designed Regents Hall. She also was part of the committee that designed the IRB (human subject protocols) at St. Olaf. Her favorite classes to teach are animal physiology, neuroscience, and biology 121 for the TRiO Student Support Service's Summer Bridge Program.



Jackie Yang

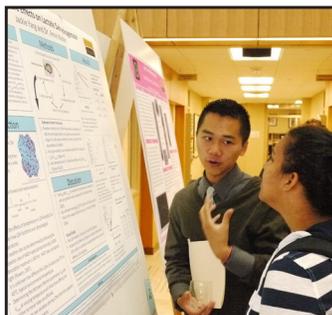
Major: *Biology*

"The highlight of the TRiO McNair summer for me was having the opportunity to work in a science laboratory. The experience of conducting research was fun and very useful. I learned that research may not always yield reasonable results and is only useful if the researcher asks the right questions. In the fall of 2012, I plan to apply to the Clinic



Laboratory Science programs at the UMN, UW Madison, and Northwestern University in Chicago. I hope to become

a laboratory supervisor for a hospital laboratory and a Ph.D. is required to hold that kind of position. McNair is a great experience and I wish everyone could experience it!"



Research Title:

Temperature Effects on Lactate Dehydrogenase

Lactate dehydrogenase (LDH) is the glycolytic pathway enzyme that permits anaerobic glycolysis in many organisms. A change in temperature may cause LDH to lose or gain some function. LDH's ability to function at different temperatures is essential for the survival of ectotherms (such as insects or fish) because in ectotherms, body temperature is close to ambient temperature which can vary over diurnal and annual cycles. The purpose of our research was to test the effects of temperature on LDH kinetics and to observe how LDH functions over physiological temperatures. Reaction rates were obtained by NADH depletion observed with a microplate reader at 340nm as pyruvate and NADH were converted to lactate and NAD⁺ by LDH. LDH extracted from fish muscle had higher V_{max} and higher K_M values at warmer temperatures; V_{max} peaked at 37 degree Celsius. Future studies will compare these properties in multiple species of fish adapted to different conditions. Then we propose to probe the fish DNA for LDH genes in order to determine if LDH's ability to function in varying temperatures is due to different LDH isozymes.