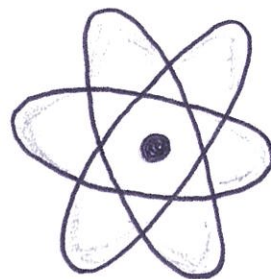


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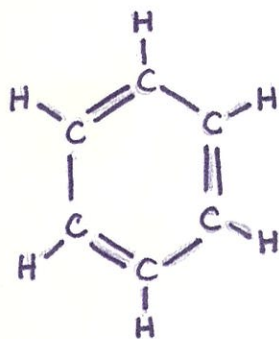
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WISEST Summer Research Program

2004

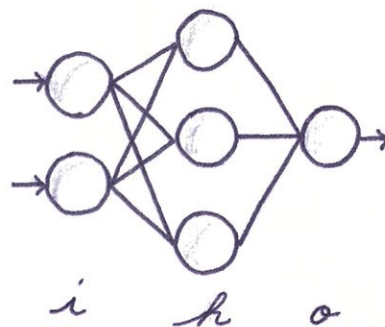
Student Reports



WISEST

women in scholarship, engineering, science & technology

Artificial Neural Network



Women in Scholarship, Engineering, Science & Technology

20th Anniversary

WISEST

(Women in Scholarship, Engineering, Science and Technology)

at the
University of Alberta
Edmonton, Alberta
Canada

WISEST is a University of Alberta-based organization whose vision is to strengthen science by increasing gender diversity and to enhance choices in science, engineering, scholarship and technology for women of all ages. Our programs foster collaboration and communication with partners in industry, in academia and education, and in governmental and non-governmental organizations in the community.

WISEST was founded in 1982 with a mandate to investigate the reasons why few young women are choosing careers in the sciences and engineering, to take action to alter the situation, and to work to increase the percentage of women in decision-making roles in all fields of scholarship.

The purpose of WISEST is to initiate action to increase the representation of women in all fields of scholarship. The studies and actions of WISEST are concentrated in the under-represented, decision-making fields of science, engineering and technology.

WISEST Chair

Dr. Gary Kachanoski,
Vice-President (Research)
University of Alberta

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Sarah Bentz, B.Des.

WISEST Vice-Chair

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Associate Chair, Department of Chemistry
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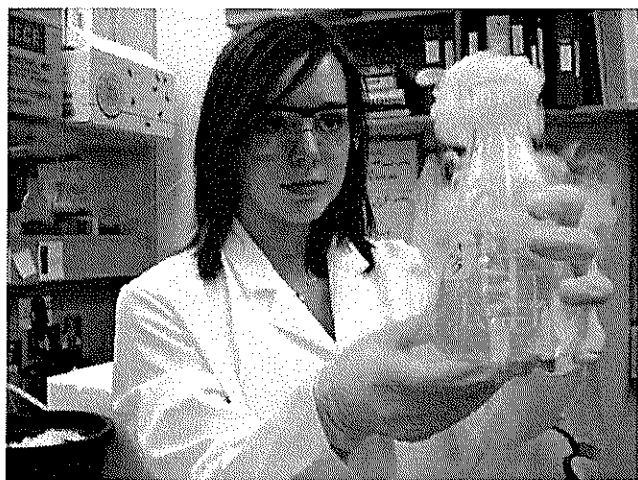
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WISEST Summer Research Program 2004
20th Anniversary

Student Report Book







women in scholarship, engineering, science & technology

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Our apologies. There are printing errors in our publication:

- 1) The page numbers listed in the Table of Contents for the "WISEST Student Reports" are incorrect. Please subtract two (-2) for each student report page listing. The students' reports are sorted alphabetically by student surname.
- 2) Student photos for Katie Molzan, Alyssa Shariff and Amanda Thompson are incorrect. You will find the true images of the students inserted within the book.

WISEST Summer Research Program 2004

Student Report Book

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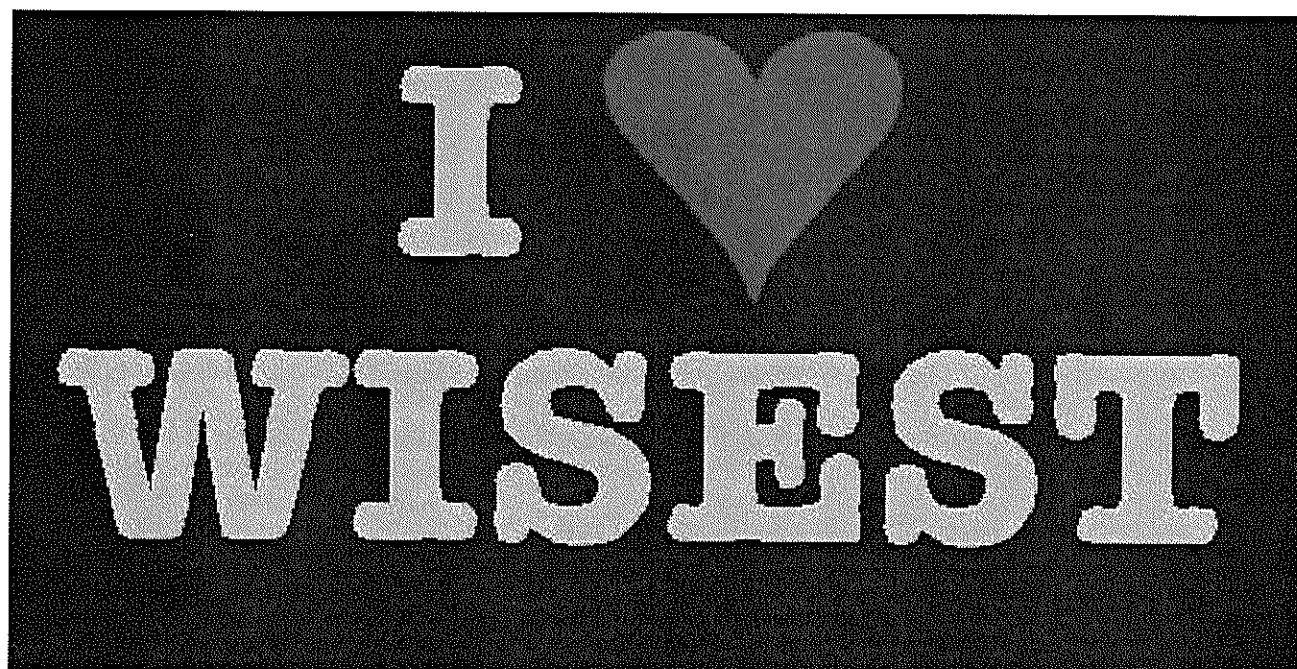
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The 20th Annual WISEST Summer Research Program

by Dr. Margaret-Ann Armour, Vice-Chair WISEST, and
Grace Ennis, WISEST Coordinator

In early 1982, while attending a seminar on microprocessors, Dr. Gordin Kaplan (then the University of Alberta Vice-President, Research) noted that there was only one woman among the 150 people present. This triggered the creation of a new group to promote participation of women in the non-traditional careers – Women in Scholarship, Engineering, Science and Technology (WISEST). The primary job of this group, said Dr. Kaplan, is to try to understand why women are under-represented in the hard sciences and engineering, and then do something about it. Since women are still markedly under-represented in decision-making roles in the sciences and engineering, WISEST has concentrated its efforts to date on these fields. WISEST began by investigating why relatively few young women choose and remain in careers in the sciences and engineering and then initiated several on-going programs to change the situation.



Dr. Margaret-Ann Armour, Vice-Chair WISEST since 1982, will be retiring from the University

One of the first major initiatives was the WISEST Summer Research Program, a valuable six-week research experience at the University of Alberta for high school students who are making decisions about their future fields of study and career paths. Students (both young women and men) who have completed grade 11 spend six weeks working as a member of a research group within disciplines less traditional to their gender. For young women, these areas include engineering, science, and technology, and for young men, the areas of nursing, nutrition and human ecology.

In the following pages you will read about the many experiences that the students had working in the research laboratories under the supervision of their scientist mentors and fellow research team members. They learned first-hand about cutting-edge research, the techniques and types of research being conducted, the research career opportunities available, and they gained an introduction to academic and university life. The students also participated in a variety of weekly activities that are designed to supplement their work experience. The reports describe in their own words the six weeks of hard work, mistakes and triumphs, and the amazing discoveries both in and outside of the laboratory that are the valuable memories held by the students.



women in scholarship, engineering, science & technology

As we celebrate the 20th Anniversary of the Program, we recognize that its success is a reflection of the support of many, many people, including high school science teachers, faculty supervisors, research team members, and WISEST Partners and Contributors. Many, many thanks and words of sincere appreciation to all high school teachers who spark their students' interest in the Program, and to all research team members who mentored, guided and encouraged the WISEST students to explore their interests.

WISEST genuinely thanks the many local industries, philanthropic groups, the Provincial and Federal governments, and the University of Alberta for their financial support in the 2004 Summer Research Program. The students are paid an hourly rate for their six weeks of work; the number of students who can be accommodated depends on the number of sponsorships available to pay the students. A detailed list of the WISEST Partners and Contributors is included in this book and on our web page www.wisest.ualberta.ca

Steps into the World of Research and Science

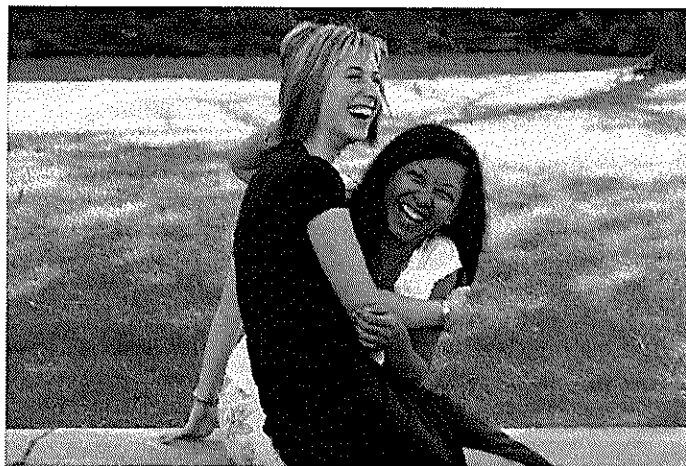
by Mariel Dagot and Emily Krauss
WISEST Student Coordinators

There were 63 very nervous WISEST students and 2 more nervous Student Coordinators in that room in Mechanical Engineering on the first day of the Program. Together we took our first steps into the world of research and science. These first steps were so special because they were from a very different perspective. The students were discovering their paths as they anticipate leaving high school. Is University right for them? Is research where they would like to be? What will I learn this summer that can help me with my decisions? And we, the student coordinators, were asking similar questions as we leave University, Bachelor degrees in our hands, wondering what career paths to choose and what life experiences are ahead of us.



The Summer Research Program encouraged students to question, to discover the challenges and surprises of scientific discovery, and to develop their interests as they search for paths to pursue after high school. Together we experienced an adventure in learning. The learning extended beyond lab skills and into the

practice of life skills that were developed because of Wednesday afternoon sessions and social activities throughout the Program.



To our students, look back and think of all the work that your supervisors have done, and all of the support the WISEST Partners, and role models have been invested in you. Remember to be respectful of their hope in you. Remember to be respectful of science – researchers, scientists, and technicians. Keep working with them, collaborating with them. As a part of a team of scientists, engineers, and researchers, you have helped to advance science in the past six weeks, and should continue to use your talents.

Use this report book as a reminder of where you were at the beginning of the program, taking those first steps into the world of research and science. Use it as a reminder of all the support and help you received along your way. Use it as a reminder of that last day in the Program when all the growing-up you did as a person and all the learning you did produced wonderful research posters to be proud of. Use it as a reminder that you are now part of this year's WISEST team and the greater WISEST community.

We were honored to travel on this journey with the students and observe their transition in only six weeks into inquiring scientific minds expressing the confidence they need to continue to learn and succeed. We 'heart' WISEST. We've 'hearted' WISEST from the first day we began work in May. Now you 'heart' WISEST too.

Thank you to everyone for a summer of learning, a summer of exploring opportunities, and a summer of (many) laughs.

Our Thanks to the 2004 WISEST Partners

*Strong funding support gave 63 WISEST students
a remarkable summer research experience*

- Alberta Heritage Foundation for Medical Research (AHFMR)
- Alberta Human Resources and Employment, STEP
- Alberta Ingenuity Fund
- Alberta Ministry of Environment
- Alberta Ministry of Innovation and Science
- Alberta Research Council
- Alberta Women's Science Network (AWSN)
- Allard Foundation
- Camille and Henry Dreyfus Foundation
- Canadian Imperial Bank Commerce (CIBC)
- Canadian Information Processing Society (CIPS)
- Canadian National Railway (CN)
- Dow Chemical Canada Inc., Western Canada Division
- Edmonton Glenora Rotary Club
- GlaxoSmithKline
- Human Resources & Skill Development Canada, Summer Career Placement Program
- Merck Frosst Canada Ltd.
- NSERC - Promo Science
- Petro-Canada Community Investment Program
- Suncor Energy Foundation
- Syncrude Canada Ltd.
- University of Alberta
 - Faculty of Agriculture, Forestry and Home Economics
 - Faculty of Engineering
 - Faculty of Medicine and Dentistry
 - Faculty of Nursing
 - Faculty of Science
- Weyerhaeuser



... and to the 2004 WISEST Contributors

- Lehigh Inland Cement
- Dr. Arlene Ponting
- Celanese Canada Ltd.
- Ms. Esther Ondrack

Become a WISEST Partner

- The WISEST Summer Research Program students are paid an hourly wage for their six weeks of work and the number of students who can be accommodated depends on the number of sponsorships available to pay the students.
- Several local industries, philanthropic groups, various University of Alberta faculties, and the Provincial and Federal governments sponsor students.
- Sponsorships are \$2,000 per student. The money is used to pay the students an hourly wage, the costs of special activities such as field trips, group discussions, and poster sessions, and for administrative costs.
- An endowment fund helps to support rural students who stay in an Edmonton residence complex during their participation in the Program.
- Receipts for income tax deductions are issued for all contributions.
- Please contact us at the WISEST office for further information about any of our initiatives.



YES, we would like to become a Partner of the 2004 WISEST Summer Research Program.

We will sponsor _____ student(s) at \$2000 per student.

☐ **YES, we would like to become a Contributor to WISEST. We wish to contribute to the following:**

- | | |
|--|--|
| ☐ WISEST Summer Research Program
☐ SET Conference for high school girls
☐ Choices Conference for Grade 6 girls
☐ UA-WISE (University of Alberta Women in Science and Engineering) | ☐ Margaret-Ann Armour Endowment Fund for Rural Students
☐ We would appreciate further information. Please contact us. |
|--|--|



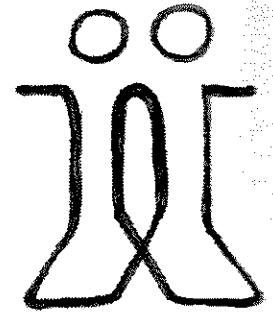
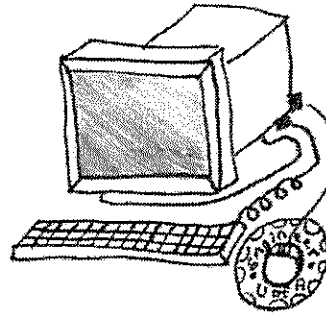
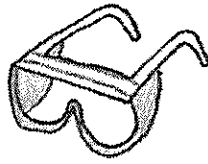
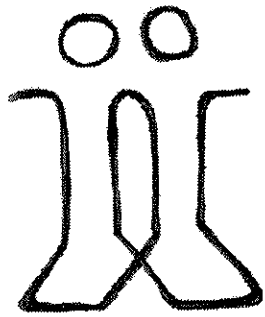
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Contact Person: _____

Address: _____

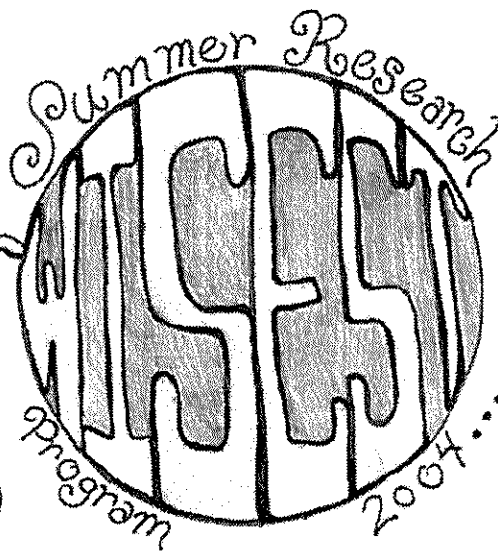
Phone: _____ **Fax:** _____ **Email:** _____

Please return to: WISEST, 295 CAB, University of Alberta, Edmonton, Alberta T6G 2G1



Women in

Engineering

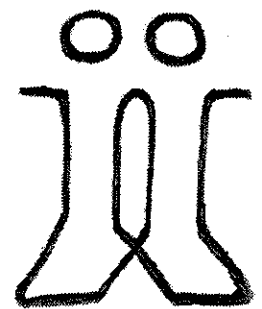
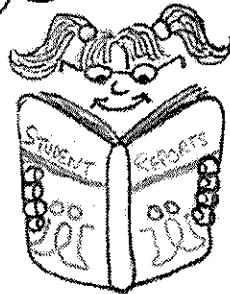
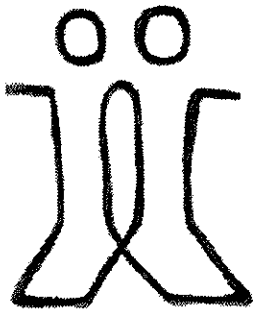
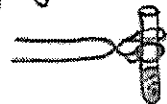


Scholarship



Science

Technology



WISEST Orientation Day **A Flood of Information**

by Kathryn Twyman

Whoever claims getting into a routine and staying with that routine for a long period of time takes some extraordinary effort clearly never attempted the routine of an average high school student on summer vacation. Later than usual nights (verging on mornings), rising when the sun is at or past the highest point in the sky, eating and drinking whatever and whenever, and overall just heavy duty relaxation. But for 63 students dedicated to expanding their experience and knowledge, the one-week of summer holiday was brought to an abrupt end on the morning of July 5th, 2004.

For the WISEST students, there was certainly a sense of apprehension that accompanied them to Mechanical Engineering Building at the ungodly hour of 9:00am. Memories of kindergarten and pre-school flooded your senses as you were directed to pick-up a name tag (preferably your own). A brief introduction to the program was followed by various icebreaker games, and then the flood of information that would descend upon the naïve students soon began. Detailed introduction to the WISEST Program was provided by the "fab four" – Dr. Margaret-Ann Armour (Vice-Chair WISEST), Grace Ennis (WISEST Coordinator), Emily Krauss and Mariel Dagot (Student Coordinators). Also speaking at Orientation Day was Dr. Andy Greenshaw, the Associate Vice President of Research (the lone male speaker) and a former WISEST student – Andrea Murland. Following the lunch break, there was a mad rush for the bathrooms. With 58 girls lined up, waiting their turn, we were slightly envious of the 5 males with no line-up. No wonder they applied for WISEST – pretty good odds.

Back in the room Dr. Margaret-Ann Armour got the spotlight again. Her pragmatic nature was clearly evident with her edible "hammer" – a banana dipped in liquid nitrogen. In addition, she awed the crowd with her demonstration of the miraculous powers of the juice extracted from the skin of oranges. Dr. Margaret-Ann Armour did a great job of the presentation and provided some comic relief to the students who were approaching the limit of their attention span. The presentation did, however, entail significant risk. Anyone who was camera-shy would have suffered greatly. On top of having the WISEST photographer, Sarah Bentz, snapping photographs every few seconds, a camera man was also taking video footage. An absolute nightmare for those with camera phobia. Oscar Wild once said that, "Vanity, thy name is women," so the excessive photography posed no serious threat to the vast majority of WISEST students who are female (I, of course, am an exception). Despite the fact that the WISEST coordinators have various degrees, they appear to be unaware of the lethal combination of late afternoons, full stomachs, warm rooms, and safety seminars. With this scenario before her, Dr. Margaret-Ann Armour tackled this daunting task with courage and determination, bringing humor and group discussions to battle the boredom.

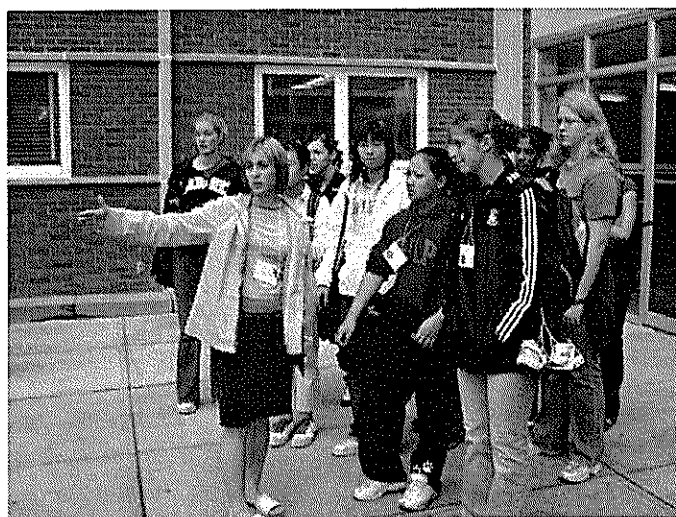


Then came the moment which every student was anxiously waiting and simultaneously dreading – meeting your supervisor. Most jobs entail meeting your “boss” for an interview, so you typically know what you are getting into. Perhaps this is what sets WISEST students apart - they have the courage, determination and a few loose screws to dive headlong into uncertainty. As each professor or grad student was introduced, every time you would be wondering (hoping or sometimes dreading) “is that my supervisor?” Finally, your professor is introduced and you are swept out the back door and into the lab. By the time I was introduced to the lab, my brain had suffered from an overload of information and had shut down, thus I had no clue what the heck my lab was all about until a few days into the program.

At the end of that first Orientation Day of WISEST, I was beginning to wonder what I had got myself into. But after a few days I began to settle in and knew that I would survive (perhaps even enjoy) the next six weeks of my summer as part of the WISEST Program.

Wednesday Afternoon Sessions **A Tour of Campus and an Intro to Bear Tracks** by Lana Cuthbertson

Our first Wednesday afternoon session included a tour of campus and a computer session, showing us how to log into various programs on the University Computers. The tour of campus came first. We met in a room on the third floor of the Central Academic Building (CAB), all of us coming from our various science buildings around campus, mine being Biological Sciences. From there, we split in to groups of ten and each group went with a different leader, ours being a student at the University who gave tours frequently, so he knew what he was doing. We toured around the North part of campus mostly, considering that was where all the science buildings were, and also considering that most of the buildings we would be concerned with were, in fact, the science buildings. We were given a sheet that had questions on it for us to answer, like a scavenger hunt, and I was put in charge of writing everything down. The questions had lots of interesting answers, and it was neat to learn lots of little odd facts about the University. This tour was really fun, but we had to cut it short because the weather was cold and rainy.

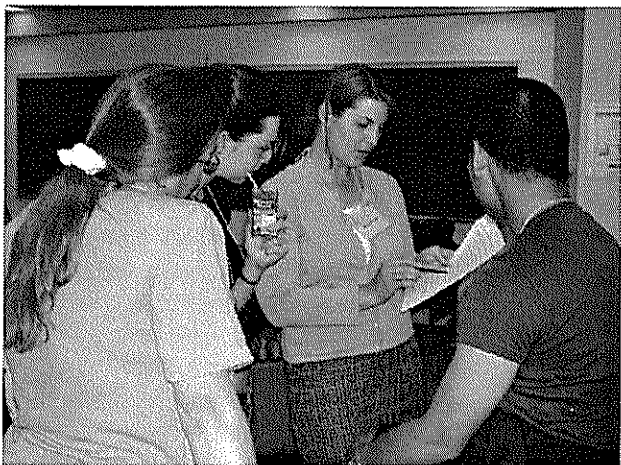


After the tour, we went to a computer lab in an engineering building and signed into the university computers. Before this afternoon, we all had to go and get our university ID's and passwords in order to do this. The process wasn't too complicated, but there were lots of steps and passwords to remember and type correctly, so it would have been confusing. However, luckily Mariel explained everything very well, so the process was a breeze! We also logged into 'Bear Tracks' which is a program through the University website that allows its staff to check up on their payments being made to them. This program is easy to understand as well, and very handy if you ever need to know anything about your monetary status.

All in all, this Wednesday afternoon session was very informative. It was our first one, so it mainly dealt with making sure we knew all that we needed to for the weeks to come. Without the campus tour, I would have been absolutely lost over the summer, but luckily, thanks to the tour (and my fortunate good sense of direction) I remembered where to go to and from my lab. The computer session taught me all I needed to know if I ever needed to use any University computer, which I had to do on a few occasions. As well, the tour

was one of my first small group interactions with other WISEST girls, which set the stage for the weeks to come. This session was informative and fun at the same time, and a great way to start off the program.

Wednesday Afternoon Sessions
Small Group Discussions with Women Scientists
by Jessica Vatcher



Finally, the second Wednesday afternoon activity! The preparation amongst student participants in the WISEST program for this special day started the week before. Whenever there was a spare moment to be found from the lab or the piles of papers to read, WISEST students would dash up to the office to select which small discussion group they wished to be placed in.

At 2:45 in the afternoon, 63 WISEST students eventually poured into a small rather warm room, with just enough seats, amongst all of the moderators and role models. Here, Dr. Armour gave another one of her insightful and inspiring speeches to the students and to the generous moderators and role models who had given up their afternoon to take time with us. From here, everyone traveled to her or his respective rooms.

For each small group, there was a moderator and 5 role models. These consisted of women who were working/studying fields that are not generally considered traditional for women. Professions and areas of study ranged from things such as civil and environmental engineering, immunology, and developmental biology.

Upon sitting down around a table, we were given a great "ice breaker" activity. Every member in our group picked up a folded piece of paper. On the insides of these paper pieces, there were the names of assorted barnyard critters. Soon after opening and reading the paper, the room was full of a sound that can only be described as orchestral, as students and role models alike began to moo, oink and ribbit. During the harmonious barnyard sounds, students and role models migrated to the respective areas designated for the cows, the pigs and the frogs. We then made like... animals, and had a mere seven minutes to complete a set of questions in our group in an epic battle. We were, however, allowed to





return to our natural tongue of English to answer the questions. These questions were based upon any area, but there was also a section that highlighted famous women in science. Some of the answers caused outbreaks of laughter, and certainly did "break the ice" for everyone.

After the game, everyone returned to one large group and the moderator regained control of her herd. She started off by introducing the wonderful role models that we had with us. From there, the role models were asked to give the same information they gave on their applications and more because they were all very interesting people. The role models soon began telling their life stories focusing upon their education and career, but not forgetting the ever-important aspect of family. After all of the role models had given a synopsis of their accomplishments, the floor was opened up to any questions that the WISEST students had. Common questions involved how the role models managed to maintain a healthy family and their career, how the role models would change their path if a change were required, and what they believed about acquiring an education from multiple universities. Co-op and studying abroad were some of the other topics included in the discussion.

Overall, this was a superb event that all of the WISEST students greatly benefited from. Some of the advice from this experience will last us our entire lives, and will enable us to make informed decisions about our future. This discussion broadened our awareness of many other career opportunities available to us. Due to the kindness of the moderator and of the role models in leaving their contact information, this special event increased our networking in a new world that is just beginning to open its doors to us.

Wednesday Afternoon Sessions
Research in Action: Micralyne
 by Haley Moore

We WISEST Summer Research Students knew that Micralyne was a singular Canadian company leading the world in Micro-Electro-Mechanical-Systems (MEMS) Technology, but as we entered the modern-looking Micralyne building, we had many questions. We had never heard the term "MEMS Technology" before and wondered how it could affect us. We were greeted in the lobby by a friendly member of the Micralyne marketing team and proceeded to the lunchroom where we received an informative PowerPoint presentation about the Micralyne company over refreshments. We learned that Micralyne is a leader in its field and is almost one-of-a-kind in Canada. We were told that it developed as a spin-off from nanotechnology research at the University of Alberta, and has built up a team of one-hundred young engineers, chemists, operators, and business people in order to develop and sell its products. MEMS Technology and nanotechnology, as was explained to us through the presentation, are technologies on a very small scale. We were told that most

of the products developed by Micralyne are only microns or nanometres in size, which translates to between one millionth and one billionth of a meter. At one point we were shown a thumbnail-sized plate which contained hundreds of products, and which was worth well over one thousand dollars!

We were surprised to discover that the tiny products Micralyne develops are for companies who use them in technology that many of us had used or seen the products of that very day. We found out that Micralyne produces, among other things, emission sensors for Ford vehicles, parts for high-end printing equipment, and uses fibre optics to create switches for telecommunications. We even learned of a device in development that could be implanted in the body and would release medication when it detected that the blood concentration of the drug was low. The presentation then explained to us the various procedures Micralyne uses to produce MEMS devices such as micromachining, and thin film technologies. We realized that MEMS and nanotechnology play a huge role in our lives, from controlling fuel emissions to protect our air, to playing a role in bringing the news to our front doors every morning. With the new projects that Micralyne has in development, it also seemed to us that they were on the leading edge of some discoveries that could make our lives or the lives of those around us much easier in the future.

After all this information, we embarked on a tour through the high-ceilinged hallways of the forty-thousand square foot Micralyne laboratories. Our tour guide showed us Micralyne's class ten clean rooms where numerous huge fans in the ceiling are winning a constant race against dust particles in the air. We got to see engineers and scientists at work, dressed in white from their slippers to their masks and hoods, identifiable only by their eyebrows. We noticed that all seemed excited by their jobs. It was clear to us that all the Micralyne employees loved what they did and that Micralyne would be a great place to work. This was confirmed when after the tour we were allowed a question period with some women who worked in engineering at Micralyne. To us, they seemed very happy to be working there and it was clear they enjoyed their field immensely. They answered our question about their jobs, schooling, interests, and hobbies. They offered us important insight into choosing programs of study and getting a job. All of the employees at Micralyne were friendly and accommodating to us WISEST Summer Research students. They offered us information about technological breakthroughs as well as offering us advice about our futures. It was a fascinating afternoon, one that we WISEST students will not soon forget!

Wednesday Afternoon Sessions
The Riveting World of the Alberta Research Council
by Alyssa England and Siobhan Galbraith

Our trip to the Alberta Research Council got off to a great start. First, all of the WISEST students filed into the auditorium and found seats at the very back. We were later told by the hostess, Michelle, that supposedly smart people sit in the front rows ...Irony, considering we're all "wisest" students...! And Emily, our student coordinator encouraged us to ask as many questions as possible, so during the presentations, we were like a firing squad- asking every question that came to mind. Michelle had to cut us off as the speakers began to run out of time!

But joking aside, the tour was great! We learned about a variety of careers, and research in the private sector. The keynote speakers gave us insight into different positions available in the science/research field. We heard from an animal technician, a resource economist, public relations personnel, and a microbiologist. The presentations were all very well done- with thoughtful powerpoint presentations to support their speeches. These powerpoint presentations also offered advice and success tips for the future. All the girls from WISEST were thrilled when we were told we could keep the safety glasses we were given on the tour. The glasses were necessary for our group tours around various labs at ARC.

On our way to our first lab tour, our guide stopped us to point out a bullet-proof vest designed by the scientists at ARC that is used in the Canadian military, and around the world. Next, an engineer demonstrated a 3-D computer simulation of an oil reserve showing the concentration of natural gas, oil and water in the oil-well

vicinity. Not only was the presentation both interesting and educational, but we also got to wear some über-cool 3-D glasses.

We then listened to two more women in science explain the process of the purification of oil and its numerous benefits. These women analyze oil samples from various regions of Alberta in order to help determine the ideal location for the drilling of an oil well. This tour was even better because the oil industry is an integral part of the Albertan economy.

Our final lab visit was an introduction to ARC's role in the production and development of pharmaceutical and nutraceutical substances by private companies. Nutraceuticals are compounds that are naturally derived, such as Echinacea and ginseng. The lab representative described the role the Alberta Research Council plays in the private sector. She also gave us insight into the business aspect of the research council.

The Alberta Research Council provided us with the opportunity to explore some of the career opportunities available in the science/research field. The presentations were both informative and insightful. We were encouraged to see numerous women who have succeeded in the science field, with education ranging from technical certificates to PhDs. This Wednesday session gave us an introduction to the many endeavors of the Alberta Research Council, as well as the increasing opportunities for women in science.

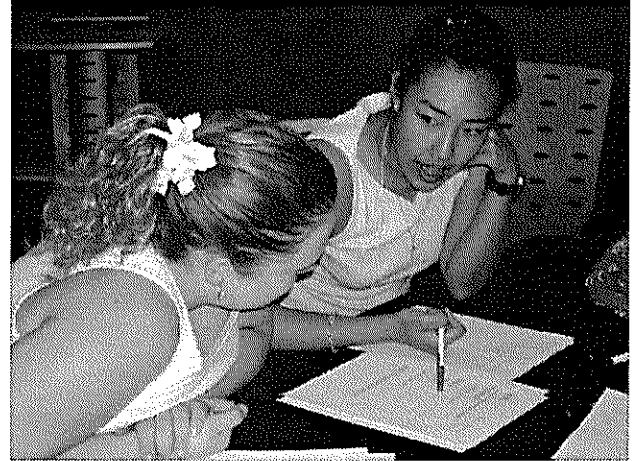
Wednesday Afternoon Sessions **Career Plans and Research Posters**

Soon we will be graduating from high school and the question everyone will ask of us is "So what are you going to do now?" It can be a difficult question to answer, as many of us are still unclear about which academic path to follow, and then to figure out what we can or want to do with our science or engineering degree in the world of work.

The Wednesday afternoon session conducted by Blessie Mathew of the University's Career and Placement Services (CaPS) gave us more information about career options for science graduates, examples of occupations that engineering and science graduates from the University of Alberta have pursued, and an explanation of how to set up a career planning model. Blessie clearly defined what she meant by Career (our life experiences, including paid work, volunteer work, education, and interests or leisure activities), Occupation (our profession or working title, including engineer, research scientist, teacher) and Job (our specific set of duties for a specific employer). Career planning was not something that we do once in our lives, but an ongoing process that is responsive to change and we need to learn about the world of work to expand our understanding of work options open to us. Our volunteer work, part-time work and/or summer jobs, our extracurricular activities and internships are ways that we can become more informed, preparing us during our undergraduate studies for the world of work. With all of this preparation though, Blessie cautioned us that change happens and we should not be surprised if our goals and plans change as we find out more about our subjects, our options and ourselves. A degree is a starting point for many rewarding and satisfying work roles, and our ultimate success will depend more on our personal qualities than on our academic credentials.

Following this presentation, we scurried over to a computer lab to learn how to construct a research poster. Using the tools in Microsoft Power Point, Jack Scott presented an interactive session that gave us an overview of what our posters should entail as well as helpful hints on how to make our posters look more professional. Many of us had not realized that the PowerPoint program had the capability to create 3 by 4 feet posters, as well as the slide shows that many of us were familiar with. After learning how to make the posters, Jack explained how to proof them and then how to send the file to be printed by the CNS plotter. Many thanks to the BioDitrl team for setting us to be successful in making our first research posters.

Wednesday Afternoon Sessions
WISEST Visits IBM Canada
by Sabrina Kratchmer



WISEST field trips never fail to be anything less than fun and exciting, as the trip to IBM further proved. We were going to take part in a role-playing situation in the IBM Canada building. Wow? You can say that again! Our host, Laurette Rajotte-Martorana greeted us and invited us into a very trendy-looking room where cookies and pop patiently awaited us. Wendy Dupree gave us a presentation about careers, business and the working-life with IBM. There were some statistical figures and note-worthy facts that were very interesting, and I guarantee that everyone in that room learned something new from the array of information that was displayed. Following the presentation we learned a little bit about the women who we were going to be working with during our role-playing session. When you hear IBM, you think computers, computers, computers, but in reality we learned that many of these women have jobs where they don't really have a whole lot to do with working on computers. For example, working with the customer, as we found out in the role-playing scenario, involves people skills and managing, not computer programming expertise.

After splitting into our groups with assigned staff members, each of us was assigned a different role in the IBM workplace simulation. Our groups consisted of Project Manager, Business Analyst, IT Specialist, Tester and da da dum . . . Customer (the role played by the assigned staff member). The project manager organized the team to meet project goals, and also met with the customer to understand the website requirements. The business analyst also meets with the customer, but is there to articulate the business aspects for the project. IT Specialists meet with the business analyst to obtain information about how the customer would like the website formatted. And the tester is the individual who serves to test the applications and systems created to ensure everything runs smoothly. It was our job as a team to create a music downloading website under specific requirements, deadlines, budget, and customer demands. Oh, the customer demands . . . we learned what it was like for people in the same situation: it can be a stressful ordeal if you displease the customer. And working together, brainstorming, talking, cooperating are what kept us together through trying to meet customer demands on time. It was so high-energy and exciting that we just wanted to keep going. We all got really into it, and had a good time working together on it.

An important theme we all learned during the role-playing game was how to communicate with the customer and with each other. Communication is important in every career, and it was definitely emphasized in our experience at IBM. But the fun didn't end there, it was time for prizes! IBM graciously gave several very cool door prizes to some lucky WISEST students (yay for prizes!). With a final thank-you and gifts for the IBM staff members, it was time load ourselves back on the bus. It was a genuine taste of what a day would be like as an employee at IBM, and a unique hands-on experience that kept us enthused throughout the whole session. It was a privilege, and valuable learning experience to go to IBM, and we all acquired useful knowledge that we took back with us when we returned to campus that day.

Wednesday Afternoon Sessions
On Campus Research Lab Tours
by Penny Garnsworthy

As our experience with WISEST was about to draw to a close, everybody gathered for one last Wednesday afternoon session with the group. After some announcements and brief preparations for our final day, we split off into groups of five or six and made our way to some different labs on campus. There were ten choices: biomedical engineering; medical microbiology and immunology; medical genetics; obstetrics, gynecology and physiology; mechanical and electrical engineering; agricultural, food and nutritional sciences; chemistry; chemical and materials engineering; entomology and biological sciences; and physical education and recreation. We had each picked a tour of our choice and were looking forward to visiting a lab in which we had a particular interest. When we arrived at our lab, we met the guide who had agreed to give us a tour. We perused through the lab, asking questions about both the research going on, and our tour guide's specific role. The smaller groups made it possible for the tour guide to answer some more detailed questions and allowed for more interaction in the lab than usual. After acquainting ourselves with the lab's projects and some of the different career possibilities associated with them, we took a last glance at the equipment and set-up of the lab and asked our tour guide some wrap-up questions. The on-campus lab tours were a great way to explore an area of interest to us in a little more depth than might normally have been possible.

Tour in Mechanical & Electrical Engineering: "I really enjoyed the tour (especially the Nano-Fab) and it was neat to see some of the projects people were working on in these areas." (WISEST student)

Tour in Agricultural, Food & Nutritional Science: "This campus lab tour was really neat because I saw the diversity in application of the procedures that I learned in my lab this summer." (WISEST student)

Tour in Entomology: "We got the opportunity to see so many different labs and the work that goes on in them. I didn't realize how much is going on in the Biological Sciences building, and I thought some of the other projects were totally wicked. Thank You!" (WISEST student)

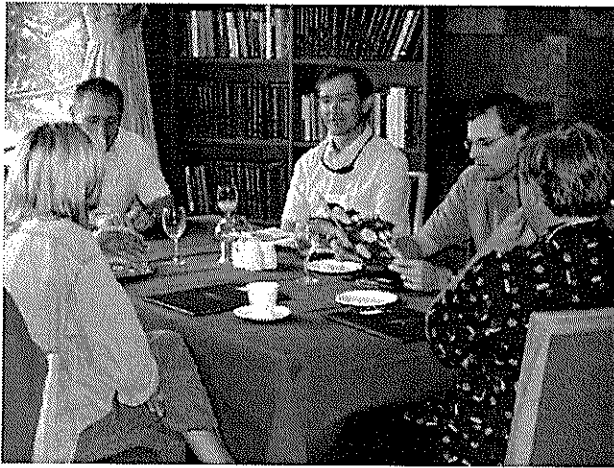
Tour in Physical Education: "I've been interested in neuroscience for a while, and this tour has definitely encouraged me to look into this area further." (WISEST student)

Tour in Chemistry: "The guides were really nice and funny, and they took us everywhere. We even got a demo in the glass-blowing shop, and I got a swan!" (WISEST student)

WISEST Celebrations
Research Day for Teachers
by Grace Ennis

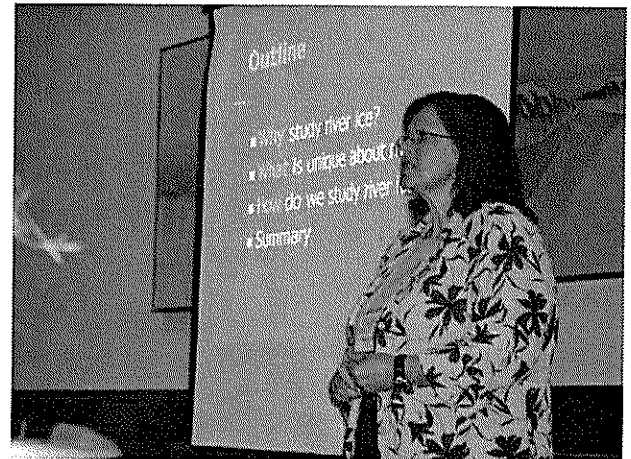
High school teachers have an integral role in the success of the WISEST Summer Research Program. As a result of the encouragement they give to their students, and the supportive letters of reference required in the application process, WISEST has been able for the past twenty years to recruit the enthusiastic students who have the needed energy, curiosity and creativity to succeed in the WISEST Program.

Early in August WISEST was pleased to host the first annual Research Day for Teachers. Teachers were invited to join fellow teachers in exploring a variety of research areas at the University of Alberta, including the Nanofabrication Lab, a Plant Pathology research lab within the Faculty of Agriculture, Forestry and Home



Economics, the Flame-Retardant Fabric lab in the Department of Human Ecology and the Mechanical Engineering Wind Tunnel.

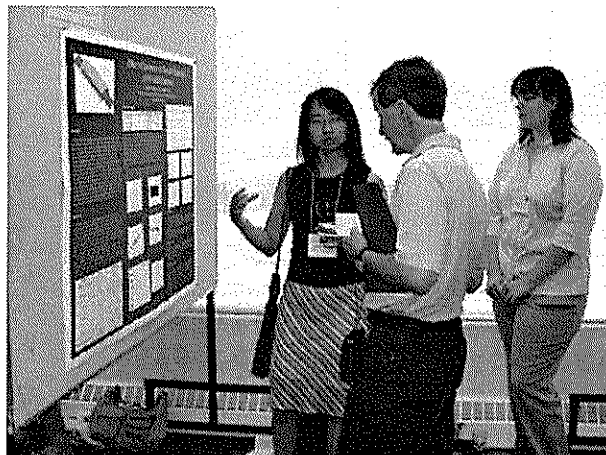
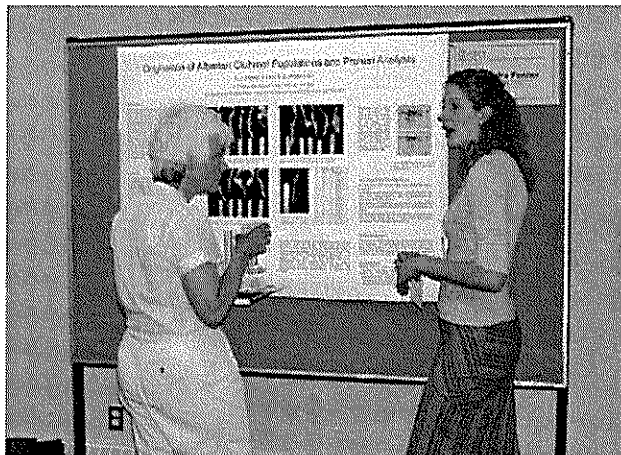
Dr. Faye Hicks, the first woman professor in the Faculty of Engineering at the University of Alberta, shared her research passion with the teachers – “River Ice Engineering”. Her current research work involves the development and application of computer models for forecasting extreme floods, especially for those floods caused by river ice jams. She also conducts field and experimental studies. She is currently working on the development of new computer models to quantify the impact of river ice on fish habitat, the effects of hydro-dam operations on the potential for ice jam floods, and the effects of climate change on the ice regime of rivers in Northern Canada.



Over lunch at the Faculty Club, teachers and their WISEST students had the opportunity to talk about the research endeavours in which the students were participating. Teachers then joined the students in their labs to get a first-hand look at the research experience. For many teachers it was an eye-opening experience to see where their student worked. It confirmed for them “their student has been introduced to an excellent program that she will take with her for the rest of her days.” At the conclusion of the day a teacher commented, “As educators and ‘career counselors’, teachers should be kept up to date on our changing needs in society. We are too often locked up in classrooms - field trips for teachers should be more available. Hence, WISEST Research Day was Great!”



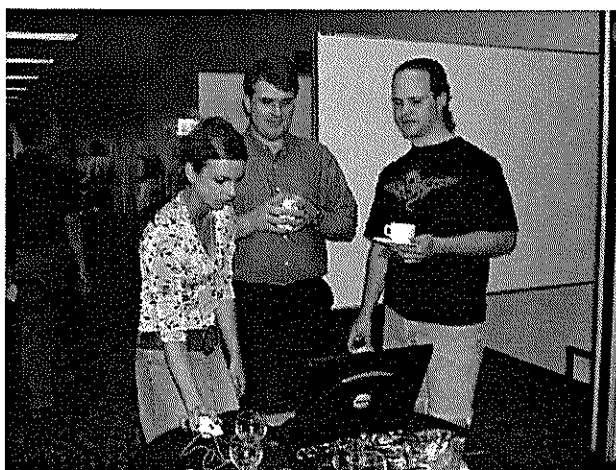
WISEST Celebrations
It's a Wrap - The Research Team Thank You
by Susan Basaraba



Let me be honest: by the time August 13th rolled around, I think most WISEST participants were ready to get on with their other summer plans. For some it meant going back home after living with a relative or in residence for six weeks, some were going on a family vacation and many were simply looking forward to the chance to sleep in.

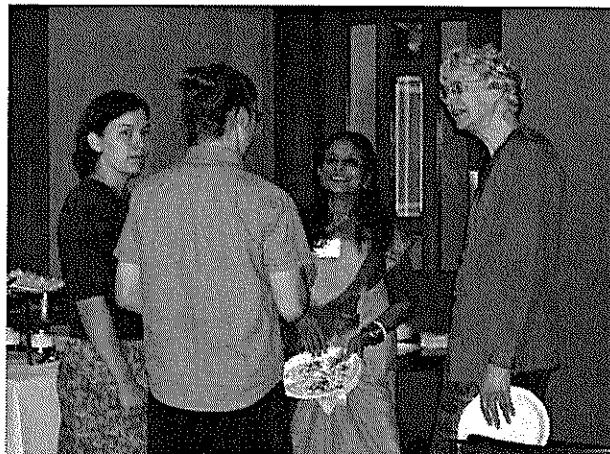
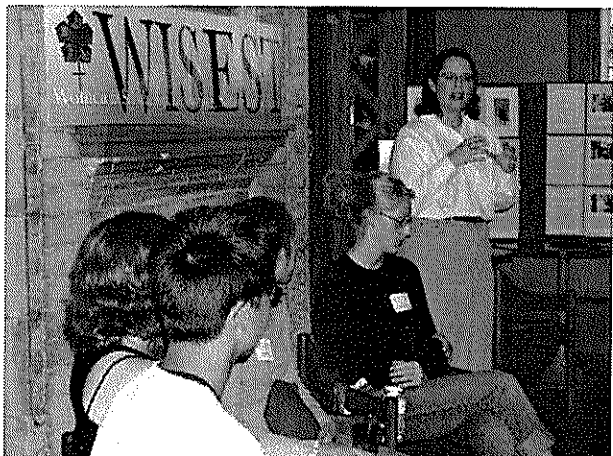
To end such an important and large part of our summer, a special event to thank the research team members and an Open Hhouse was arranged. Our lab supervisors, team members, and families would have a chance to see the product of our hard work. It also gave us the chance to properly say good-bye to our fellow students and to our awesome co-ordinators Grace, Emily and Mariel.

Arriving early for the Research Team Thank You, a few others and myself were put to work. We helped organize the bulletin boards where our final posters were to be displayed, and soon most of the WISEST participants had arrived. A nervous energy buzzed around us while Grace, Emily and Mariel explained the schedule and procedures of the day. WISEST participants soon presented their posters to one another. These presentations turned out to be good practice for the hard questions which would be posed to us by supervisors, parents and other guests.



When the lab teams and supervisors came to visit, it became apparent what a close relationship had been formed. Several students had many people from their lab come out to see their posters. Though we were often put on the spot because the supervisors asked many of the hardest questions, it was great to see the immense amount of support WISEST students received and the relationships that had been formed in the lab. On behalf of all WISEST students Jennifer Cook, who had worked in Dr. Charles Lucy's lab in the Department of Chemistry, thanked all research team members for making the research experience fun, educational and exciting all at the same time. The Research Team Thank You gave the WISEST students a chance to explain their research to others, and to feel pride in the hard work they'd been involved in for six weeks of the summer.

WISEST Celebrations
The WISEST Alumni Community Luncheon
by Jessica Vatcher



The Alumni Luncheon took place on the last Friday of the WISEST Summer Research Program. Alumni of past years of the program were invited to attend this lunch, celebrating the 20th Anniversary of the WISEST Summer Research Program. Upon entering the room, one could feel the excitement of the alumni who were assembled. All of the alumni, varying in ages, were discussing their WISEST experience and what they had eventually done with their lives. The alumni ranged from participating in last year's summer program to participating in the program 16 years ago.

After finishing lunch, Dr. Armour gave a delightful speech about the WISEST Summer Research Program. Dr. Armour explained things such as why the WISEST Program is still needed and how the program has changed over the 20 years. The change and growth of this program is amazing. After convincing some professors at the University of Alberta to take grade 11 students under their wing for the summer, approximately 10 students were able to be involved in the program twenty years ago. This year 63 students were involved in the program, and many of the participating professors have already signed up for next year.

After Dr. Armour's speech, it was my turn. My purpose was to demonstrate the changes and growth of the WISEST Summer Research Program. I started by explaining my poster and project about water and water treatment. I then moved on to explaining our Wednesday Afternoon Activities. Many of the WISEST alumni had not participated in such wonderful experiences. I then proceeded to explain the Research Day (when the science and math teachers visited the University of Alberta) to the alumni. Again, not all of the alumni experienced this event. The final section to my presentation discussed our social events, like A Taste of Edmonton and the Aloha Picnic. The alumni greatly enjoyed the new perspective, learning from a student how the program has changed and grown.

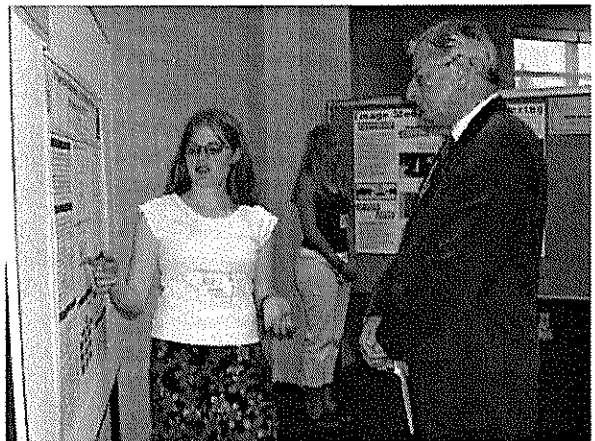
We were then given a talk by Dr. Gail Thornton, the WISEST alumna who had participated 16 years ago. She discussed her experiences with the WISEST Program, and what she gained from the Program. This was a very interesting speech. Dr. Thornton underlined that a great deal of her success in life was due to the WISEST Program. She also mentioned the amazing network of people that WISEST created for her. Not only did she have an amazing learning experience, the WISEST experience gave her confidence. This same statement was echoed throughout the alumni as we had an open discussion. I was definitely one to agree. When a professor assigns you an objective and expects you to be able to accomplish the goal, in essence he/she is treating you like one of his/her graduate students, you take a different view upon the world. Seeing the great benefits of WISEST programs upon the alumni, only enriched and reinstated my fantastic experience with the WISEST Summer Research Program.

WISEST Celebrations **The WISEST Open House** by Heather Balsom

Six weeks of work, and it all came down to one day. I was feeling very stressed out as we headed into that final day where we would have to present and support all of the work that we did over those six weeks, to people with various levels of knowledge about what we had been doing. Family, friends, teachers and sponsors all gathered into the rooms in Lister Hall where the Open House was being held, and judging by how all of the other students looked, I was not alone in my feelings of anxiety. However, once everyone got there, we realized it wasn't as bad as we thought. Maybe, just maybe, we actually knew what we were talking about. I, for one, was surprised at how well I actually knew and understood my project. After talking to a few people, all the anxiety and tiredness seemed to disappear, as we realized how much fun we had, and that we were really proud to be able to present the work that we did for six weeks, both to people that we knew, and to people that we didn't know.

There were also a lot of great speakers, including Ms. Mary O'Neill, MLA St. Albert, Mr. Jim Edwards, Chair, Board of Governors, University of Alberta, and Dr. Dallas Cullen, the Coordinator of the first WISEST Summer Research Program in 1984 and our special guest, Honourable Lois Hole, The Lieutenant Governor of Alberta. Dr. Margaret Ann Armour, the Vice-Chair of the WISEST program gave a wonderful speech about how important it is for women to move into the work force in areas that have historically been filled by men. Her Honour, Lois Hole, spoke about how important it was that we were trying to make the most of the opportunities that were given to us, as well as the importance of maintaining a high standard of education for children in our country. We were very lucky to have had the opportunity to hear from these very successful women.

All in all, it was a great way to end a very long day. As we packed up our posters and said our goodbyes to the people that we came to know as friends, the mood in the hall sank as we realized that it was over. We had completed our obligations to the program, and as stressful as the day had been, most of us couldn't believe that the 6 weeks were over. It went by so fast that most of us wished that we could continue and were sad at the fact that we may never be able to see some of these people again. I think I speak for everyone in saying that we had a great time and we will never forget this experience. We were able to experience things that not many people our age will ever get to do. So, thank you to everyone who made this program possible and the Open House was a great way to finish off an amazing six weeks!



WISEST Student Reflections **Life in Residence**

by Meghan Galachiuk (with help from everyone else!)



Hi. My name is Meghan and I am staying in room A19 at St. John's Institute for the duration of the WISEST Summer Research Program. My room number is important because starting last year, everyone who stays in this room must write the residence report. For those who are staying in A19 next year, you had better keep this up, or there will be consequences!

It is a general consensus around "rez" that WISEST would not have been nearly as much fun if we hadn't stayed in rez. Therefore, the underlying message of this report is to tell you all to stay in residence.

St. John's is owned and run by a man named Paul Bodnar. He's cool and crazy and leaves funny messages in the girls' bathroom. The whole staff here takes really good care of everything. The food is awesome (Karen needs to say that the cookies are delicious RIGHT NOW), and the rooms are so nice compared to some other places *cough, cough, St. Joe's*. St. John's is totally awesome, but it is very, very hot, so BRING A FAN! And don't worry about having a roommate because, due to our experience, 16 out of 16 people liked their roomies. And don't worry about the food – you will never, ever go hungry! But be warned – the bacon and the cookies are addictive, so we've learned to appreciate the 20 minute walk it takes to get to campus!

Everyone you meet at rez is great, and you will really appreciate getting to know some people really well so that you don't feel all intimidated and shy when you find yourself in a large group of scared people at orientation. This year, our resident advisor, Shahzma Merani, took really good care of us. She planned a lot of great activities for us, such as plays, the River City Shakespeare Festival (my personal favourite) and Improvaganza (Erin's favourite). She also organized events with the HYRS rez kids, even though every time we got together, the HYRS kids went one way and the WISEST kids went another, with Heather stuck somewhere in the middle... though, eventually we mixed it up a little. We've also gone to see so many movies (both rented and in the theatres). Some we enjoyed, like *The Bourne Supremacy* (right, Karen? *from somewhere in the background comes an "eww"*), and others that we didn't like so much, like *Catwoman* (right, Ash?), but we had a great time, no matter what.

When we came to rez, I know I for one, was worried about meeting people anything like me. I mean, we're at a science camp (*is immediately reminded of the "Science Rocks" shirt from Old Navy*), and pretty much everyone here should be nerdy (not that being nerdy is a bad thing!). To my astonishment everyone was really cool. For example, Kazz and Siobhan (Shi-von) shared a love of music, Faryn and Karmen both enjoyed skating and Charlene and Rachel were both really sporty. We also got to bond at places like Galaxyland, and the World Water Park (happy birthday, Amanda!) in West Ed – be warned that the mall is very tempting and you will end up spending far more money than you intended to – we all did! We also spent a lot of time in other places such as Steeps (the tea place around the corner).

Be aware that some people are a little more outgoing than others and can seem overwhelming and abusive after only two days (Megan!), but you will all end up getting along and forgiving each other before too long. We have also learned a lot from each other like... like ... the window washer dance from Ariel. We also had fun activities that may have seemed a little lame at first, but ended up being really fun, such as making Where Am I? wheels out of construction paper and glitter for our doors. We got to be really creative and we ended up with a few really cool wheels, like Trudy's pig butt.

Unfortunately, we didn't get to bond as much with some people as we did with others, but Kelsey will always be a rez girl, even though she had to spend most of her time at Meanook.

If you are ever wondering who the rez girls were, you can recognize us by our "Team Rez" shirts, and that unmistakable glow of knowing that you have made friends for life. Rez was great – we had our ups and downs, and we went through the emotional roller coaster that is bound to happen when you take 16, sixteen (or seventeen) year old girls and stick them in a building for 6 weeks with all the homesickness and stress and everything else, but we got through it all and are better people in the end. I hope that I will always keep in touch with the wonderful people I met here, and I am sure that my experience with WISEST would not have been half as much fun if I had not lived in Rez! Reminder: BRING A FAN!!

WISEST Resident Advisor Reflection
Our Own Little WISEST Family
by Shahzma Merani

Well, what can I say, this was the craziest six weeks that St. John's Institute has ever seen! In such a short time, we were able to make our own little WISEST family. "How can you make a family in 6 weeks?" you may ask. Well, what you need is: \$3.50 movies, the number 4 bus, chewy rez cookies, some Harry Potter books, lightening storms, Friends on DVD, LRT cops, tambourines, and of course 16 outrageous WISEST girls;

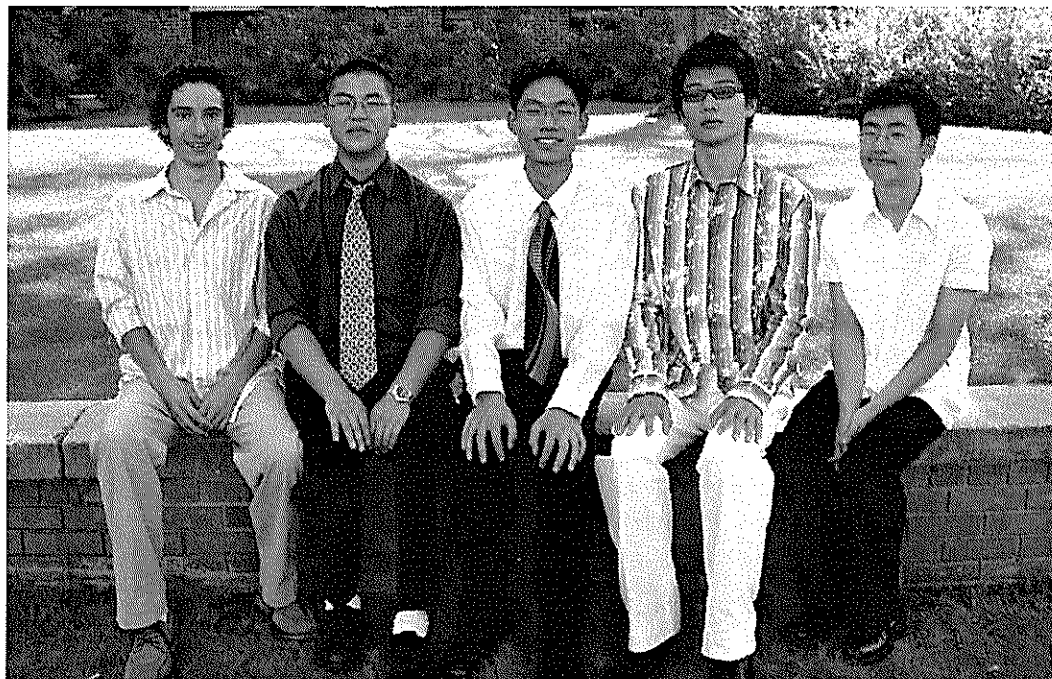
Ash, Trudy, Faryn, Karen, Ariel, Karmen, Kazz, Amanda, Siobhan, Erin, Rachael, Kelsey, Heather, Charlene, Megan and *Meghan*.

I would like to say "thank you" to all 16 of you for an amazing 6 weeks as I really could not have asked for a better group to spend my summer with. We created many memories which will stay with me for a long time. As well, living with you all was quite the learning experience. I was taught and made to realize a few things that I promise to remember: Keanu Reaves really does have a monotone voice, it is humanly possible to watch 4 movies in one night, a silent "h" in your name isn't actually *that* complicated, and ATB isn't only used by farmers.

Now that the summer has come to and end, I would like to wish you good luck in your last year of high school and I hope that you all stay in touch, maybe we will even meet in Waterloo!

WISEST Student Reflections **On Being a Man in WISEST**

by Rares Bistran, Mason Lin, Jason Pheh, and Brenton Tse



Rares Bistran: "Everyone seems confused when they find out what WISEST stands for: if it's Women in Scholarship, Engineering, Science and Technology, why are men included? I bet that not even the girls who were accepted in the program knew that WISEST is also for men; on Orientation Day, they didn't seem to understand what five men are doing in a program "for women". After they found out why we were there, we all got along really fast and continued to have fun for the rest of the summer. Maybe the name of the program is what causes so few men to apply. For example, when I first came over the WISEST website, I closed the browser as soon as I read *WISEST: Women...* Then I found out from a friend that in fact, men are also being accepted. It all makes sense, since WISEST allows participants to work as paid research assistants on a project in an area that is non-traditional for their gender. The young women worked on research projects in the Faculties of Engineering and Science, and the young men on research projects in the Faculty of Nursing and the Departments of Human Ecology and Nutrition. For six weeks this summer, I worked in the Faculty of Nursing under the supervision of Dr. Wendy Austin. I met two or three men in the Extension Building where I worked, but working only among women wasn't strange at all, and as Mason says, "being of different genders never became an issue". Although not all guys showed up for the social activities, I and Jason had fun with all the other participants; there was nothing different for us than for the girls during the six weeks.

The other four men participants in the WISEST Summer Research Program were Brenton Tse, Raymond Yan, Jason Pheh, and Mason Lin. The first three worked in the Faculty of Nursing and Mason worked in the Faculty of Agriculture, Food and Nutritional Science. We all agree that, overall, being a man in WISEST was great and we felt very welcomed among 62 women (including Grace, Emily, Mariel, and Sarah)."

Mason Lin: "Being a male participant in the WISEST student summer research program, I was asked repeatedly by my friends when I told them about WISEST, "But isn't WISEST for women?" Although the majority of the 63 summer students are female in the need to promote more women into male dominated fields, the need to promote men into female dominated fields such as nursing and food sciences exists as well. I am grateful for being one of the five male students to be accepted into the summer program. Walking into the room in

Mechanical Engineering on Orientation day was certainly uncomfortable as it was filled with female students; however it was something I learned to cope with over the next six weeks as I was forced out of my comfort zone to make new friends of the opposite gender. In the food science lab I was in, I worked under the supervision of Masters student Kylie Kidd. I felt very welcomed into the summer research program by both the WISEST organization and my research supervisor. Being of different genders never became an issue. At the end of my six-week WISEST experience that I can say with certainty, 'WISEST is for men as well as women because the issue at hand is creating diversity in scientific fields for both genders.' "

Jason Pheh: "Being a male WISEST student, I don't think there was any real difference. Sure there were a few odd looks from the adults during the final day presentations, but, with a little sense of humour it became more of a joke then anything. Admittedly I didn't quite have as large of a "groupe" after a little conversation it really wasn't a problem. All the members of the program (administration included) were not only brilliant, and witty but to top it all off, they had a sense of humour. Even though I did feel a little out of place at times (58 girls to 5 guys, but really, you won't hear me complaining) it made for good times, on occasion giving a little male view point, and at other ends, seeing that the views weren't too far apart. On a whole, I couldn't ask for a better experience. Though I'm not so sure about what the experience was like for my more reserved colleagues who didn't come out to any social events, for myself who went nuts, it proves to be a long term rewarding experience."

Brenton Tse: "As being one of the few male students in the WISEST program, it was a very different experience for me. During the year I participated in the WISEST program, there were 63 students in the program, but only five of them were males. Even though I was one of the few male students, I didn't feel being isolated, instead I felt rather accepted and part of the group. I was in the faculty of Nursing, working in the same building with 3 other male students. I became friends with them, and we had lunch every day. I really encourage male students to continue to participate in the WISEST program because I had a lot of fun and met many other amazing people."

WISEST Student Reflections
Life at the Meanook Biological Research Station
by Kelsey Brock

Ahh, life at Meanook. A little bit of paradise located just an hour and a half north of Edmonton. It's going to be hard to sum up Meanook with mere words but I'll give it a try anyhow. For the last 6 weeks, Meanook has been my home. There are about 10 rooms per trailer and each person gets their own room. There is a communal bathroom where everyone just leaves her toiletries, that's how homey the atmosphere is. Beware, the sink knobs in trailer M13 turn the wrong way! But don't worry, there is a mop and bucket just outside the door if you decide to flood the place like Amanda and I did.

There is a great kitchen that contains everything that you could possibly need. You must make your own lunch and breakfast but dinner is prepared for you at 6:00. On the weekends, the residents must cook for themselves and sometimes the meals are surprisingly fancy such as chicken parmesan and double baked potatoes. A payphone is downstairs so you can phone home once in a while which is great because cell phones don't work very well at Meanook. There is one computer that has internet access but don't count on spending a lot of time on the net if the station is busy as other researchers often need the internet for their work. The number of people at the station can range from 5 to 30 but the people were all great so I didn't mind that it was crowded.

There is always something to keep you busy at Meanook. Every week intramurals are held and each team must compete for the vigorously sought after Meanook cup. Every once in a while, every one will pile into the Meanook truck and head into town to play drop-in soccer or stop at Ken's Confectionary for giant freezies.

Sometimes after supper everyone gathers in the TV room to watch a movie or play board games, which can get pretty competitive at times. I suggest that any future Meanook residents bring a few of their own DVDs because new additions to the movie collection are always appreciated.

On hot summer days the Meanook crew heads out to Narrow Lake. The lake is awesome because it is so clear and there are a lot of plants and animals to look at. Plenty of waterfowl and fish can be seen whilst paddling one the Meanook canoes but be careful because canoes are easily flipped by mischievous swimmers. There is a fire pit by the lake with a great view of the setting sun where everyone can gather around to tell funny stories and roast marshmallows.

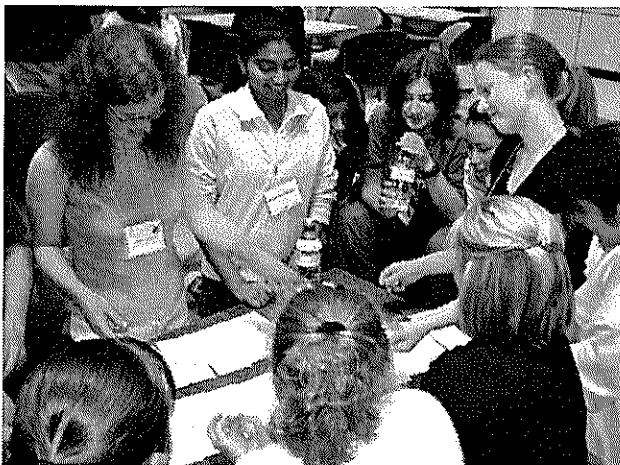
Another great thing about being at Meanook is that you are exposed to other researchers and science enthusiasts. Most people are willing to discuss their project and some may even bring you along on one of their trips if you ask nicely. You'll even meet the odd person who has a profoundly interesting idea and will find yourself discussing the topic till the wee hours of the morning.

The landscape of Meanook is beautiful. There are so many flowers and interesting plants that I spent many hours just wandering around looking at the flowerbeds. One may say that Meanook is the perfect place but alas, I must contradict that statement. The horrifying truth is that you must say goodbye to everyone at the end of the summer and return home but not without a load of everlasting memories.

WISEST Leadership and Social Activities

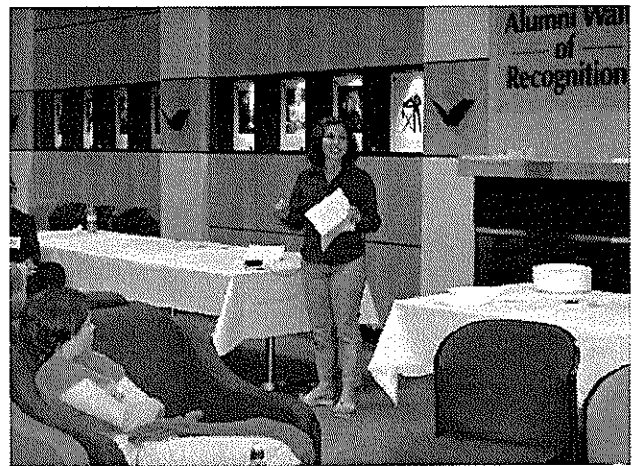
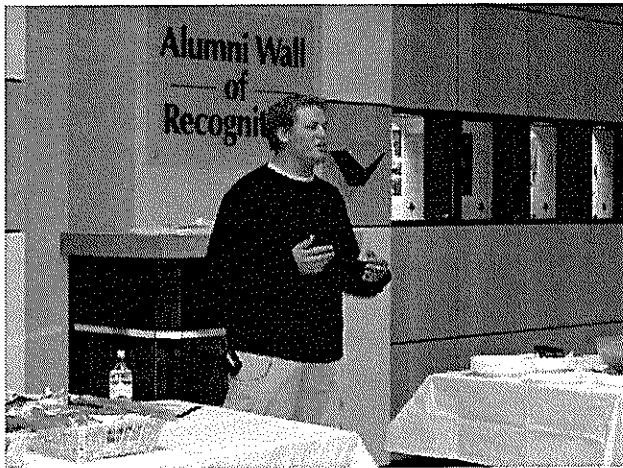
WISEST and HYRS Fanfare

by Erin Elliott



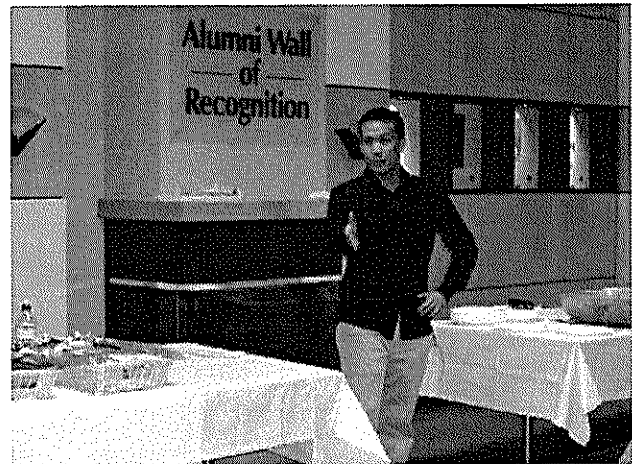
Although the weather on Tuesday, July 6th was dreary and depressing, the atmosphere inside the alumni room in SUB was anything but. You see, on this particular Tuesday, WISEST and HYRS got together and decided to kick off the summer with a joined celebration in which they called the "WISEST and HYRS Fanfare". Students, leaders and guest speakers alike united, hung out and sat down together in anticipation of a fantastic meal and evening to come. It was easy to find things to talk about with our newfound friends, an obvious topic being how hungry we were and how good the food smelled.

Finally, we were allowed to eat, and when our faces weren't being stuffed with food, we were busy chatting and laughing with everyone around us. After the plates were cleared, the students were separated and placed in small groups. Because the groups were picked for us, we got to branch out and really get to know all of the people that normally we do not see everyday. In these small groups, Mariel and Emily introduced us to some creative "get to know you" games, which often forced many of the groups to get silly and members of



those groups to laugh so hard they cried. One particularly entertaining game that we played involved the creation of a word or phrase from random letters that were given to us. You can imagine how difficult it is to come up with a creatively suave slogan when all you are given is a pile of rare letters like "Q".

The evening flew by, and soon it was time to cool down and chill out on the comfy couches and chairs as the guest speakers took their turns at the podium. We were lucky to have three speakers come and talk to us that night, each with a different story to share with us. Their words of wisdom inspired, encouraged and entertained all of us for the remainder of the night, and everyone who attended the Fanfare left with a different message.

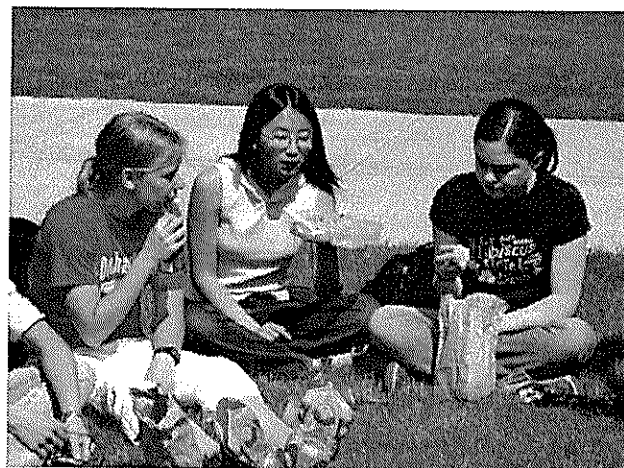
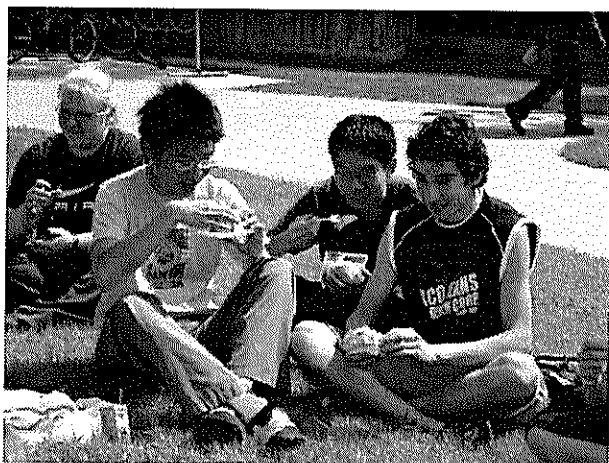


Getting together with all of the WISEST and HYRS students was the perfect way to get to know each other better, and it allowed us to let our hair down and have fun. It proved to be an event filled night, and an amazing way to start our six weeks in Edmonton at the University of Alberta with WISEST.

WISEST Leadership and Social Activities **Em and M Lunches** by Alyssa Shariff

Sitting out on the grass in front of CAB, every Thursday and Friday felt like a picnic. With Emily or Mariel there, the Barracudas and Enforcers had a chance to catch up and gossip about the adventures they had had during the week. Hearing about some of the grad students in other people's labs really made you appreciate the ones in yours. There was a grad student in one of the student's labs who always wore the same green sweatshirt everyday. The lunches themselves made for great stories to tell your friends. We had little adventures like learning how to play Frisbee, by joining a bunch of university students we had never met before, or Jason trying to teach us how to break dance on the grass, which Mariel was pretty good at.

The lunches were a great opportunity to meet up with the other students. Even if there were not any WISEST students near your lab, you still had those weekly lunches to look forward to. There was no worrying about having to eat lunch by yourself or where to meet people for lunch on those days, because you knew where



they would be, right outside CAB. Even if you were not sure where to find them, you just had to listen for the sound of laughter. The lunches were filled with funny stories and jokes that tickled everyone's funny bones. The WISEST group was one of the loudest ones out on the grass, but who could really get mad at us for having so much fun.

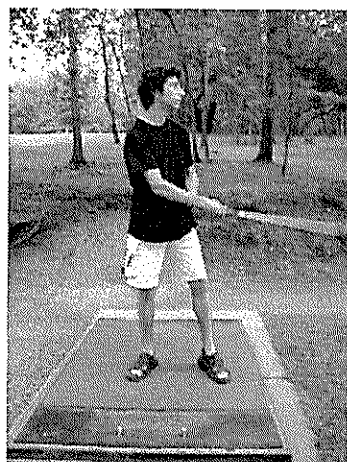
The Wednesday afternoon sessions were informative and fun, but they were filled with things to do. The lunches were a chance to relax, chat, and make new friends. They offered a chance to catch up with the other students and talk about everyday things: work, movies, reality TV, and the sale on old cds, like Five, at the HUB bookstore. It was also fun to just lie around on the grass or play volleyball. They were a nice break from a busy day at the lab and always something fun to look forward to.



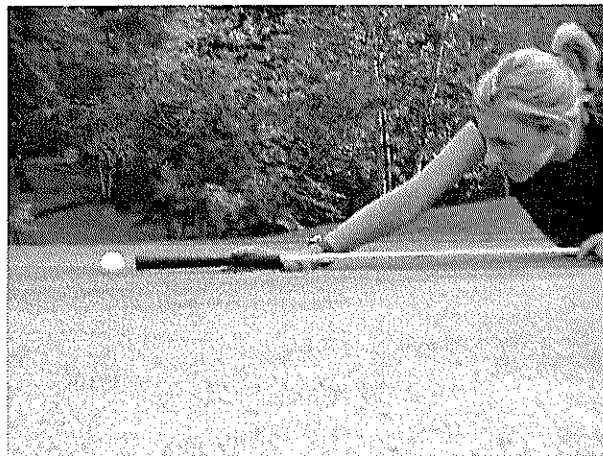
WISEST Leadership and Social Activities

Pitch and Putt

by Nisa Jayathilake



On a bright and sunny morning, the WISEST students set out for the Kinsmen Pitch and Putt course. Although we all walked REALLY slowly, we eventually arrived to our destination. Awaiting us there was a luscious green course (soon to be hacked away into lumps of dirt) and an afternoon of fun. Oh and the mosquitoes, which there seemed to be an army of! If anyone was wondering why their bug spray wasn't working, well that's because it wasn't bug spray! One of our WISEST students accidentally, but well meaning, passed around what she thought was bug spray. However it was actually body lotion spray or something of the sort. So a big SORRY to all those who were continually itching for the rest of the week! Despite this minor set back, this WISEST social event was by far my favorite! With some quick tips from Mariel, who is a PRO at golf by the way (or at least compared to me), the WISEST crew set off on our golfing adventure. And what an adventure it was! After a couple "practice shots" the dimpled balls starting flying all over the



place (mostly into the trees) and the craziness began! Backwards swinging, spin driving and pool queue putting (which was more effective than my actual putting) and rolling down hills were among the many stunts the WISEST kids pulled. I can only imagine at the other patrons of the golf course thought of us!! "So these are suppose to be the brightest students Alberta can offer?!" Aside from being a really fun time, the WISEST Pitch n' Putt afternoon was a great opportunity to meet and get know new people. It turns out a bad golf swing is a great thing to bond over!! I'm sure we will all look back on this day, once we make it into the PGA or LPGA, as the astounding beginning to their brilliant career. Or we can at least remember how it was better than staying home to watch reality TV. Just jokes, nothings better than that!! And with one last comment I will conclude my recount of this perfect day: I MADE PAR ON THE LAST WHOLE!!

WISEST Leadership and Social Activities **Aloha Picnic** by Erin Prenoslo

We were all looking forward to our last WISEST social activity when the fifth week rolled around; lots of sunshine, fun games and pizza seemed like the perfect recipe for a Hawaiian-style great time. The day of the event was cold and rainy, which dampened the tropical atmosphere a bit, but we moved the party inside, and there were still a few leis to be spotted in the enthusiastic crowd: nothing gets these WISEST people down!

As we waited for the pizza to arrive, Mariel introduced us to a wonderfully crazy game called the Barnyard Number Game, which involved knowing the multiples of seven (surprisingly hard for a group of supposedly smart people), flapping and clucking like chickens, rooting pigs, and holding lots of three-person hoe-downs. Finally, the pizza arrived, and we were saved from our counting problems (the best group got to fifty-six). The pizza was delicious, the pop was great, and Emily's Bob Marley CD really set the mood!

One very important part of the evening was the announcement of the winner of the cover design contest. There were so many creative entries on display that the judges really did have a hard time choosing- who knew we had so many artistic scientists in our group! In the end, the grand prize was awarded to Jessa Vatcher, whose design beautifully showcases our theme "I heart WISEST"!

To end the evening, Mariel gave us lessons on how to make balloon dogs, mice, elephants, giraffes, flowers, hats... all very important skills for aspiring researchers and engineers. Mariel is a very talented person, and we are all in awe of her abilities. And now we know to avoid yellow balloons!

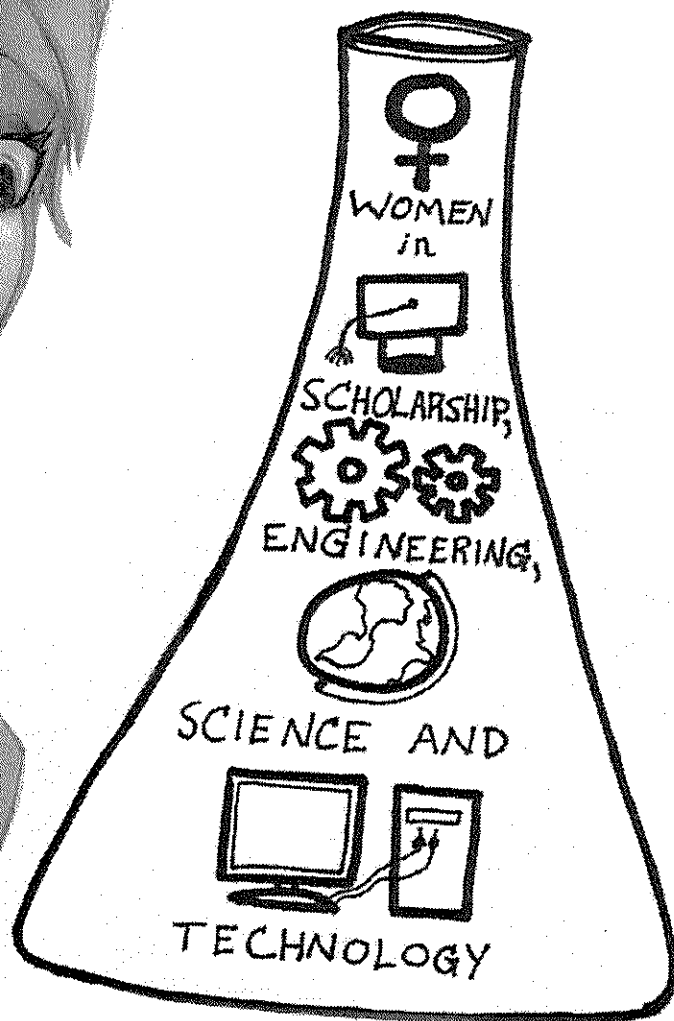
This picnic ended up being a lot of fun, a good last opportunity to mingle with the other WISEST students, and a valuable learning experience (no, 32 is not a multiple of seven, and if you put too much air in your balloon, your dog will explode), not to mention the great food. Thanks a lot to Emily, Mariel, Grace, Margaret Ann, and Shahzma for organizing this event and for joining our party- you're all great people, and we really appreciate your work!

WISEST



SUMMER RESEARCH PROGRAM
~2004~

STUDENT REPORTS

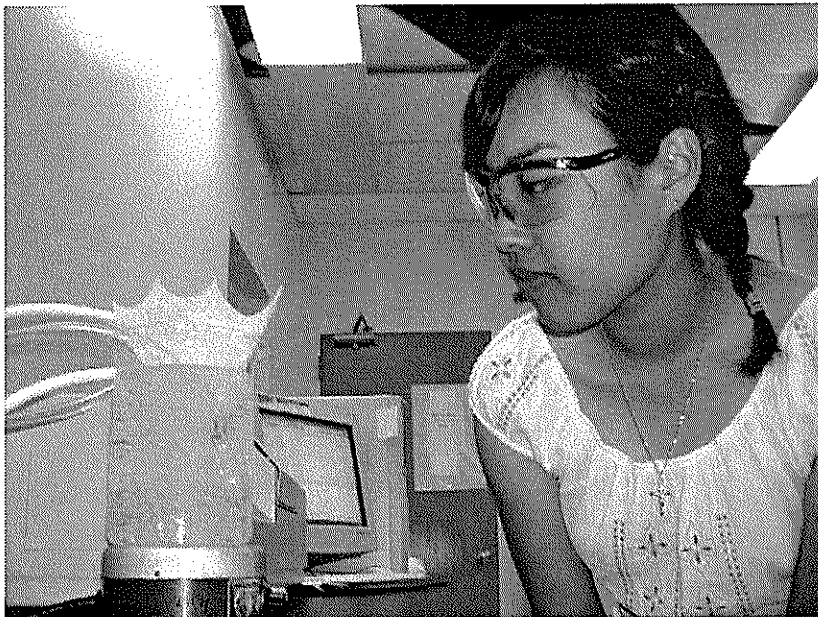


WISEST
WOMEN IN SCIENCE, ENGINEERING, AND TECHNOLOGY

Sylvia Ahn

WISEST Supervisor: Dr. W. McCaffery, Dept. Chemical & Materials Engineering
Sponsors: Summer Career Placement Program & Faculty of Engineering

"The WISEST Summer Research Program is a great opportunity, so we want you to make the most of your experience in this program. If you hate the project that you will be working on, at least the experience will give you a better idea of what you are interested in and what you are not interested in." I distinctly remember hearing this, or something similar to it, numerous times throughout the six weeks that we have been participating in the WISEST Summer Research Program; my memory takes me back even to the first day of the program, when our WISEST coordinators stood in the front of the room, smiling at us welcomingly, while saying these words.



For six weeks now, I have worked under the supervision of Dr. William McCaffery and Andrée Koenig, with their support, encouragement, and help to guide me through my project, a project which has been very interesting and stimulating. The motivation behind the project is the desire for the production of fructose from sucrose, in the most efficient, economical, and profitable manner. Thus, in order to obtain this information, the kinetics of sucrose, the rate of reaction at which sucrose is converted to its invert sugar, had to be determined; this concept was the basis of my project.

For the first week or two, the polarimeter, which we were to use for the project, was calibrated with sucrose. Polarimeters read the optical rotations of aqueous solutions. That is, polarimeters detect how substances reflect light: at what angle and in which direction. This was done in order to determine how the optical rotation readings of sucrose solutions relate to their concentrations. Once the calibrations were completed, we began the actual testing for the kinetics of sucrose.

In order to obtain the kinetics of sucrose, many sucrose solutions were tested with an enzyme that converts them into their invert sugar; in our case, it was the enzyme, invertase. However, enzyme in its free form can cause many unwanted results. Therefore, we used our enzyme in the immobilized, or encapsulated, form. Sucrose solutions of many different concentrations were run through the enzyme beads in a reactor that we built. The optical rotations of the sucrose solutions were continuously read over a long period of time and the data was then plotted. The slope of each plot was found; these represented a value of the variable "k". Each k was then graphed onto another graph, which represented the kinetics of sucrose. We also tried several side projects: double-encapsulated enzyme beads and enzyme bead storage in different mediums.

The WISEST Program and the project that I have worked on during the summer have taught me so many valuable lessons. These include the importance of using the resources available to you to search for opportunities, becoming active in as many things as possible, and asking people for help with discovering your strengths and weaknesses to determine which careers would suit you. I have also learned so much about the endless career possibilities for high school students. The WISEST Program is a valuable experience, which is full of opportunities. And for this reason, it should be kept strong and striving, so that students of the future may look into a whole new world of opportunities available to them, just as we have had the privilege of doing this summer at the University of Alberta.

Charlene Antaya
WISEST Supervisor: Dr. Al Meldrum, Dept. Physics
Sponsor: Suncor Energy Foundation

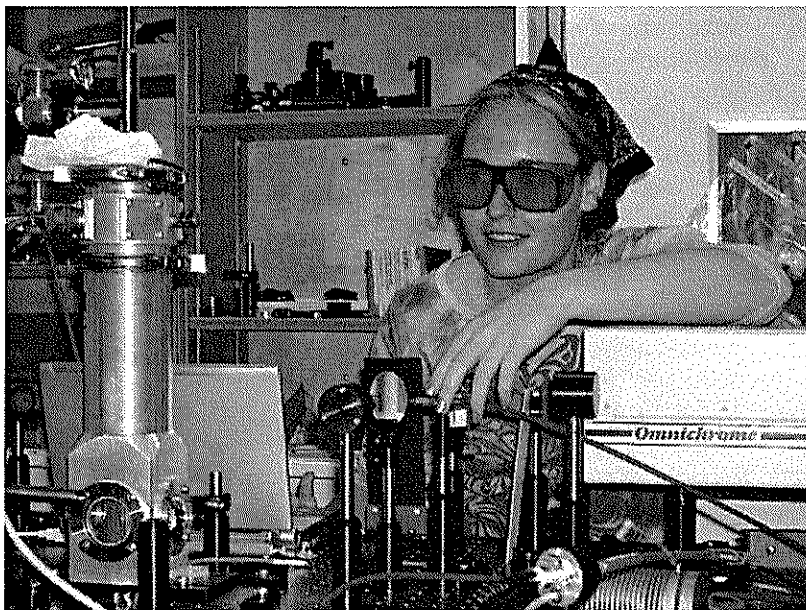
When Ann-Margaret Armour came to my chemistry class this year and gave a presentation doing lots of interesting science experiments, I had no idea that I would end up living in Edmonton and working in the University of Alberta for six weeks because of it. I am totally thankful to her for that because the WISEST program is an awesome and unique program that has opened my eyes to many new things, if it hadn't been for her I would not have had the chance to participate.

Working in the lab was quite the experience, I hadn't even dreamt that research such as what I did this summer was being performed. My personal project consisted of making samples of silicon rich oxide doped with rare earth elements using an E-beam evaporator, annealing them at various temperatures and testing their luminescence using a HeCd laser. It is the most interesting and unusual summer job that I could have asked for. The people that I worked with: Aaron, Cindy, Nicole, Ken, Tom, Angela and my supervisor Dr. Meldrum, have all been exceptional, they have made my experience so much more by their friendliness, their patience and their will to answer every single one of my many questions.

One of the things I found the most fun about this program was living independently in a residence just off campus. The residence advisor, Shazhma, was a lot of fun, there was always something interesting to do or look forward too. Also, all of the other girls staying at the residence and I have become very good friends: my roommate Erin, my neighbors Megan and Ariel, and all of the girls upstairs, Siobhan, Kazz, Rachal, Ash, Meghan, Karmen, Trudy, Kelsey, Heather, Amanda, Karen and Faryn. We have done many things together such as go to West Edmonton Mall, go for walks, even runs, we've gone to see lots of movies and eat out at cool places like Julio's Barrio where they sell excellent virgin margarita's, and Steeps the best tea bar you could ask for.

I am eternally thankful to everyone that made the WISEST program a possibility for me, that being: my parents, my teacher references, my sponsors at Suncor Energy Foundation and all of the WISEST administrators and coordinators, Mariel, Emily and Grace. The WISEST program is definitely one of the best things that I have had the chance to take part in, in my life, and I will never regret taking the time to thoughtfully fill out the long but very worthwhile application form. All of the things I have learned: taking the bus around Edmonton, becoming familiar with the University campus, etc, will surely help me along my path in the future. I have made great friends and contacts in and out of the lab and even from outside of the program completely. The program has been quite an undertaking and I wasn't exactly sure what to expect when I walked into the Mechanical building the first day, but it has been terrific.

There is so much more that I have to say than there is space on this page, there were a few minor 'sweets' about my experience, firstly there were the cookies at residence, very good. I got to see a good friend of mine who lives just out of Edmonton and I got to shop at West Edmonton Mall, I couldn't ask for more. Good luck to the WISEST girls of the future!



Ghazaleh Ashrafi

WISEST Supervisor: Mr. Rob Lake, Dept. Computing Science
Sponsors: Summer Career Placement Program & Faculty of Science

This summer, I had the wonderful opportunity to realize my dream of participating in a research activity, thanks to the WISEST program. I was placed to work in an area I hardly ever imagined myself in. Therefore, I was rather surprised to find preparing a database for over 350 computers of the Department of Computing Science quite satisfying. In addition, WISEST enriched my vision of university life by introducing me to various role models and speakers, and also by organizing many social events to expand my social skills.



I worked at the Department of Computing Science under the supervision of Mr. Rob Lake. I spent the first two weeks learning HTML coding, CSS, PHP and MySQL programming. After acquiring the necessary tools with Mr. Lake's help, my partner, Karen, and I embarked on the project. Our project was to use MySQL to create a database, which would contain software and hardware information of over 350 computers of the department. In order for the database to be accessible on the web, we had to use PHP codes to create forms and web pages that would perform functions such as adding, deleting, modifying entries and searching the database. We also created error messages to make the forms more interactive and user-friendly.

Working on the project introduced me to the challenging world of research. There were times when insistent errors paralysed progress and left us frustrated. However, Mr. Lake was always eager to help and bring us back on track. It was as a result of his kind helpfulness that I learned to be patient and enjoy and welcome failure as much as success. Therefore, I now have a more educated love for scientific research and a growing impatience for entering the university.

Nevertheless, WISEST was not all about solid work on the project. Our research social life at WISEST involved plenty of fun activities targeted at our enjoyment of the program and gaining social skills that will prove useful in many stages of our lives. These social activities helped me meet people who were on a research path I might be taking soon. Along with other WISEST students, I also toured industries or labs with job opportunities for researchers. It is amazing how many different, and exciting research projects are taking place on and off campus. I have learned that there are so many interesting paths one can take for post-secondary education. Therefore, one should not hold prejudgements about one field or another because I, as an example, never knew that I loved IT and computing so much before coming to this program.

I am deeply grateful for having the chance to explore a research area I always shunned and feared. Fortunately, I learned a lot from this program through both my project and friendships. Overall, my experience at WISEST made me more prepared and excited to enter university and research life in about a year, because I now know a lot more about research and what qualities a good researcher should possess.

Heather Balsom

WISEST Supervisor: Dr. Gregory Taylor, Dept. Biological Sciences

Sponsor: Syncrude Canada Ltd.

I am extremely grateful to the WISEST Program for giving me the opportunity to experience what it is like to work in a research lab. I mean, I am seventeen years old, and I have already learned and experienced things that most people wouldn't be able to do until they were in their third or fourth year of university.

Anyway, during my six weeks with WISEST, I worked in Dr. G.J. Taylor's lab. Also, I did not end up working with just one person, but rather with several, which gave me many opportunities to learn new skills as well as benefit from their experiences. For my project, I worked with Lisa Mancell. My project dealt with canola plants (*Brassic napus*) and what their reaction was to phosphate deficiency. I won't go into all of the details, simply because that would be too long and very boring, (not to me, but probably to everyone else)! Instead, I will just give a brief description of what I did.

First, we germinated the canola seeds in a complete media for three days, to allow them to start growing in a healthy environment. Then, the seeds were transferred into Magenta vessels, which are small, clear, plastic containers that have lids with air filters for the plants, so that we can avoid contamination. They are exposed to a hydroponic solution containing all of the nutrients that the plants require for normal, healthy growth. After one day in this solution, they are split into two groups: + phosphate and - phosphate. This allowed us to see the differences between the plants that were grown both with and without phosphate. The plants were grown in these solutions for eight days, but they were transferred to new vessels with fresh solutions every other day to ensure that they stayed in the environments we wanted them to. After the experiment, we ran assays on



the solutions they were kept in, the tissue itself and on various enzymes (ie. acid phosphatase). So, that is my lab work in a nutshell! Now, don't think that all I did was work besides the planned WISEST activities, because that is so far from the truth that it's not even funny!

Now, onto the important stuff! For all of the 63 WISEST students, Mariel and Emily planned some awesome activities! I especially enjoyed the Pitch n' Putt golf and the IBM Tour. However, these are just a few of the activities that kept me occupied while here in Edmonton. As I am from Fort McMurray, I got to experience "Life In Rez"...dun dun daaaaaaaa!

Living in residence while I was here was one of the high points of my experience. First of all, Fort McMurray is not a very big, or entertaining city. I mean, while here, I lived on Whyte Ave for 6 weeks – how much more of city life did I need to see? I had a blast in rez, though. Honestly, I am the kind of person, that if I wasn't in rez where I got to meet and get quite close to other girls who were feeling the same things as me, I probably wouldn't have made very many friends while I was here. I would have ended up sitting in the corner by myself the whole time I was here!

Not only did I make some great new friends that I hope to stay in contact with, I also had some great experiences! From all of us crowding into Shahzma's room for meetings that we attempted to have every

night, to watching two complete seasons of Friends, to me and my roommate, Faryn, running to Shahzma's room when there was a big thunderstorm, it was so much fun, and I will never forget the experience!

Taking the initiative to apply for this program and actually coming to Edmonton, away from my family, for six weeks was one of the best decisions I ever made. I learned so much, had so many awesome experiences, met so many great people while with WISEST. (Not to mention how great this looks on a resume and all the great contacts I made for when I come to university!) I had the best time and I will never forget this experience!

Kara Barnes

WISEST Supervisor: Dr. John Feddes, Dept. Biological Sciences

Sponsor: Alberta Ministry of Innovation & Science

During my involvement in the six week WISEST Summer Research Program I worked under the supervision of Dr. Feddes, assisting Michelle Jendral with an experiment she had conducted over the last year concerning the housing environment of the layer hen. The purpose of the experiment is to determine if hen welfare can be significantly improved by the addition of various amenities to the existing battery cage, which consists of nothing more than a wire cage and sloping floor. The issue of layer hen welfare may not seem very important to many people and yet it is an international concern. In fact, the European Union has already passed legislation to ban the conventional battery cage by 2012. In North America however the conventional battery cage is still the current accepted housing practice in many egg production operations.



Michelle's experiment was designed to test the production levels and welfare of laying hens in four housing treatments: a conventional battery cage, a modified battery cage containing a nest box and perch, and commercially available colony (group) cages both with and without dust baths. Over the course of the trial data was collected concerning the behavioural, physiological (blood and fecal samples, etc.), and physical condition (feather cover, foot lesions, bone density etc.) of the birds housed in the various treatments. Egg production measurements, such as the number of eggs laid, egg weight and specific gravity, and shell thickness were also collected to show that enriching the battery cage would not have a negative impact on egg quality.

Most of the time, the hours I didn't spend riding a bus, I could be found at the Alberta Poultry Research Center on the University farm inputting and running stats on the data collected over the course of the trial. My primary focus was on analyzing the egg production data. Sitting in front of a computer for six weeks wasn't initially my idea of fun, but I warmed to my work as the hours of inputting began to pay off with final results. Michelle's excitement over the outcome of a year's worth of work was definitely catching. As the many tricks of Microsoft Excel began revealing themselves to me, and I dabbled in the wonders of stats and the SAS program I realized that I was gaining skills that would be useful no matter what I choose to do in the future.

Stats in particular I have been told will come back to haunt me. I was also able to gain some lab experience by staining blood slides and looking at the different cells under a microscope. In addition to my own project, I was able to assist others in the poultry unit with both a hatch and a slaughter, thereby experiencing both ends of the spectrum of life at the poultry unit.

Having the opportunity to experience a research project like the one I was involved in has opened my eyes to issues and opportunities in agriculture that I had never considered, or even knew existed before. Not only has my experience shown me new career opportunities, it has given me something to look forward to - university. Knowing my way around the university and the insider secrets Michelle shared with me, such as the quietest places to study or the best places to go if you need to use a computer at the same time everyone else does, gives me an advantage when it comes time to enter university myself. The complete WISEST experience definitely has me looking forward to university life.

Susan Basaraba

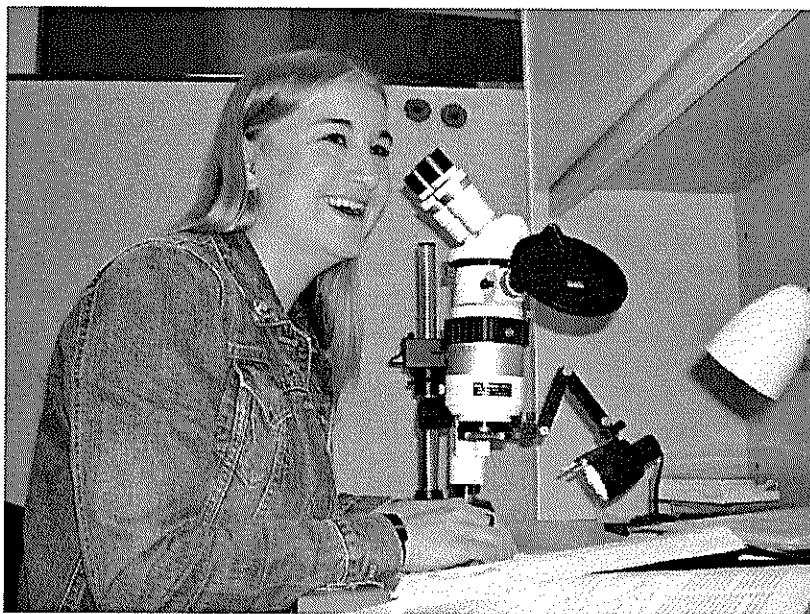
WISEST Supervisor: Dr. Raoul Mutter, Dept. Biological Sciences

Sponsor: Alberta Women's Science Network (AWSN)

When I was called and told by Mariel that I had been accepted to WISEST, my first thought was how early in May it was. *They aren't supposed to call me for another two weeks.* Once the initial shock wore off, though, and I stopped dwelling on the details, I was pretty amazed. Mariel told me I would be working with fossils and I thought it could either be incredibly boring or incredibly interesting. I'm very happy it turned out to be the latter.

My project started with me looking at a three-dimensionally preserved skull of the genus *Saurichthys*. Being handed the fossil itself, a couple of photographs and some paper, I was forced to dive right in. This approach proved to be a useful one, because in a week my knowledge on fossils had expanded incredibly. Before the research project, I didn't know the slightest thing about fossils. After the first week I learned to identify bone margins and even the bones themselves. Not knowing where exactly I was headed with my project, I started studying *Saurichthys* fossils in the University's Vertebrate Paleontology collection. I collected data on them, such as their size and what body portion the fossil was from. I learned many scientific terms and how to properly describe fossils.

After two visits to the Royal Tyrrell Museum in Drumheller, I was able to come to a breakthrough in my



research. By looking at some distinguishing features, it became clear that the specimens could be separated into two groups. From there, I took the dominant group, and after doing more research on it, I was able to put together a detailed description.

Writing down my project in less than six hundred words makes it sound like it was really simple. The truth behind it is that from the very beginning, when I spent two days examining one fossil, I was amazed at how tedious and painstaking the research could be. Working on this project definitely taught me patience.

The whole WISEST experience

definitely was not just spending seven hours a day looking at fossils. The Wednesday afternoon activities were really awesome and every week, I really looked forward to them. The sessions taught me a lot about post-secondary options, career options as well as the application of a degree to real life.

The weekly lunches with Mariel and Emily were also a lot of fun. Just being able to hang out with people from the program who I didn't get to see in a regular week around campus, and hearing the funny stories people told about their labs put a bright spot in my day. By spending time with others from WISEST, I was able to make some really good friends.

Overall, WISEST has been a very positive experience. I've learned so much, and it definitely all hasn't been about fossils. I've learned first-hand what it's like working in a research role, and a lot about the University. I know I'll keep in touch with many of the friends I've made and I will keep my mind open to the career options WISEST has exposed me to.

Jody Bekevich

WISEST Supervisor: Dr. Margaret-Ann Armour, Dept. Chemistry
Sponsor: Alberta Ingenuity Fund

For me, WISEST was not just an opportunity to gain lab experience, it was an opportunity to gain life experience. I moved from small town Peace River to the big, scary city for six short weeks. I was forced to be independent in a completely different setting full of anonymity and fear. The most intimidating part was the U of A campus, considering that it is about the same size as downtown Peace River and on any given summer day is over twice its population. I was overwhelmed by my scenery. I had not realized that the campus was so big and looked so prestigious.

Since I was interested in becoming a pharmacist, the WISEST coordinators chose the best department for me: chemistry! I actually worked in a real lab! I got to wear the slick lab coat and the geeky glasses. Doctors wanted *me* to do research for *them*! The little nerd inside me was feeling very important.

My first project was to find a way to break down polychlorobiphenyls (PCB's). They were used in transformers. Workers would also use them to clean grease off themselves. It wasn't until decades later that all these workers began dying of cancer that they stopped making them. Now there is no way to dispose

them safely. It was believed that UV rays could break them down, but this theory was never fully tested. I made solutions of PCB and hexanes then added either sodium hydroxide or solid sodium to them. I monitored these solutions on a daily basis with a gas chromatography machine. The sodium hydroxide solution formed two layers and a precipitate formed between them. This was the reaction we expected and the amount of PCB in the solution slowly decreased. There was no physical evidence that the sodium solution had reacted with the PCB. Sodium reacts with the moisture in the air if left out for too long so it is extremely reactive and it reduced the amount of PCB the quickest. This research will help



other researchers find a more efficient way of breaking down PCB's.

My second project was to break down cancer treating drugs called CeeNU or lomustine and estramustine. I reacted them with both sodium hypochlorite (bleach) and an acidic potassium permanganate solution. This project was full of problems and filled me with a frustration I never thought was possible. The drugs never reacted the way I predicted. This project is not complete and probably will not be completed for many years.

These two projects showed me both the joy and suffering involved in research. The joyful days inspired me to become a chemist and work in a research lab for the rest of my life while the disappointing days made me hate anything relating to science. Some days I would make one minor mistake at the end of the day and my entire day's work would literally go down the drain. It is those days that make me rethink my career path.

I came to WISEST hoping to discover my passion. I wanted to find a subject that interested me enough to pursue it for the rest of my life. Unfortunately, I did not discover my passion, but I did discover that science is enjoyable. This is the first job that I have had that I found interesting. I got to learn something new everyday. Even when my experiment was not successful, I learned from it. Now I can walk away from this experience knowing that I put everything I had into it and got as much as I could out of it.

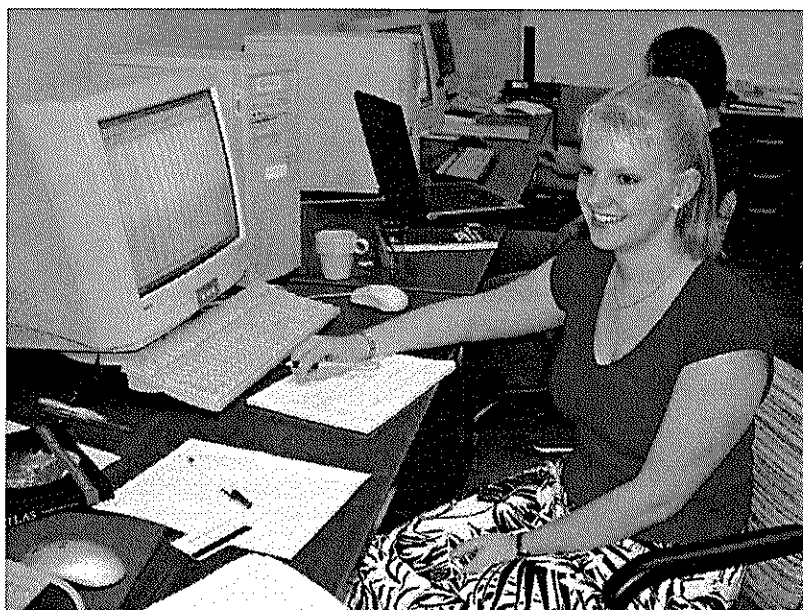
Megan Belke

WISEST Supervisor: Dr. Paul Meyers, Dept. Earth & Atmospheric Sciences
Sponsor: Weyerhaeuser

Six weeks ago I never thought I would know as much as I have learned, or have had the relationships that I have had. Seriously, I didn't think I would have learned the names of the people sitting next to me on that first Sunday night, let alone become so close with some of them that we have become like a family. Being away from home, in a new city, and doing things way above your current level of skill is challenging. You need someone to fall back on and the girls were always there. The program itself and the experience it gave me was great, but without the 'Rez Girls' I'm not sure I would have made it through to experience it.

Not only was residence home for the last six weeks, it was also place of great events and a great way to spend a summer. We did many activities to keep us busy. One of the more memorable ones was, the night Mariel came and taught us how to make balloon animals. That night was a whole night of entertainment, even after Mariel left. Another memorable evening was the night Emily came and picked up those who were left at Rez and took us out to a movie and to hang out at her place. Practically every night there were great times with Shahzma. Rez was so much fun, such a good experience, and something that will probably stay with all of us probably forever.

My lab was very different from anything I've ever done before which is a good thing. It started off pretty slow; mainly I was doing data entry and analysis. But by the 3rd week I had completed that and moved on to learning about oceanography. Oceanography, I soon found out, is



something which is definitely not covered in the public school system, I read, asked questions, and read, and asked some more questions. I thought I would never "get it", but finally I got through the readings and I went to meet with my professor, to discuss the results. At that point, the learning just set in and I started my report and poster. It was neat; all of the information I had read about was now going on paper, well really a computer, in my words talking about my project. So even though my project sort of ended where it began, it was an excellent opportunity for me to see the 'Highs' and 'Lows' of research.

On top of the experiences in residence and the experiences in my lab there were many other great activities organized by Emily and Mariel (such a team!). The activities were a great chance to meet the other WISEST participants and to get to know them a little bit. One of the really neat activities was the small group discussion. It was really great to get the chance to meet other women, who have careers in math and science, and to see how some of their interests are similar to mine. It gave me a great chance to ask some questions that no one back home would be able to answer, and to make some really neat contacts. All of the times we had, to out as a group or just stay around campus, were really great.

Even though many times it may have felt that we were not learning anything, we were actually learning constantly. This experience was once in a lifetime, and I hope, it gave me a great head start for University. Live life, love much, laugh often!

Katie Berg

WISEST Supervisor: Dr. Fiona Bamforth, Dept. Laboratory Medicine & Pathology
Sponsors: Summer Career Placement Program & Faculty of Medicine

"Where did you work over the summer?"

"Well, I worked at the University of Alberta Hospital in Laboratory Medicine and Pathology where I developed a screening test for glucose-6-phosphate dehydrogenase deficiency."

".....Oh."

Impressive? I THINK SO!! To me, The WISEST Summer Research Program had nothing to do with being impressive; it was an amazing experience, and an opportunity to see just what careers are available for a person with a true interest in science. Because of WISEST, I had the

opportunity to watch in action so many completely diverse careers that without this program I would likely never even have heard of. Foolishly, I expected to prance away from this summer with my life goals planned and set...but now to have even more options? ...I feel nauseous.

Moving past my irritable digestive system, let's get right down to business. Glucose-6-Phosphate (Or as it is commonly referred to, G6PD.) is a cytoplasmic enzyme that is distributed in all body cells. The objective of my six-week project was to develop a screening test that would detect a patient with a deficiency of this enzyme. Prior to starting my research project, I was terrified. Develop a screening test? By myself? Is that legal? Before



I give you the chance to be impressed with how complicated that must be, let's look at the key words. "Develop". No, I did not invent a test, cure a disease, or change the face of modern day science, but I took a step towards it.

To test for G6PD Deficiency I was introduced to a galactosemia screen, and here is where my whole project starts. To simplify my lab, you basically take the blood sample to be tested, add a test substrate to it and drop this solution onto filter paper. This is repeated every hour; between these intervals it is placed in a thirty-seven degree water bath, to increase the reaction of the test substrate with the enzymes in the blood. After the lab procedure is complete, the filter papers are observed under UV light. Now this is where it gets good!

A normal blood sample with G6PD enzyme activity will fluoresce brightly once under UV light. What causes the spots to fluoresce you ask? "Well," I reply enthusiastically, "The fluorescing is caused by the presence of NADPH, which is a coenzyme that is produced by G6PD. Without G6PD, there will be no NADPH, and without NADPH, there will be no fluorescing!" I tested the effects that heat had on blood samples, along with their stability over periods of time including a one- to-six week analysis and another lab from 1 to 9 months, using newborn screening samples taken from the lab. Another interesting assay was to test the minimum dilution of whole blood that can be used, and still have reliable qualitative results. This is important because if a patient is anaemic, which is characteristic of this disorder, they will have fewer red blood cells in their whole blood sample. This may make it difficult to analyse the screening test, altering the reliability of the results. All of the data I acquired helped to me create a range, and to further "Develop" this screening test so that it can be used in countries, such as Uganda, where the technology is limited but this information is vital. I learned so much from the last six weeks, but I was glad that my project could be helping others in the future; As much as I took away from this experience, I hope what I have given back will be a fraction as valuable.

"I can't wait to share my experience with others. From this experience I will walk away knowing many more career options, as well as feeling comfortable getting around university campus. The women in this program have also had a huge impact on me. I now know that nothing can stop you from your dream. No matter how huge the obstacle, or how odd you may seem to other people. If I have the drive, I can achieve anything I want, and this entire program is an example of that very goal."

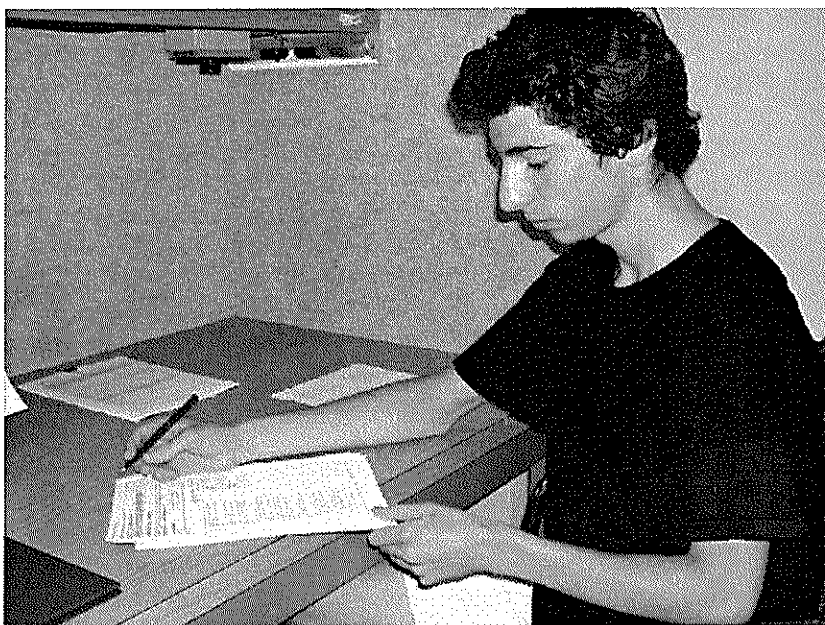
Rares Bistran

WISEST Supervisor: Dr. Wendy Austin, Faculty of Nursing
Sponsor: Faculty of Medicine

In the six weeks that I was involved in the WISEST Summer Research Program at the University of Alberta, I worked with Dr. Wendy Austin's research team at the John Dossetor Health Ethics Center in the Department of Nursing. Along with Dr. Austin, the research assistants Erika Goble and Gillian Lemermayer helped me and another WISEST student, Brenton Tse, with our projects. The John Dossetor Health Ethics Center is an interdisciplinary centre committed to work in the area of health ethics. Through partnership and dialogue, it promotes professional and public reflection, debate and research on matters of ethical and moral concern in our healthcare facilities and in our community.

The project I worked on this summer was about the moral distress experienced by nurses in healthcare environments. My work involved gathering as much information as possible about moral distress and ethics environments of nurses' work place. The information was in the form of academic journal articles, internet websites, pictures and paintings on this topic that can later be used in power point presentations etc. During the six weeks period I also learned how to use a program called Procite, used by researchers when writing articles and final reports to their findings, and of course the University of Alberta Libraries website, which is

very useful no matter what information you are looking for. Aside from touring the north side of the campus on July 7th, we got the chance to see the buildings on the south side, such as the modern Walter C. Mackenzie Health Sciences Centre, including the John W. Scott Health Sciences Library. In the second last week of the program all the guys (5 out of 63 students ☺) went on a job shadowing tour at the Grey Nuns Hospital in Mill Woods, where Janice Phillips gave us a tour of the Intensive care/Coronary care Unit and talked to us about the clinical side of nursing. Also in the second last week of the program Brenton and I took part in a discussion on Integrity. This was presented by Dr. Austin and Gillian



Lernermyer and took place at the Telus Centre for Professional Development. We met researchers from the University of Alberta but also from other universities in Canada and the United States. Of course, these researchers were just a few of all the people we met this summer: students, professors and all the scientists on the Wednesday afternoon tours, such as the IBM tour and the Micralyne tour.

WISEST wasn't only about working. Over the six weeks, we had a lot of fun at all industry tours and social activities. The Micralyne tour was the best one, as we got to see the labs in which the small gadgets are built and learn how they work and what they're used for. The Aloha picnic and golfing night were the funniest social activities, although it was quite hard to pitch n' putt when all the mosquitoes were biting us.

Overall, this was the best summer job a high school student could ever get. The WISEST Summer Research Program provided an opportunity for everyone to gain first hand information about different science and engineering disciplines. Participating in this program helped us all to broaden our awareness of career opportunities and encouraged us to consider a future in the research culture. Also, this adventure helped us familiarize with the stunning U of A campus and meet top research scientists at the university, who we'll most probably meet again when attending the U of A.

Giselle Bohaychuk

WISEST Supervisor: Dr. Kurt Konhauser, Dept. Biological Sciences

Sponsor: NSERC - PromoScience

My name is Giselle Bohaychuk, and I am a grade twelve student from Ponoka, Alberta. As part of the WISEST Summer Research Program I worked in the Department of Earth and Atmospheric Sciences with Doctor Kurt Konhauser. Though I did not have my own research project, I contributed to the projects that Dr. Konhauser and his research team were focused on. For six weeks I worked on research projects pertaining to the silicification and preservation of bacteria, and banded iron formations (BIFs). The object of the bacteria projects is to find out why silica preserves bacteria so well as microfossils. Did the bacteria bind to silica because it was beneficial to their survival? The purpose of the BIF experiments is to try and figure out how the iron and silica precipitated, and why there are no microfossils present in the BIFs. The period of time in which the majority of BIFs formed had no oxygen in the atmosphere, and oxygen is what precipitates iron. If there was no oxygen did UV light of bacteria cause iron to precipitate? We also know that silica provides an idealistic setting for bacteria to form microfossils, so if bacteria were part of the environment why did they not

fossilize in BIFs? These questions should hopefully be answered with continued research. The BIF project has been the focal point in Dr. Konhauser's lab; therefore, I spent the majority of my time on this project.

Working on these experiments introduced me to a variety of pieces of lab equipment, such as the centrifuge (for spinning liquids off bacteria samples), the spectrometer (to measure amounts of absorbents in solutions), and the glove box (to create an anoxic atmosphere). Working in a lab also familiarized me with various chemicals because making solutions was such a significant aspect of these projects.

Being a part of a lab setting educated me in regards to safety precautions and the tedious precision needed to guarantee a successful experiment. Lab work also requires a great deal of patience because not every experiment is going to work exactly as a person expects it to. However, because labs are not always predictable, it makes lab work all the more interesting!

Being a part of the WISEST Summer Research Program was a privilege. The WISEST Program was an excellent opportunity for me to learn more about my peers, and my career and academic options. The summer program was a wonderful way to introduce myself to other students my age that shared my career and scientific interests. This program allows young adults to share their common enthusiasm for science and engineering. I found that the WISEST co-ordinators were very encouraging of all the students, creating an incredibly welcoming atmosphere. Questions were always encouraged and readily answered. The WISEST Summer Research Program also encouraged student's enthusiasm by hosting a variety of activities such as tours and guest speakers. These activities provided me with new knowledge regarding the various science related careers that are open to me in the future. Also the WISEST Summer Research Program ensured that the students were comfortable in a university environment. Thanks to the help of the student co-ordinators I am now more aware of what opportunities I have concerning my future education. I feel that what makes the WISEST Summer Research Program such a success is the effort that the students make to ensure that they gain as much valuable knowledge and experience as possible.



Kelsey Brock

Supervisor: Dr. William Tonn, Dept. Biological Sciences

Sponsor: Alberta Research Council

This summer I went to Meanook Biological Research Station located near Athabasca and my job was to assist a small research team under the supervision of Dr. Bill Tonn and Jeff Divino. The project I was involved with studied the effects of reproductive timing in fathead minnow. To put it more simply, the purpose of the investigation was to determine how early spring thaw effects egg production and offspring survival in fathead minnow versus late spring thaw in boreal aquatic ecosystems. To conduct this experiment, a tarp barrier divided 3 ponds and fish were stocked in side "A" on June 17th and then an almost identical population of fish was stocked on July 8th in side "B". Population "A" simulated an early spawning period while population in side "B" was forced to spawn later. Floating wooden nestboards were placed around the edge of each



pond to provide a spawning substrate for breeding fish. To accurately compare the two fish populations, the number of eggs laid was recorded daily and every week we would set minnow traps in each pond and weigh and measure each fish. Once the fish were finished spawning, and the hatchlings had grown enough to catch them, the ponds were drained until there was very little water left and a huge net was used to catch every hatchling and adult minnow. The hatchlings were counted and measured to compare the growth and survivorship between the two pond halves.

Everyday, nestboards were inspected for egg masses and each nest was counted. A grid was placed over the nest to make counting a bit easier as the number of eggs in a nest be over 3000. The hardest part about counting eggs was trying not to get distracted. Every once in a while I would see an aquatic invertebrate in my peripheral vision and would have to start all over again because I had looked away and lost count. Fathead minnows have very interesting spawning behavior. The female lays the eggs but does not invest any effort in parenting while the male would gladly bite a chunk out of me to protect his eggs. Watching the male fish was my favorite part of egg counting as they seemed so fearless and I actually got to study a few fish's unique behavior because I could usually see the same fish every day for as long as his nest still existed.

Not only was I incredibly fortunate to be chosen to participate in the WISEST program but I couldn't believe that I was placed in a field that I had an immense interest for. I learned things that I never thought I would. For example, when I entered the WISEST program I thought I would go home only with knowledge about the project. Little did I know that I would learn everything from filleting a very tiny fish to new and improved ways to build a fire. I happen to really like fish and it was great to experience a group of people who didn't look at me strangely when I went off on a nonsensical fish tangent. The people I worked with were great and made my summer exceptionally fun and eventful. If possible, my already enormous interest has grown with my knowledge and I couldn't ask for a better summer. From only six weeks I have acquired more than enough memories to last a lifetime.

"It feels like I have learned more during the six weeks of the WISEST program than I have in my whole life. Every thing that I had read in books about science and research was brought to a whole new realistic level because I was able to experience the research process hands-on."



Karrilyn Carpenter

WISEST Supervisor: Dr. Michael Deyholos, Dept. Biological Sciences

Sponsor: NSERC - Promo Science

My name is Karrilyn Carpenter I am currently one of a select few that were chosen to participate in this wonderful program called WISEST. My experience in this program has been an intriguing one and I wish everyone was offered the opportunity to discover this wonderful introduction to the world of science that is available to women. I have met many wonderful people in my lab and as well as around my lab.

If you were to ask me what I was going to do this summer I would have never imagined that I would be doing Polymerase Chain Reactions (PCR) or screening Arabidopsis for vascular mutations. In these last few weeks I have screened Arabidopsis thaliana (commonly known as wall cress) seedlings for mutated vascular structures with a \$65,000 microscope. This procedure is also referred to as mutational analysis where one gene is mutated with every plant in order to find which genes affect the vein patterns and structures found in the cotyledons (leaf like structures that first appear when the plant begins to grow). Every plant contains a protein called GFP, which is a green fluorescent protein extracted from jellyfish. There are two different types of tissues found in the plants. The phloem distributes the products of photosynthesis and a variety of other solutes throughout the plant. The xylem transports water and mineral ions from the root to the rest of the plant. Most research has been done on xylem due to the forestry industry. Better knowledge of phloem and vascular structures will give us the ability to enable us to possibly manipulate the vascular system in order to produce higher yielding crops that are resistant to drought or salinity. If we have a better understanding of vascular systems and structure we will be able to improve crop productivity and function, and vascular flow to improve seed development.

Another area I was working in was with the PCR. Now the only way I know to explain PCR is this: In Jurassic Park a mosquito was used to extract a very small amount of dinosaur DNA (no I am not making dinosaurs). This small amount of DNA needed to be amplified in order to make it useable. This is where PCR comes into place. PCR replicates DNA over and over and over again by using DNA replication using semi conservative method to do so. PCR can also be used to test patients for bacteria and viruses that cause infections such as tuberculosis, chlamydia, viral hepatitis, HIV, and many others. PCR can also be used for genetic testing, to determine whether or not a patient carries a genetic mutation that could be passed on to offspring (cystic fibrosis) or to determine disease risk in the patient themselves. As you can tell PCR has many uses and is an important technology to not only lab researchers but to doctors, patients and many others.



I would just like to conclude with a thank you, not only to my lab and to WISEST, but to the people that helped me get here: my teachers, my Grandmother, and to Mariel, Emily, and Grace, thank you for making my WISEST experience the best it could be.

"I wish that everyone was offered the opportunity to discover this wonderful introduction to the world of science that is available to women."

Tammy Chen

WISEST Supervisor: Dr. Martin Jagersand, Dept. Computing Science
Sponsor: Canadian Information Processing Society (CIPS)

Six weeks already? Wow, this summer certainly flew by because of the WISEST program at the University of Alberta! Along with 62 other students, I nervously walked in on that first Monday morning not knowing whom I would meet.

Fortunately, I was placed in the Department of Computing Sciences with about nine other WISEST students. Did you know that the Computing Science building has three identical floors? It was confusing when you were new to the building! Even though we were all in one building we were dispersed amongst different laboratories. Another WISEST student, Katie Molzan, was in my lab with me for the duration of these six weeks



under Dr. Martin Jagersand in the Advanced Man-Machine Interface Research Lab (Room 353). The basic definition of my six weeks here was to use a video-based camera to capture objects and then to modify them through various steps so that we could animate them in Maya and finally put them into a website as a form of interactive media to help readers learn with enthusiasm.

Other than Dr. Jagersand, there were two graduate students in the lab with me, Keith Yerex and Neil Birkbeck, a recently graduated PhD student, Dana Cobzas, and a summer student, Cam Upright. Throughout the weeks, Dr. Jagersand, Keith and Neil have helped me learn to use the programs they created to capture different objects. Though people in computer science do not talk often, when they do talk, it is usually quite complex and my first week in the lab was quite an introduction, as I did not want to talk, worrying that I would disturb them. However, as time went on, I became accustomed to the environment and did my own project.

At first, I learned to use Maya 5.0 Unlimited to create and manipulate 3D objects. This was in hope of creating an animation using artifacts to tell a story so that people are able to experience a sort of virtual heritage, which is a goal of image-based modeling and rendering. To detail the full procedure of capturing an object would take more room than WISEST has allowed me for my report, so I will only give a brief overview. My personal project was to capture artifacts involving the seal hunt, which I borrowed from the University of Alberta Museum. I captured these artifacts and researched the history and significance of these objects and further generated an interesting story regarding them. I then imported these images to Maya and animated them so that I could export them into my website. The final result was a website that incorporated assorted media types, particularly 3D animation made from Maya. As the capture program was quite recently designed, my role in their lab was to "test out" this program and integrate these models into a website to observe the quality of the animations and the improvements that could be made.

WISEST did not leave me in the lab for the full six weeks alone, but we had lunches and social events and sessions that not only allowed everyone to interact with each other but learn about opportunities in this world. For example, going to Micralyne for one of the Wednesday afternoon sessions helped me confirm that electrical engineering was for me and going to IBM also reassured me that if women are willing, they too can hold positions in the scientific world.

Through WISEST I learned a lot about not only University life, but also the work life. Being able to work in the Department of Computing Science through the WISEST program allowed me to experience what research in a computer lab was like since my previous view on computer specialists were quite different from reality. I heard several success stories from women who have studied in non-traditional fields and I look forward to enrolling in the Faculty of Engineering at the University of Alberta. I met many new friends at WISEST and went on a mini journey of self-discovery asking myself questions about my future. Over the six weeks of this program I have been able to interact with a variety of professionals and I can tell everyone that this was definitely an awesome summer!

Jennifer Cook

WISEST Supervisor: Dr. Charles Lucy, Dept. Chemistry
Sponsor: Camille & Henry Dreyfus Foundation

I arrived on the University campus at about 8:30 in the morning on July 5th, convinced that the very air surrounding those buildings smelled of learning, and that the next six weeks would be an exciting experience for me to treasure forever...

I was an eager and willing student, and WISEST, thankfully, placed me in my element- chemistry! Dr. Charles Lucy (the boss!) met me towards the end of that first exciting day, and he led me to the lab. Nearly failing to conceal my hyperventilating, I was introduced to a multitude of people, whose names I promptly forgot, and then relearned over the following weeks. I had my own desk, my own keys, my own computer, and best of all, my machine. Sarah Pelletier, my supervisor, introduced me to the setup on which I would learn the art of high performance liquid chromatography, otherwise known as HPLC. I spent the first two weeks reading, taking notes, and learning some basic skills. By the third week, I felt like an expert, and I was dying to start my project.

That first day of practical work, I thought my head might explode with the information I was cramming into it. Apparently books *can't* teach you everything. I learned how to use the machine, calibrate it, set the UV light, turn on the helium, work the computer... the list of new tasks was endless. My project was straightforward: Vary temperature and pH in order to find the optimal conditions for the separation of carboxylic acids in a C18 Silica column using a Phosphate buffer eluent (and breathe...).

In other words, I had a 15 cm column, 4.6mm in diameter, through which I was injecting small amounts of



solution (20 μ L). The column was filled with porous silica particles, 5 μ m in diameter, which is very small. Every solution has a different affinity for these pores, meaning that certain acids would be more strongly attracted to the silica, and therefore would remain in the column for a longer period of time. At the end of the column is stationed a UV detector, emitting UV rays at 210 nm, to be absorbed by passing acids. The detector passes that message along to the computer, which then draws out the peaks in a chromatogram.

I was testing this column with nine different acids, so I had to begin my work by injecting each of them separately, to determine the retention

times. I then made a solution containing all nine of the acids, and could easily tell the peaks apart using the previous individual chromatograms. Weeks three and four were enough time to allow me to test my column at 5 different pH's, and 4 different temperatures. In week 5, I got to test real samples of juice to see those same acids appear.

But one can only do so much work, and even in the short time that I spent there, I found a great social side existing in the lab. Whether taking a break to chat about the weekend, or which materials are best to blow up in a microwave, laughter and smiles were never lacking. Lunch hours could be spent walking down 112 St to Yokozuna for a farewell lunch, or hanging out in a pack at a Chemistry barbecue, they were a close-knit bunch, and I feel privileged to have met them and been included in the fun.

I'd been looking forward to this experience for a long time, and it absolutely lived up to my expectations. I will miss my fellow researchers, everyone was so friendly and willing to help me learn, and I'll miss just being in the lab. But I take comfort in the knowledge that someday soon, I'll be returning to the U of A for post secondary schooling, and who knows. Maybe I'll see that lab again.

Eve Coppinger

Supervisor: Dr. Erin Bayne, Dept. Biological Sciences

Sponsor: Alberta Ministry of Innovation & Science

Although a life-long Alberta resident, before this summer I would have struggled to name more than a handful of native shrubs, birds, or insects, and had only a vague idea of the ecosystems of these organisms. My WISEST placement was with Dr. Erin Bayne in the Biological Sciences department, and working with him and his team allowed me to learn more about the fascinating variety of life in the boreal forest and the threats that this habitat faces. In addition, the WISEST program itself allowed me to meet new people, explore campus life, and discover opportunities in science and engineering, especially research.

During my six-week placement, I worked on several projects, but focused on one: a study of the relationship between changing landscapes and bird populations across Alberta. The Breeding Bird Survey has collected decades of data recording bird numbers and species along the province's highways, and the land use of every part of Alberta for the last fifty years can be found in archived aerial photos. However, until now, these two records have never been compared to explore how massive human intrusion into native landscapes may

be changing bird populations. My work involved creating a database to store information obtained from air photos, designing a methodology for choosing and analyzing the photos, and collecting preliminary data. Although this ambitious project will take months or possibly years to complete, much longer than my six-week stay, I feel a sense of accomplishment in being a part of an effort to greater understand the environment, and to possibly gain insights into how we can minimize our damage to the boreal forest.

One of the most interesting and unique experiences of my time in the WISEST program was an opportunity to do field work near Lac La Biche, Alberta. I spent a weekend assisting Erin Cameron's



research on earthworms, a non-native species in this province. Very little is known about earthworms in the boreal forest. This project aims to study the populations and species of these earthworms, and to possibly discover if they arrived here by natural mechanisms, such as being carried by birds, or by human movements, such as being brought as fishing bait. For two days I sifted through soil in search of the creatures and their cocoons, as well as recording nearby shrubs. I also learned to identify and name various species of trees, birds and shrubs, and experienced camping and riding a quad. This trip was an excellent insight into cutting-edge research and the life of a research scientist in the field.

My WISEST experience afforded me a wide range of experiences and opportunities. It allowed me to learn about ecology and fieldwork, discover possible futures in science, and to explore campus life. My work in Biological Sciences has rewarded me with specific knowledge, which will help in high school and future studies, as well as general skills such as teamwork and problem solving. The WISEST program's additional activities allowed me to feel more comfortable on campus, and revealed various potential paths I can choose from.

"WISEST allowed me to both learn about a field I am interested in, and to be a part of important and fulfilling work, making the program a perfect way to begin to experience science and research on the way to post-secondary studies and a career in science."

Lana Cuthbertson

WISEST Supervisor: Dr. Michael Deyholos, Dept. of Biological Sciences
Sponsors: Summer Career Placement Program & Ms. Esther Ondrack

In the six weeks that I was part of the WISEST program, I learned more than I ever imagined I would. I worked on a few different projects in my lab, helped some grad students with theirs, and generally just learned how a lab functions. But there was one main thing that I realized, and that is that the efforts of WISEST are working. In my lab, the majority of people working were women, even if it was a slight majority, and in our group activities, I met many women who had succeeded in becoming some sort of scientist. This, above all, was what struck me most.

My lab was one of a biological sciences nature, dealing with the genetics in plants of many kinds. There were projects happening all around me, some people working with flax, some with hemp, and some with *Arabidopsis Thaliana*, including myself. Under the instruction of Dr. Deyholos, I first grew the tiny *Arabidopsis* seeds on microscope slides, putting them in the refrigerator for two days and under lights for five. Next, I examined the seedlings under the microscope, determining which ones were mutated and which were not. This process is called screening, and while at times it could be tedious, when I found a cotyledon (leaf-like structure) with a completely wacky vascular structure, it made my day.

A grad student named Melissa supervised my second project. She had grown many colonies of bacteria from flax plants on several different plates, called her "DNA libraries". My task was to put these templates through a reaction called PCR to find out whether or not they had inserts in their DNA. These inserts could be different things, like a rust resistant gene, or something of the sort. Setting up a PCR reaction involved mixing the samples of bacteria with several different reagents, putting them in the PCR machine for two and a half hours, and then running them on a gel and examining the gel under a UV light machine in order to see bands, and therefore "see" the inserts. This process had specific steps, and a few time periods of waiting were involved, during which I amused myself with more screening of *Arabidopsis* plants.

On top of all of my projects, I was enlisted to help with a few other tasks around the lab. For example, another university student working in my lab was carefully growing several trays of hemp plants in order to study their



DNA. She had me concocting three or four liters at a time of a fertilizer made from chemicals. I had to mix up the fertilizer and carry it upstairs to the plants to "feed" them. I also learned how to do a DNA isolation reaction, just for fun. I discovered what an autoclave was (a machine to sterilize things using heat and pressure), and how to use it to sterilize pipette tips and various lab tools. I also learned the lovely task of washing dishes, and how to use the monstrous dishwasher with the scary looking dish racks.

All in all, my experience with WISEST was fantastic, and one I won't forget in a hurry. I experienced and learned an incredible amount, and met some incredible people, most of which were

fellow women in science, engineering, and technology. The efforts put out by WISEST are exemplary, as thanks in part to them, more and more women are discovering careers in science. I had a great summer, one that I'm sure I'll look back on with fond memories of learning, fun, and most of all, the people I met.

Rachael Da Cunha

WISEST Supervisor: Dr. M.A. Kouritzin, Dept. Mathematical & Statistical Sciences
Sponsors: Summer Career Placement Program & Faculty of Science

My six-week term here at WISEST was an amazing experience. Since I am from a small town north of Edmonton, I stayed in residence during this time period. I met many amazing people and made several new friends from around the province. Our in house residence coordinator was excellent. She made everyone feel at home, planned activities for the evenings and was always there for us. I felt much closer to those that I lived with in residence than anyone else in the program. It made the whole experience that much more. Many unforgettable memories and experiences will remain with me throughout the years to come.

I worked in Dr. Michael Kouritzin's math and statistical lab. I was fortunate enough to be working with another WISEST girl. We could work together on complex problems and keep each other company. We did several small scale projects such as: investigating random number generation, compiling reports dealing with the finance sector, C++ programming and creating a flash program on the computer that demonstrates anomalies in the stock market.

At first, it felt like I was way over my head being in this lab. I looked at one formula in a recent report our professor had completed and I didn't even know how to say it out loud, let alone understand what it was used for or how it worked. However, within a week after reading that report, I could understand the formulas within it. I didn't realize how much technology depends on mathematical research, including things such as: a spotlight following an actor around a stage, detecting where cancerous cells are prone to be in the body or the possible position of an object; all based on statistical analysis through the use of a filtering system. I learned a lot more about computers through the programming that I part took in for some time. I made several small scale movies with the flash program that I never had the knowledge to do before; it was also a lot of fun. We created simple cartoons that demonstrated complex procedures. This makes it much easier for the average person to understand a complicated concept. I never knew that working in a math and stats lab could be so much fun.



I am so glad that I decided to participate in this program. It opened my eyes and broadened my horizons as far as the diversity in science. The role models and guest speakers that shared their experiences with us left an impression on me and have aided some of my future decisions. The Wednesday afternoon sessions provided good opportunities for us to see possible science related work fields. We visited the Alberta Research Council, IBM and other labs around the university. This really made me aware of many different career paths in science. As well, I find it beneficial to already know the university campus and I am positive that the U of A is where I want to attend. The WISEST program helped

me with many upcoming decisions and expanded my awareness of the world of science. It was nice to have a summer job that stimulated my interests and challenged me at the same time.

Lucia Daisog

WISEST Supervisor: Dr. James Cahill, Dept. Biological Sciences

Sponsor: Alberta Ministry of Environment

My first introduction to the Women In Scholarship, Engineering, Science, and Technology Summer Research Program, a colorful pamphlet on display in my biology classroom, induced a great deal of enthusiasm in me. Extraordinary prospects of bona fide laboratory research opportunities, fieldwork, and valuable career guidance would be enticing to just about anyone, let alone a grade eleven high school student like myself. The real WISEST experience, however, was much more than a small purple pamphlet could possibly portray. Never did I expect to be so encompassed by optimism, encouragement, and opportunity. The broadness of constructive knowledge introduced to me by a group of remarkable individuals was astounding in itself. My involvement as a student in the WISEST program proved to be an outstanding advantage for my intellect, my imagination, and most importantly, my future.

The transition from Orientation Day to Research Day was liberating. I began work in the Biological Sciences building on the seventh floor of the Botany wing. I was introduced to my supervisor: Dr. James Cahill, informally known as "JC", as well as



a number of University students I would be working with. Bryon Shore, Eric Lamb, Steve Kembel, and Malcolm Coupe, among others, were dependable for answers to my eager inquiries concerning my project and it's background information, the equipment and rules of the lab, and post-secondary schooling advice. They were also sufficient in distributing humour, a pleasant bonus whenever tedious work abounded.

My laboratory work varied from day to day in accordance with who required help for which project. I helped Bryon strip roots in preparation for staining and microscopic observation. I also worked with JC at the sixth floor green house, taking data for his project on insect herbivore and its influence on vegetation. I used an exceptionally delicate balance for weighing small items like dried leaves, chemicals, and tiny caterpillars. I also spent 1-6 nights per week contributing to various fieldwork undertakings, including species percent cover, biomass collection, watering, measuring of light and soil moisture, and even nightly dishwashing. My own project, however, took precedence over most of these tasks.

My project involved the study of the seed bank—the store of seeds buried in soil, composed both of seeds produced on the area and seeds blown in from elsewhere. I studied the composition of different seed banks of Alberta-grassland origin and looked for a relationship between seed bank species diversity/abundance and aboveground species richness and productivity. In short, I was looking to discover whether the type and amount of plants in a specific area would affect the type and amount of seeds in a seed bank from that area. In progressing this study, I collected 35 seed bank samples from a southeast research field outside Kinsella, Alberta. I am currently allowing the seeds from these seed banks to germinate under optimal conditions in one of the BioSci growth rooms, where I continually observe, question, and label the various seedlings that have sprouted. This endeavor has become more and more thought provoking as my studies have progressed. My supervisor has even informed me that my project has potential to be published, a detail I can use to again stress how overwhelmingly astounding this program is. I have grown in maturity and in understanding; I have been influenced by an array of inspirational role models; and I have begun to familiarize myself with the vast world of scientific research.

What can be concluded by my vivid descriptions of an encounter with WISEST, is that it was essentially everything I expected from what I read in the pamphlet, in addition to a score of new perspectives, new concepts, and new incentives for developing my high school education to its fullest. I am sad to say goodbye, yet I am perpetually thankful for being chosen to take advantage of an amazing program like WISEST. This has truly been a most magnificent summer.

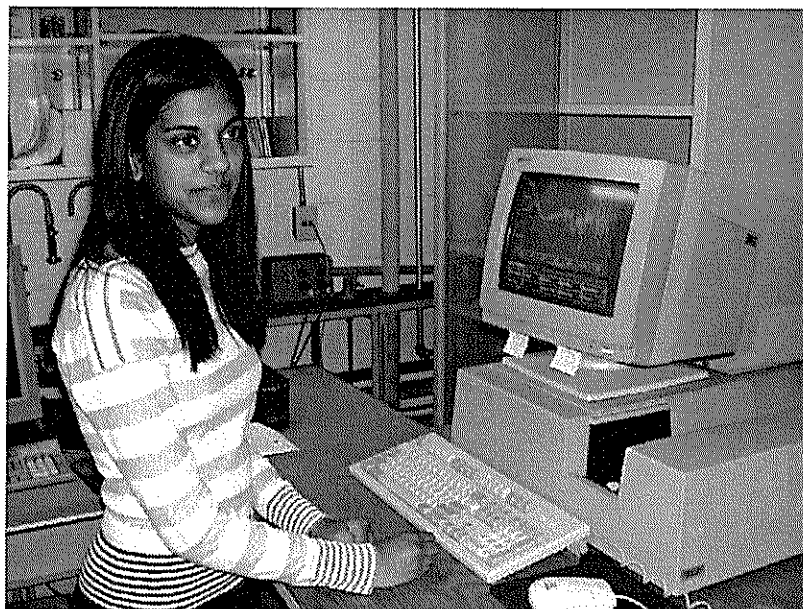
Swathi Damaraju

WISEST Supervisor: Dr. Glen Loppnow, Dept. Chemistry

Sponsors: Summer Career Placement Program & Faculty of Medicine and Dentistry

When I first heard that I would be working in a chemistry lab, my initial thoughts were that of loud explosions, colourful compounds, and Erlenmeyer flasks. However, once I started the WISEST Program, I realized there was much more to my job.

At the beginning of the program, I was told that I would be studying the effect of UV light on DNA. I wasn't quite sure what the project entailed, but I was already beginning to get excited (and a bit nervous) about my next 6 weeks at the University. My job had me working with the two nucleobases, thymine and uracil, found in DNA and RNA, respectively. The main responsibility of mine was to irradiate solutions of thymine or uracil, with one of two sunscreen ingredients, DBM and ODPABA (two benzene compounds). At first, I had to read from a few dry chemistry textbooks, but I soon realized that had I not read these, I would not have fully understood what I was doing and why. I irradiated the solutions at specific time intervals (starting at two minutes, and then slowly increasing) and took spectra's of each solution's absorbance on what is called a UV/Vis Spectrometer. As each spectrum was taken, I could see whether the absorbency peaks on the graphs were rising or falling after increasing minutes of irradiation. Essentially, we were testing to see whether DNA/RNA degrades under UV light by itself, whether it is the sunscreen that is "activated" and degrades the DNA, or whether it was both factors combined. We first used a broad band UV lamp to irradiate the solutions under



all wavelengths of light (from 190-800 nm) and then used a monochromatic UV lamp to target specific wavelengths where we saw degradation of either the thymine/uracil, or the sunscreen ingredients. This experiment was extremely interesting for me to study as it looked at the idea that sunscreen may not be beneficial for one's skin.

Not only did this experience change my preconceived notions about chemistry, but it also taught me skills that are useful in any type of job. The Wednesday afternoon events and the evening functions were a great chance to meet new people, and to learn about the varying faculties and subjects for research available to high

school students going into University. I met grade 11 students with similar aspirations, and gained much from the valuable mentorship that the University of Alberta researchers provided. Working with such accomplished professionals expanded my research knowledge and love for science. As well, inside the lab, I learned a lot of skills and "tricks" that helped to make my experiments more efficient and accurate. However, most importantly my experience in the lab (especially during the long experiment days) taught me tolerance, and admiration for the challenges in scientific research.

"All in all, I had the experience of a lifetime. I managed to pick up leadership skills and research knowledge valuable in the future, and established friendships that will linger no matter which path I follow."

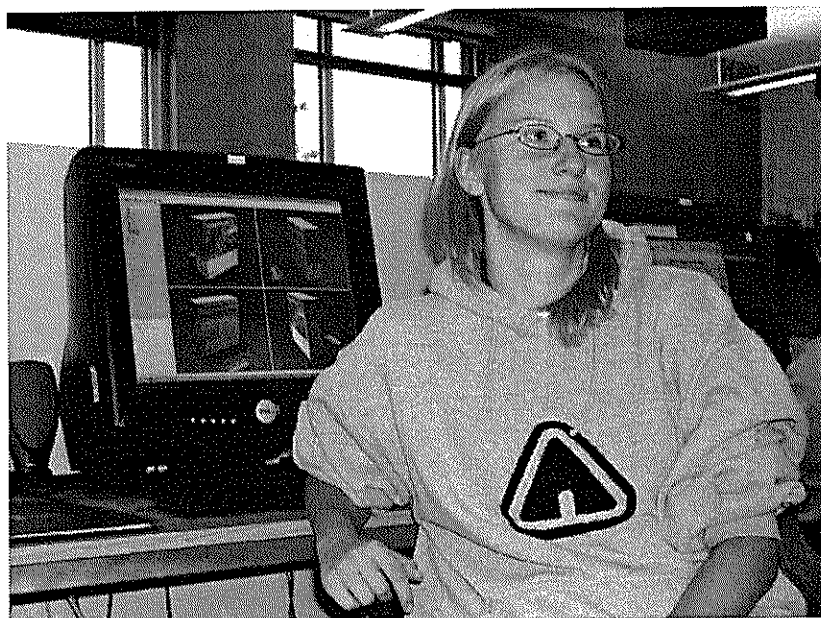
Leslie Day

WISEST Supervisor: Dr. Sherif Ghali, Dept. Computing Science
Sponsor: Alberta Women's Science Network (AWSN)

This summer, I participated in the Women in Scholarship, Engineering, Science, and Technology (WISEST) Summer Research Program in the Department of Computing Science under the watchful eye of Dr. Sherif Ghali and his student, John. In addition to my work in the lab with my supervisors, I also was able to socialize with the other WISEST students through activities designed to ensure us girls (and boys!) didn't feel isolated on campus.

Though my WISEST experience was ultimately positive, I initially entered the program with feelings of trepidation. I was concerned that I would not have the computer skills necessary to work on Dr. Ghali's project, or that I wouldn't know any of the other students. Of course, many of my worries turned out to be absolutely pointless. Dr. Ghali and John allowed me to start my work slowly to become familiar with the software packages I would be using, and one of my friends from Jasper Place was working in the Biological Sciences building, as well as another working in Mechanical Engineering. Our two Student Coordinators, Mariel and Emily, made sure that everyone was where they ought to be, when they ought to be, and our weekly group lunches let everyone get to know each other through stories about grad student fights and rat attacks.

As I started my work in the lab, I was surprised to realize that many of my basic skills from Computer Science courses at my high school came in quite handy while working on the graphics project. Though my project



consisted of developing three-dimensional models for use in testing shadow creation algorithms, various problem-solving methods, as well as my C++ programming skills, were nearly indispensable. Unlike Computer Science courses at the high school level, however, I was able to take a far more self-directed and hands-on approach to my portion of the project. This I enjoyed, as I tend to prefer working independently and at my own speed.

Overall, I enjoyed being a part of the 20th Anniversary of the WISEST Summer Research Program. I discovered things about myself and the sciences that I could not have found in any classroom. I met so many new

people, not just professors and university students, but high school students like myself, that I could not possibly have come away from WISEST without a few new friends. The lessons I learned over my six weeks as a research assistant at the University of Alberta have given me a new set of skills to take forward into other jobs and into my high school studies, and into university beyond that. I am glad that I did not dismiss the WISEST program as "nerdy" or "geeky", and I intend to advise other girls to apply, in the hopes that they too can share my experiences.

Erin Elliott

WISEST Supervisor: Dr. Maya Evenden, Dept. Biological Sciences
Sponsors: STEP & CIBC

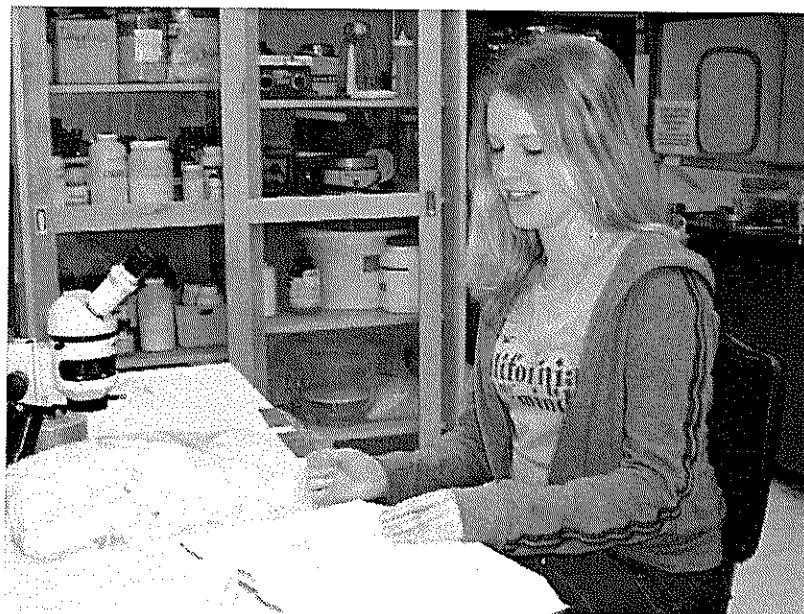
Six weeks ago I came to the city, feeling small and vulnerable, trying to find my way around campus. I knew I was not alone in feeling this way, as almost everyone else of the WISEST program was new and learning. Despite how nervous I was, I was one hundred times more excited and absolutely ecstatic about being here in Edmonton. Not very many people, after all, get a chance to live in residence and work at the University of Alberta for the summer, getting exposure to city life and participating in lab research.

I spent my time at the U of A in the Earth Science Building, working in Entomology. My project was regarding moths, particularly Large Aspen Tortrix. My larvae, which are the newly hatched, worm-like form of many insects that undergo metamorphosis, were infected with microsporidia (which is thought to be responsible for insect mortality). Those larvae infected were often smaller than normal, with reduced reproduction rates. Death would result if the levels of infection were high. My job was to care for the larva, recording data on the effects of the treatments preformed. There were two separate diets - Fumigilin B, which would hopefully cure the microsporidia, and a control diet.

Daily, I would check them for signs of pupation, which is the non-feeding stage between larva and adult. I extracted the pupa and weighed them, recording the data as I went. Next, I transferred the pupa into a cup where eventually the larva underwent a complete transformation within a cocoon or hardened case. Soon I was taking data on the moths that emerged and even got to play matchmaker, when I paired the females and males of the treatments to see if they would mate. The data I kept would allow us to analyze whether the microsporidia had been conquered or if the treatment was unsuccessful. Also, I did odd jobs with the other

colonies in the lab, including the Oriental Fruit Moth and the Ash Leaf Cone Roller, and even got out in the field to check or change cages. WISEST students also attended social activities outside of work, which allowed us to get together and enjoy evenings with others that we didn't see every day.

The most memorable part of WISEST was the people, and all of the important friendships I've made. Emily and Mariel, the student coordinators, were creative and friendly, and their outgoing personalities allowed us to be laid back and have fun. Because I chose to live in residence at St. John's Institute with over a dozen WISEST girls, I developed very strong friendships with everyone there. My flatmate in the "Box", Charlene, and I became instant friends, teasing each other with inside jokes and having a blast. With Ariel and Megan, our neighbors in the basement, I was always messing around, and the fun didn't end when the "Superman" did. Rachael was with me on my first bus ride, or when I pointed at the vase on the way to Improvaganza, and making fun of my "serious face". Meghan always made me laugh, and kept me busy talking about movies, music and everything else girls talk about. Every time I see that Crest commercial I'll think of her and Ash. So many nights were spent just hanging out, either kicking the beach ball around in Sibohan and Karen's room, or doing hair with Kazz, or trips uptown with Trudy, Karmen, Faryn, Amanda, Heather and the girls from residence.



I can honestly say that I enjoyed waking up in the morning and looked forward to going to work, and so I'd like to thank everyone that I worked with and saw daily. Also, thank you to Katie Molzan, Katie Berg, Erin P and Kathy-Erin (hehe) for being friendly faces in large crowds. I'll really miss everyone I met here and I know I will never forget the summer of 2004.

Alyssa England

WISEST Supervisor: Dr. S. Proctor, Dept. Agricultural, Food & Nutritional Sciences
Sponsors: STEP & Faculty of Agriculture, Forestry & Home Economics

Overall, my WISEST experience was both educational and rewarding. Not only was I able to gain hands-on lab experience, but I also met many new friends. I was selected to participate in Dr. Spencer Proctor's lab, which studies the effects of obesity on the cardiovascular system and lipid and carbohydrate metabolism using a rat model. This is an area, in which I am interested, and I enjoyed participating in this project. Throughout the six weeks I have become more knowledgeable in this area thanks to the research team.

I also gained an understanding of what a career in research involves. For example, as my lab partner Siobhan Galbraith and I learned, experiments don't always work the first time you attempt them and that a lot of time is involved in both running and designing experiments. We realized this when we were performing experiments that measured the triglycerides, protein and cholesterol levels in sera samples from the JCR:LA-cp rats. The samples were from lean rats, obese rats and rats on a lipid-lowering drug, CLA. It was a great experience to meet Dr. Russell, who formed this strain of rats. In addition, I gained many lab skills, for example pipetting, that will help me with labs in both university and high school. This program also gave me experience working with

animals in a laboratory setting, and both my lab partner and I are now certified rat handlers after participating in a rat-handling course.

Also, the various Wednesday activities enabled me to see women working in the science field and a few of the different jobs available in both the science and research area. For example, the small group discussions allowed me to see women in the science field and understand more about the education needed for various jobs. The discussion also gave me more information on the different levels of education and the amount of time and requirements needed for specific certifications. The tour of the Alberta Research Council



demonstrated the wide range of careers available in the science area, from public relation personnel to animal technicians. I was surprised when I learned how many careers are available in the science field and I now know about jobs that I had never heard of before. Also, the campus tours made me feel more comfortable working at the university. The computer sessions were both very useful; I now know how to make a research poster using PowerPoint. This will be very helpful in university when I have to make a research poster.

In addition, both the Wednesday Activities and the social activities allowed me to socialize with students who were interested in the science field. It was great to meet people my age that shared an interest in this area. Also, these events allowed me to participate in new and different activities with people that I just met. The other WISEST students, especially my lab partner, made my experience even more enjoyable.

Therefore, my WISEST experience has been very beneficial. I learned a lot about various careers in the science and research areas, which will help me choose a future career. Now, I have a realistic view of what a career in the research field involves. I presently know that in research there are many obstacles to overcome to run an experiment, but that it is rewarding once the experiment finally works. It was also a lot of fun to meet other people my age that are interested in science. It was great to talk to all the WISEST students and learn more about them and their experience in the program. This job was not only educational, but a great experience overall.

Meghan Galachiuk

WISEST Supervisor: Dr. Sundararaj, Dept. Chemical & Materials Engineering
Sponsor: Syncrude Canada Ltd.

My experience here at WISEST is certainly one I will never forget. I have learned my new and great skills and have met a lot of great people. Both, I hope will stay with me forever.

For the past six weeks I have been working in the Department of Chemical and Material Engineering, which has, of course made my father (the chemical engineer) very happy. I am working under the supervision of Yun Bai trying to optimize processing conditions of PS (polystyrene)/Cloisite 20A (a clay) in the Alberta Polymer Asymmetric Mixer (APAM). The APAM is that drill looking thing that I'm standing over in my picture. Dr. Sundararaj who is the head of my research team and my principal supervisor designed it. The objective of the APAM is to evenly distribute clay through out a plastic building a substructure with in the plastic on a



nano-scale making the plastic stronger. I have been testing different variables like temperature, rotation speed, ratio fill and time trying to find the best combination to successfully mix PS/Cloisite 20A. I've also experimented with polypropylene (PP), polystyrene and Cloisite 20A. PP and PS are immiscible by themselves, but if you add Cloisite 20A then the two materials will mix creating a plastic with shared properties of both materials. The goals of the whole polymer mixing research team is to develop a plastic that is easily made and easily molded but after it has set, it will be able to withstand high heats and extreme pressures. These nanocomposites, as they are called, will be used in and

are already used in computer frames, chairs, paints and helmets. HIGHLIGHTS: I got to use liquid nitrogen and smash samples with a hammer (it is part of the procedure). I also got to work with the SEM (Scanning Electron Microscope) and see the results of my work. I was able to learn to do experiments on my own and got a chance to work on a completely unique machine. This lab experience is a priceless asset that will undoubtedly help me in the future.

I hail from Fort McMurray which is about 5 hours north of Edmonton as you must be thinking there was a lot of kicking and screaming involved to get me to come down here (HA YHA RIGHT!!). Living in residence was the highlight of this whole trip. Great people, great activities and good times, for example randomly breaking into song (power to Motown!) or spending way too much money and counting the hours until pay day. I have watched more movies in the past six weeks than I have in the past six years. I have been to West Edmonton Mall more times than I have been there in my whole life! All sixteen girls here have been great fun and I've learn so many new and interesting things from them and I hope I have imparted some knowledge on them. We have had so many laughs and cries because it's our party and we'll do what we want to (yes that's the song I'm singing right now). HIGHLIGHTS: the whole darn thing. The Shakespeare Festival (The Duke), Street Performs Festival, and Improvaganza.

NOTE: a special thanks to Shahzma for putting up with all of us and being there when we needed you and giving us all the advice we needed. Also thanks for staying up with me all night to watch movies even though you were tired. Also thanks to Paul and the staff of St. Johns for keeping us alive for so long.

All the activities plan by Emily and Mariel have been so awesome, Pitch'n Putt (rolling down the green and YES there's pictures). I learned a lot about different jobs and degrees at the small group discussion (but please people talk more). The tour of Micralyne was fun right Mariel "I Thought I recognized those eyebrows". Thanks to both Emily and Mariel for making this the best summer of my life.

*"X number of movies at full price: You don't want to know \$'s
Time at West Ed. Mall: You really don't want to know \$'s
6 week at WISEST with the best people in the world: PRICELESS"*

*"I want to dedicate a little time to Margaret-Ann Armour;
with out her this program wouldn't be what it is.
She is the one who told me about the program.
Her presentation never ceases to amaze me and so
Thank You Margaret-Ann."*

Siobhan Galbraith

WISEST Supervisor: Dr. S. Proctor, Dept. Agricultural, Food & Nutritional Sciences
Sponsor: Suncor Energy Foundation

This summer has been one to remember! When I found out I had been accepted to the WISEST program, I had no idea what was in store for me. And I must say, the research program far exceeded my highest expectations- in terms of fun, personal growth, excitement, and learning within the lab!

Dr. Spencer Proctor took me under his wing for the six-week WISEST term I spent in his lab. His enthusiasm for the project was infectious, and made my time in the lab all the more worthwhile! Working with Dr. Jim Russell, Dr. Proctor and his wife Dr. Donna Vine, as well as the rest of the research team, including a summer student from Japan, has been very rewarding.



I was lucky to have been placed in a field of study that is of great interest to me. Our topic is one of tremendous pertinence in today's society- the effects of obesity, specifically on the cardiovascular system. I had the privilege of being able to work with an animal model- one predisposed to cardiovascular disease, atherosclerosis and type two diabetes- diseases which are all side-effects of obesity in humans. Due to the fact that this animal model – a colony of rats exhibiting the principle elements of obesity because of their homozygous genotype for the cp/cp allele – were developed by the U of A's own Dr. James C. Russell, (hence their name: the JCR:LA-cp rat), the U of A is the only University in the world having access to this strain of rat. After Alyssa England, my lab partner, also part of the WISEST program, and I had taken a rat handling / animal ethics course, we were able to assist in surgeries involving the rats, and even perform procedures on rats ourselves. I learned a lot about the care and ethical treatment of lab animals in research.

The learning curve in the lab for the first week was very steep, as Alyssa and I found out! It was great to have someone to talk to about the basic physiology needed in order to comprehend the more complicated workings of how cholesterol, proteins and triglycerides can be atherogenic if found in excess in the blood. It was great to bounce ideas off each other, especially when it came to figuring out what our results proved, and what conclusions we could take from the experiments done over our six weeks in the lab. To begin with, blood samples were taken from three groups of rats: the obese JCR:LA-cp rat- a control, lean rats- heterozygous for the cp gene, and JCR:LA-cp rats given CLA – a fatty acid having supposed lipid-lowering capacities. Using sera samples from these rats, Alyssa and I perfected our pipette skills as we performed cholesterol, triglyceride and protein assays on our very own samples.

Working in the lab was only part of my WISEST adventure; the social aspect has been equally as important. I have built so many close friendships, and made many memories. Life in residence has given this small-town girl a sense of what life in the big city is like, and what I can expect when I head off to the U of A next year. The WISEST program has spurred my desire and passion for knowledge. It has given me a taste of University life, while building new friendships and working with new people. It has been so inspiring to be surrounded by other young women, similarly passionate about science, who share my ambition, and have similar goals and aspirations. I am so proud to have been a part of this program, and movement of women entering the science field. If life is the sum of our experiences, I'm happy to say that the WISEST experience has been part of mine!

Penny Garnsworthy

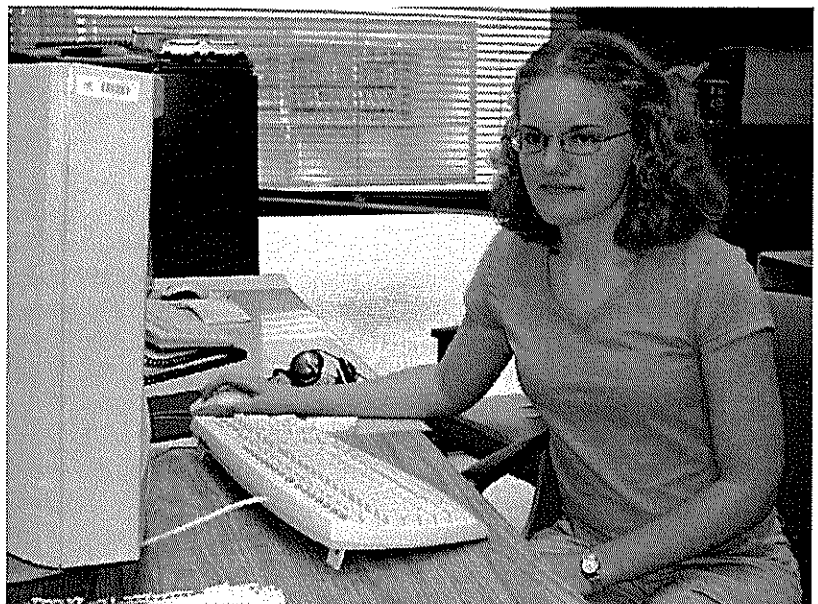
WISEST Supervisor: Dr. M. Kouritzin, Dept. Mathematical & Statistical Sciences
Sponsor: Petro-Canada

When I came to the WISEST Orientation Day at the beginning of July, the only mental picture I had of a "science lab" was a vague image of a quasi-space-station sort of room—a vast and rather airless glaring white tank, with spotlights drifting in indefinable orbs, and all smoothed off into circles around the corners. Inside the lab, I imagined a research team in pristine white coats, solemnly and wordlessly going about their work. Needless to say, my experience in the Department of Mathematics and Statistics successfully swept away all my half-formed notions about science and research. The squat little office that a fellow WISEST student and I occupied was comfortable and relaxed, and bore no resemblance whatsoever to the eerie, dome-like room I had pictured. Similarly, the people I met were all cheerful and friendly, and always willing to offer an explanation or try to make something clear. In fact, if there is one thing I can say about my experience in the WISEST program, it is that it was almost the exact opposite of my hazy expectations.

My partner and I spent the first week researching and compiling a report on random and pseudorandom number generation. At first we both found it somewhat intimidating, but after we had found our stride, the work became less overwhelming and a little bit easier to handle. In the weeks that followed, we spent a lot of time organizing spreadsheets and turning data into useful formats for our supervisor's spin-off stock company, Random Knowledge Inc. We also did some web research to find the basic characteristics of about forty top hedge funds. We then made a survey for Random Knowledge to help the company determine what to aspire to for its own hedge fund. Interspersed within these larger projects, we ran computer simulations and dabbled in C++ computer programming. Later on, we moved into another large project. We were asked to design a Flash media animation to demonstrate the Random Knowledge stock model for the ordinary "layman." We did some brainstorming with our supervisor and other members of the research team to try to come up with some workable ideas of how this might be done. We also brought in some of our earlier research of random numbers and C++ programming to generate graphs that could fairly accurately simulate a line graph of a stock exchange.

However, the technicalities of the projects I worked on, although they made for atypically interesting summer work, were really only a small part of my total WISEST experience. The weekly group activities and lunches, as well as some of the after-work outings, augmented my "good summer job" into a wonderful, broadening experience. Meeting new people and learning about other projects, as well as partaking in science-related tours and presentations, helped me to realize just how much is available in the field of scientific research. I also learned how to navigate the university campus in ways that never seemed possible during that mystifying and exasperating day on campus.

I suspect that the shadowy impressions I initially had of scientific research were based on either an old science fiction book or a "mad scientist" film. I now have a much stronger grasp of the true atmosphere of research and the pursuit of scientific knowledge. My experience with WISEST is not one I will easily forget. Even after my specific knowledge of "pseudorandom number generators" has slipped into oblivion, the skills I acquired and the impressions I formed of math and science will remain part of my remembered experience.

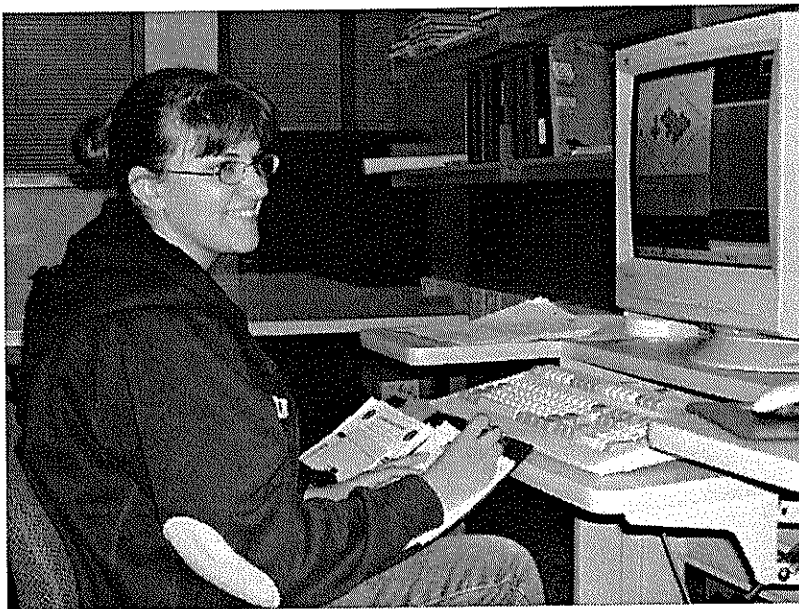


Felicia Gotobed

WISEST Supervisor: Dr. Ryan Hayward, Dept. Computing Science
Sponsors: Summer Career Placement Program & Faculty of Science

During my six weeks work with the WISEST Summer Research Program, I worked for Dr. Ryan Hayward and two of his graduate students, Jim and Sean, in the department of Computing Science. When I first got there, I was nervous about working in a lab with really smart computer guys. Lucky for me there was another WISEST student working in the same lab as me. I was sure that the guys were going to start talking in some programming language and leave me behind to marvel at how little I knew. To my surprise, these guys were all about math. They did a lot of math work in the Computing Science Center.

We started with a little bit of graph theory; we learned the basics and some of the history so that we could understand what we were doing. Then we moved onto the game of Hex. (Hex is a board game played on hexagons where each player tries to make a path from one side of the board to the other while blocking the opponent's attempts to make a path.) I could not understand how Hex was closely related to graph theory... but then I found out that we were working on different projects. Dr. Hayward wanted us to learn the basics on both projects so that we could talk to each other about our projects and help each other prove or disprove our theories.



I ended up taking on the Hex project. It took me two full weeks to learn and understand the strategy involved with playing the game and to win a few times. Once Dr. Hayward felt that I understood the game enough he set me the task of writing an opening book for an 8*8 Hex board. After working on that for a couple days and getting nowhere, he brought me a different problem with Hex. Each year the University of Alberta has a games competition with a different school. The Universities pit their games programs against one another to see which has the 'smartest' program. The Hex program for the U of A is Mongoose and the competition is called Six. I received a printout of all of the moves played in the 2004 games and was asked to analyze them. I was to report

any mistakes that I found in the way that the computer played the game. Which is to say that I was to report any places that Mongoose should have played in but never or to point out any virtual connections that Mongoose missed. (Virtual connections are connections from a piece on the board to another piece or edge that are not physically placed on the board, but there is no way to stop it from connecting.) I have documented all of the games that were marked as 'not perfect' as well as checked for missing connections and reasons as to why mongoose had lost. For this I am using a real 11*11 Hex board as well as two versions of Mongoose on the computers in the Algorithmics Lab. This is a very challenging problem and it can take days to find one small missing connection or mistake.

Every time that I think I have found a tiny break through, I get so excited. I honestly didn't think that I could ever get excited over a board game that takes thinking and skill, but this just goes to show that anything's possible. I hope that Mongoose will be able to beat Six next year in the competition. I know that what I have found will be vital to how Mongoose performs in any future competition and I will be proud to know that I have made a difference... even if it is only in a computer game.

Cathy Hajmrle

WISEST Supervisor: Dr. Andrew Simmonds, Dept. Cell Biology

Sponsor: Dow Chemical Canada Inc.

This summer I had the opportunity to work with Dr. Andrew Simmonds and his research team, in a cell biology research lab. Much of the research being done involves studying the changes and interactions between RNA and proteins, and how this effects cell growth and differentiation. To do this, the lab studies *Drosophila* (fruit flies), as they have homologues of human WNT-1, a cancer-causing gene. *Drosophila* are used as a model system, as opposed to human, because of their short life span and their high reproduction rate.

My project in the lab was based upon the concept that within all cells of eukaryotic organisms, cell function is dependent upon the effective decoding and translation of genetic material, DNA, to selectively produce various proteins. The basic flow of information in cells goes from DNA to mRNA to proteins. The DNA is in the nucleus and proteins are made in the cytoplasm. It acts as an intermediary messenger, mRNA, containing transcribed information, which is then exported into the cytoplasm, where its "message" or code is "read" by specialized "protein-making" ribosomes. A majority of cell regulation occurs at the level of selectively making mRNA, but recently, it has been found that cells also control the production of proteins by restricting access to the mRNA molecule after it leaves the nucleus and goes into the cytoplasm.



Our lab helped develop a completely new method that directly isolates the RNA from cells in such a way that the proteins remain bound to it. My WISEST project was to help test this method of determining mRNA binding proteins using a non-WNT mRNA and protein partner (from Rubella virus) that were known to interact. By showing that these known partners interact in this assay, I helped to verify that the effectiveness and reliability of isolating unknown RNA-protein partners using a well known RNA and binding protein produced from the Rubella virus.

I acquired first-hand knowledge of many common laboratory procedures, and gained understanding of the atmosphere and methods of a research lab. Also, being employed on the University of Alberta campus, and working with graduate students, has helped me gain insight and expectations of post-secondary education. The WISEST program has helped me acquire confidence and familiarity of university and science research, which will prove to be extremely advantageous in my future.

Overall, my six-week WISEST experience was very positive and constructive. In addition to working in a research lab, WISEST gave us the opportunity to explore other alternatives of the science field. I became aware of many more possibilities of careers and opportunities available to me. Also, through these activities, I met many new people, and had the opportunity to make new friends, explore the university campus, and have a really great summer! WISEST was a wonderful experience, and I am very thankful for being given the opportunity to participate in this summer research program.

Amanda Hall

WISEST Supervisor: Dr. Ken Westra, Dept. Electrical Engineering
Sponsors: Summer Career Placement Program & Faculty of Engineering

The moment I found out that I would be participating in the 20th anniversary WISEST Summer Research Program, I began to get nervous and excited about residence, what my lab and the people in my lab would be like and most of all how my experience at WISEST would turn out. As soon as I started talking to the other girls at residence, I realized that they were just as, if not more, nervous than me. Finally being introduced to my supervisor and entering my lab put all of my worries at ease. I was placed in the NanoFab in the Electrical and Computer Engineering department in the ECERF building under the supervision of Aruna Kroetch, my key supervisor being Dr. Ken Westra.

Just the name of my lab alone got me interested but when I first saw it I was overwhelmed with excitement. I got to wear cleanroom suits, otherwise known as "bunny suits" because they were white in color and everything is covered except your face. It was really neat but if the humidity gets high in the NanoFab, they have to increase the heat, so some days it felt like a sauna in there.



My project was testing to see the reliability of PDMS (polydimethylsiloxane), a type of plastic. I had to see when the PDMS started to stick, shatter the wafer or if pieces broke off after repeated uses. I was to test if features were still visible by using a SEM computer that sends electrons onto your sample so features can be seen close up. This was a tiring process because 30 PDMS molds were made, I cut out certain areas that had to be observed, sputtered them with gold and then looked at them under the SEM. The design of our wafer could be used in DNA electrophoresis and potentially in ambulances or hospitals. This is when a sample of your blood has currents of electricity sent through it and then bands of your DNA can be seen. They can then tell if you have a disease so certain precautions can be used before they begin to help you. My job here is to see how many times we could make these PDMS molds from the wafer with consistent results so that companies could save money by using the same wafer over and over. All was not good though, because the wafer we needed took four weeks of preparing so it would be in perfect condition when we started testing. It took so long because the etching process would not work but finally at the end of the fourth week a wafer was perfected and I began making PDMS molds. So in the last two weeks at the NanoFab I was trying really hard to make these 30 PDMS molds and look at them under the SEM. Since I had to wait sometimes, I always had other projects to work on. I had to find contact angles of wafers that had different processes done to them. The wafer could be hydrophobic (water hating) or hydrophilic (water loving). A computer was used to test this. I also helped Bryan, a NanoFab staff member test a manual he made on making a MEMS (microelectromechanical system) wafer.

I also had so much fun being in residence because you become a residence "clan" and you are constantly doing exciting activities. Just about every night we would go out and do something like go see a movie, or the amazing events going on in Edmonton and there always was the excitement of walking down Whyte Avenue. Residence was so much fun and the food was excellent as well. I had the best experience participating in the WISEST program; meeting new people and getting an up close experience being at the University of Alberta. I had the best summer and I hope everyone next year will have as much fun as I did.

Kazz Hamilton

WISEST Supervisor: Dr. Rina Freed, Dept. Biological Sciences

Sponsor: Edmonton Glenora Rotary Club

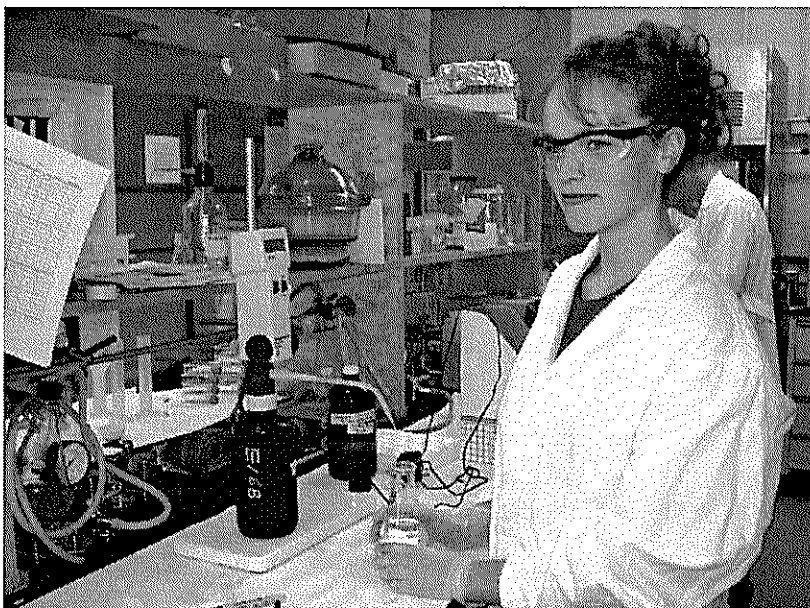
My first impression of WISEST was that of a put together and professional program. It turned out I was right. WISEST has left me with an experience I will never forget. Coming into this program, I was a little bit unsure of what responsibilities and challenges I would face. The first time I went to the field was not a good experience for me. I had no idea what was going on, and the weather was less than pleasant. I remember thinking, "I hope this was just a bad day, and fieldwork isn't always like this." However, my project was fascinating, and I loved my research team. I worked part of the time in the field and part of the time in the Limnology lab in the Biological Sciences building at the University of Alberta. When I was in the field, the weather was very unpredictable and the conditions were hard to work with. I learned that fieldwork means you have to be flexible, because nature is constantly changing, moving, and growing. This was a little challenge for me in itself because I am so used to everything being set in a certain way.

My project was looking at the effect of nutrients and silica on the water quality of Lac la Biche. There were 24 mesocosm bags set up in the water, with water from the lake in each one. Every week, different nutrients would be added to each bag. The most exciting part of the project was noticing the differences in the bags every week because you know that the experiment is working. That's the beauty of science, when something works! It was eye opening to see the real world of fieldwork and all the workings of nature.

After a long day or two in the field, we would come back to the lab, analyze our samples, and get ready to go out to the field again. Getting ready would include washing all our equipment, labeling bottles, cutting up strips of mesocosm bags, and typing data into the computer. Although this was sometimes repetitive, it was good to have a balance between the lab work and fieldwork. The people working on the project were a highlight in my project. It is really hard when something in your project does not always turn out the way you expected it to. Everyone on the project always tried to be cheerful on those days when things seemed to go wrong. We just had a good laugh, and tried to start fresh, without crushed hopes. Another valuable lesson I learned is that although science is very academic, it is not just so. You need to have other skills for when your initial plans change. Being creative and being able to recreate your plans is essential. Being well rounded is very important and can help out a lot when you get stuck.

Living in residence was one of the best experiences I had at WISEST. The residence girls were so much fun and everyone got along brilliantly. Although not all of us could attend all the WISEST events, for being in the field and other things, we always had fun things to do together. We made time to explore Edmonton a bit, go to movies, and taste the different foods on Heritage day. The festivals left an imprint on me I will never forget. The only thing I wish I could have done more of was meet with the rest of the WISEST students more often.

I think WISEST should be commended for their excellent job in organizing such a useful, insightful program, of which many young scientists will find enjoyable and interesting. Thank you WISEST. You have left me with not only an experience I won't be soon to forget, but also skills and ideas about what my future holds. To the world of science, here I come!



Bayan Hussein

WISEST Supervisor: Dr. G. Fasenko, Dept. Agricultural Food & Nutritional Sciences
Sponsor: Alberta Ministry of Innovation & Science

When I first started the WISEST program I didn't know what to expect. All I knew for sure was that I was going to work on a farm – with chicks! I was really excited about this because chicks are cute...but what was not so exciting was the uncertainty of what was going to happen. Was I going to work all alone on a far-away stinky farm watching chicken eggs 24/7 and waiting for them to hatch? Or was I going to work with a bazillion people, work on a farm that didn't smell too bad, and do more than watch eggs all day? I had absolutely no idea – but lucky for me it was more the latter!



I was placed in the department of Agriculture, Food and Nutritional Sciences with Dr. Gaylene Fasenko and her research team April, Bryanna, and Patrick. They were really nice and funny people and didn't seem to care much for the fact that I was quite clueless. I studied the effect of incubator conditions on hatchability of chicken eggs and focused on how egg-turning affects the hatchability of the eggs. The first day of work, while everyone else was 'reading' for their projects, my partner (Faryn) and I candled eggs, and we had to crack open the eggs that were infertile or had dead chicks in them to see what day they died. From then on I knew it was going to be an interesting six weeks! And it was – especially when the eggs hatched! The chicks were a variety of different rare breeds, so there wasn't only the usual yellow ones, but there was black, brown, black with white stripes, brown with white stripes, green (hehehe just kidding), and they were all so small and fluffy!

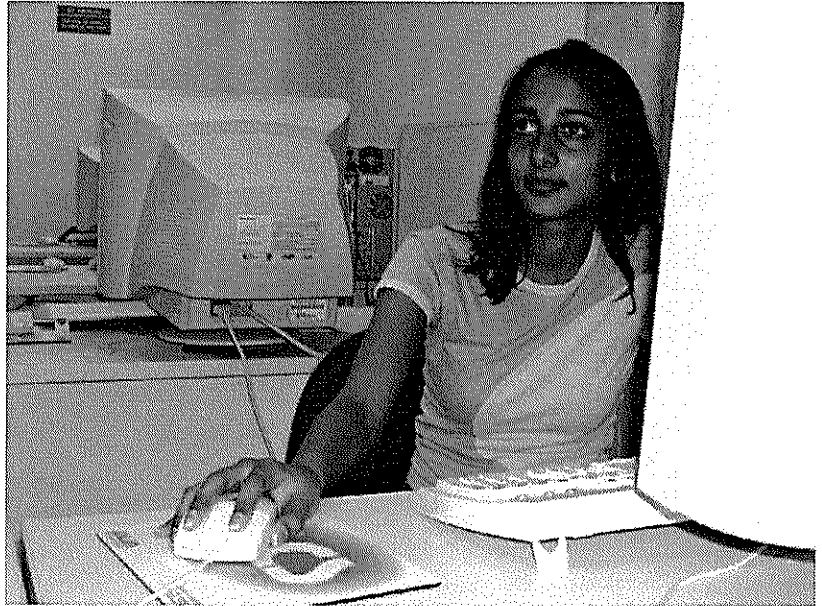
Unfortunately, my project finished early, so I worked with Faryn Lyseng in the micro lab and helped with her project. She was investigating how different brands of disinfectants work on manure on the surfaces wood, steel, and concrete. We mostly made agar, poured agar into plates, labeled plates, pipetted, and did dishes; all with good company. I have to admit though, every time I did dishes, I'd somehow manage to accidentally break at least one or two test tubes. Faryn referred to me as the most accident-prone person she knows...I took it as a compliment. So one thing WISEST taught me is to hold tight to glassware when your hands are slippery, oh and when you're vortexing a test-tube make sure you hold it tight too because it can just fly right out of your hands and all over the counter and floor...not that it's ever happened to me or anything.

Overall, WISEST was one of the best experiences I've ever had. It is definitely waaay better than other jobs. The coordinators, supervisors, and students were all such great people and are what made this experience extremely enjoyable. I met so many people in WISEST that I probably would have never otherwise met. The group activities like the pitch n' putt, lunches, and aloha 'picnic' were so much fun! Oh and the free bags, t-shirts, clipboards, highlighter-pens, and of course the free lunches were awesome. I learned a lot from the Wednesday afternoon stuff that we did, and I learned my way around campus, which is really important since I'll be going to the U of A. But most important of all, WISEST showed me that teaching and medicine are not the only two options available to a science graduate, and it opened my eyes to the numerous opportunities there are in the field of science. When I first came into this program I was rather inexperienced and unknowledgeable, but six weeks of intense experimentation, a couple of dropped chicks, and several broken test tubes later, I can truly say that I have changed for the better. I make my mama proud!

Nisa Jayathilake

WISEST Supervisor: Dr. J. Bowman, Dept. Mathematical & Statistical Sciences
Sponsors: Summer Career Placement Program & Dr. Arlene Ponting

My name is Nisa Jayathilake and I am a grade 11 student at Harry Ainlay High School. When I heard about the WISEST program I was very excited at the prospect of being able to have hands on experience at the university. I wanted to learn more about different fields before making my finale decision in my final year of high school. I thought the Summer Research program would be perfect in helping me make my decision.



When I first got my call for WISEST, informing me I was to be placed in the Mathematical and Statistical Sciences, I was perplexed as to what this field involved. This was the first time I had even known of its existence. I enjoy math and most especially the

sciences, but I never knew math could be considered a science. As my professor later told me, math is the science of patterns. With a vague idea of what to expect, I looked forward to learning about this new field while meeting new people and learning first hand what university life is like.

After the orientation day, I knew that even if my field turned out to be a total bore, I would still have the time of my life. The co-coordinators seemed very passionate and my peers all were lively individuals that I couldn't wait to spend more time with. However lucky for me, mathematical and statistical sciences was a very interesting department. Not only did I get to sound very smart when telling my friends which field I was in, it gave me the opportunity to learn a great deal about computers. I had previously found computers boring and merely a tool to communicate with friends and write up essays. However I found programming and the likes surprisingly fun! It was a challenge to write programs that did simple things my calculator could do, such as find standard deviation. However the feeling when I finally completed this was second to none.

The learning didn't stop when I left the computer lab though. The Wednesday afternoon sessions were very informative and made me look forward to my university career. The Thursday and Friday lunches, and well every lunch I spent in CAB, let us get to know each other while lounging under the sun. The best memories are from the social activities, especially our grand time at pitch and putt! Taste of Edmonton was a blast under the light drizzle and the indoor aloha picnic was unforgettable with the entire hula dancing balloon animals!

This summer has been a great experience and I am so glad I chose to participate it. I am very grateful to all those that made this summer possible for all of us!

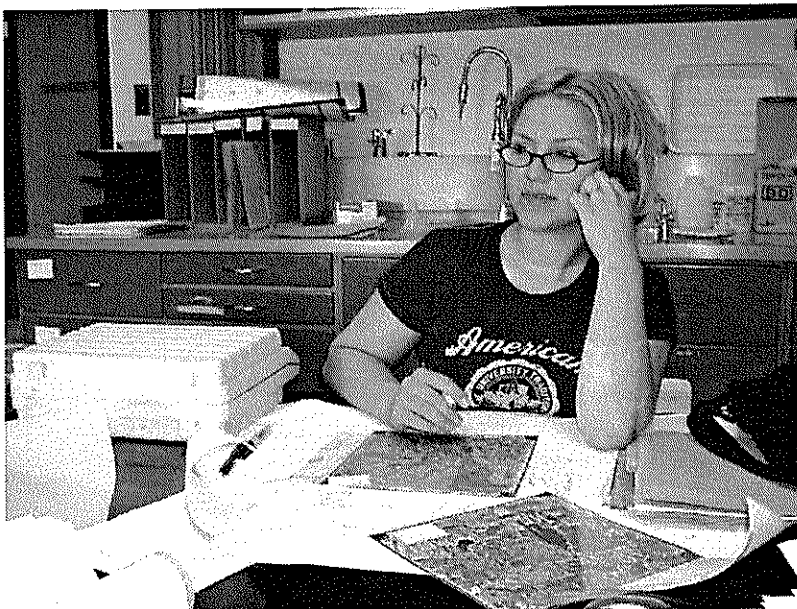
"However lucky for me, mathematical and statistical sciences was a very interesting department. Not only did I get to sound very smart when telling my friends which field I was in, it gave me the opportunity to learn a great deal about computers."

Karmen Kisser

WISEST Supervisor: Dr. Kevin Devito, Dept. Biological Sciences
Sponsors: Summer Career Placement Program & Faculty of Science

This summer I was given a once in a lifetime opportunity- the chance to work in a University lab, prior to completing my High School education. This opportunity allowed me to see what a career in the sciences was really about, and was all thanks to the WISEST Summer Research Program.

I spent my summer working in the department of Biological Sciences under the supervision of Dr. Devito in the field of hydrology. Hydrology is the study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere. Since it has been proven that the wetlands in Alberta run on a 50-year cycle, through understanding the movement of water and the role that wetlands play in buffering the environment, it is thought that we can predict where the next wetlands will disappear and where others will reappear.



I worked on numerous projects in many different settings, including the lab, library, field and computer lab. The majority of my time was spent on the analysis of air photographs, in which I was responsible for mapping the wetlands and areas of open water. Once I had mapped the wetlands on the air photographs I proceeded to digitize this information to come up with the total area of wetland versus the area of open water. The digitizer enabled me to find the area and perimeter of ponds efficiently. Although much of my time was spent looking at air photographs, I was also able to experience the wetlands first hand, which I found extremely interesting.

The experience on the field was by no means glamorous - we stayed in trailers and were constantly surrounded by mosquitoes. From this experience I learned many new things about the natural sciences. I performed various functions, some of which included coring soil, purging wells, and preparing samples for testing. When we prepared the soils for testing we first had to homogenize the samples and extract two small masses of soil, each weighing about 10 to 11 grams. Using these two soil extractions we were able to test for nitrates and phosphates in the peat. The complimentary extractions were made into two separate solutions using approximately 50 mL of distilled water (DDW) in one sample, and 50 mL of potassium chloride (KCl) in the second sample. Each of the above solvents helped to measure nitrates and phosphates respectively.

As one of the "Rez Girls", some of my fondest memories are of life at St. John's Institute, which, for 16 of us was our home-away-from-home. Being only 16 and coming from the small town of Barrhead (which hosts a grand total of 4 200 people), I found moving into the 'big city' rather intimidating! Life in residence was great- it is amazing how close people become in such a short period of time! The best thing about living in residence was building new friendships and hanging out. I will always remember our late night talks and our final infamous sleepover. In short, I had a blast! Without living in residence WISEST would not have been complete- for me WISEST was not just work experience, but also life experience.

Overall, this experience was very rewarding and actually reinforced my career goal- even though it is completely unrelated! I now know that I definitely want to be a medical doctor and hope to someday specialize in neurology. I also know that if my "plan a" fails, a career in the natural sciences may be in order.

Sabrina Kratchmer

WISEST Supervisor: Dr. Duane Szafron, Dept. Computing Science
Sponsors: Summer Career Placement Program & CN

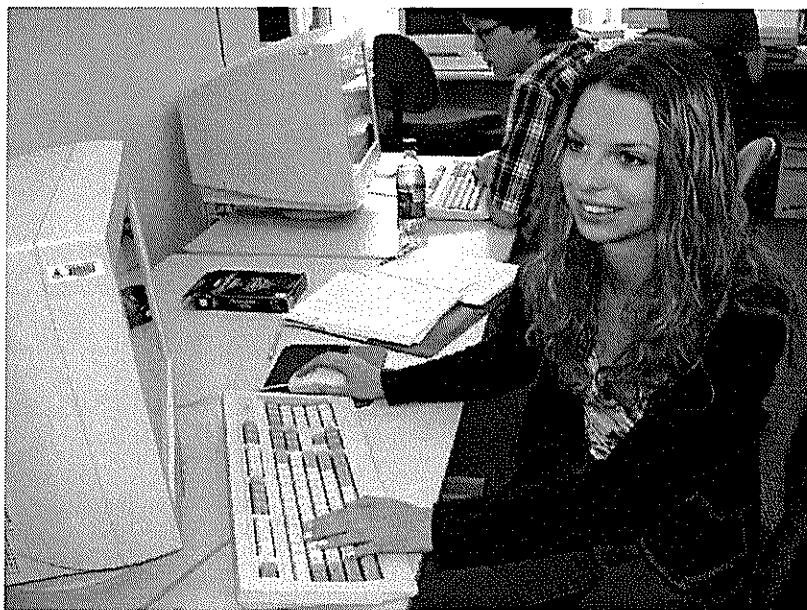
Whoever said good things come in small packages wasn't lying. When I received a little envelope containing an application for the WISEST Summer Research Program, I had no idea what was in store. But I soon found out that my experience with WISEST would be one of the most memorable of my high school years.

Working under the supervision of Dr. Duane Szafron, Dept. Computing Science and under the wing of his amazing research team, I learned more than I could imagine about the computers and technology that I love. Before my involvement with WISEST I thought I knew a fair amount about computers. Boy, was I in for a little bit of a shock when I met Maria, Curtis, Stephanie, Thomas, and Matt – my research team. They were so knowledgeable, and absolutely brilliant at what they do. They were all willing to teach me new things, help me out whenever I was having troubles with the project, or provide their opinion on whether Long & Mcquade or Axe was the better place to buy a guitar.

My role in the research program dealt with the designing, constructing and usage of video games and computer programs. I began by familiarizing myself with the programs we were going to be using. Specifically a computer RPG (role playing game) called Neverwinter Nights, and design tools Aurora Toolset and ScriptEase. I first went through tutorials for both programs to better understand how to use them, and then began the creation of my very own module using Toolset and ScriptEase. Later on, I even attempted to help with some technical writing for a Toolset tutorial being made by the research team.

The Aurora Toolset allows the builder to create their own game module (world) to play. It permits the designing of physical game layout of the module, setting of creature (character) and object (tree, chair) properties, and game object interactions. The tricky part hands down is the game object interactions. Computer scripting is required to create game interactions, and unless you know how to program, that can be fairly difficult, as I too discovered. Even the simplest behaviors and interactions were difficult for a newbie like me to script.

With the demand from game users for more intense and exciting games and characters, the scripting becomes even more complex. But luckily, the tedious scripting can be avoided with a new program called ScriptEase. This program allows the game builder to create scripts for a module with ever having to write code. You can imagine how technology like this would affect game creation and even storytelling in the future. Creating a game becomes so much easier, as I also found out, and there's even room for creativity as well. Stories can be told easily. Instead of readers, you have players, and you can create a whole plot and storyline to go with your game. During the beginning of the 2004 school year, the goal for ScriptEase is to have some grade eleven high school students use the program, see how they like it, how it works for them, and expose them to a new concept of storytelling. I'm very hopefully, as the program has been successful for me in the past six weeks.



I've always loved video games, computers, and technology, that sort of thing. But for me to be able to work in a lab with real designing tools, real research atmosphere, and such a talented, knowledgeable research team

(who by the way have excellent taste in quality films such as Anchorman and books like Harry Potter), the experience has been surreal, priceless, and something I will always treasure and never forget. This opportunity would not have been available to me if WISEST wasn't opening the doors and providing chances like this each year for students like me, so I would like to extend my thanks to them and deep gratitude for this once-in-a-lifetime experience.

Ariel Lau

WISEST Supervisor: Dr. Imran Mirza, Dept. Laboratory Medicine & Pathology
Sponsor: NSERC - PromoScience

If anyone could begin a story with, "I spent six weeks with an interesting bunch of MAD scientists," that person would be me! Well not quite, but it was undeniably similar! Here is my WISEST Summer Research Program 2004 experience.

I worked in the Hematology Lab, Bone Marrow Reading Room of the Laboratory Medicine and Pathology, which is located within the University of Alberta Hospital, or what is better known as the WC MacKenzie Health Sciences Center. I worked for Dr. Imran Mirza. The research I carried out here was formulating a database with 3 years worth of records for all acute myeloid leukemia (AML) and acute lymphoid leukemia (ALL) patients within northern Alberta. The information and conclusions found in this project will be valuable to future research done on acute myeloid and acute lymphoid leukemia. These records consisted of various tests, such as flow cytometry, cytogenetics, blood counts and bone marrow



differentials, which patients must undergo during a formal diagnosis. My project was to generate statistical and analytical evidence of these records as well as suggest or infer any patterns and/or relationships that may appear to correlate with certain environmental factors, living situations, age distinction, etc.

I began my work by entering records and test data of numerous patients. Each individual test performed received its own table of information. Once all the necessary data was entered into the program, I could begin generating a web of relationships. Between these tables, a group of related information emerged and could now engender queries and reports. Specific statistics were chosen from the database and presented as factual information to use in comparison to other hospitals or geographic areas. Creating and furthering a relational database was challenging, but with a little stamina and perseverance, the outcome was valuable.

I found that the work I had performed would be very beneficial and useful for future employment. I attained knowledge of some computing programs such as Access 2000, which is a program used in constructing relational databases. Both large, multi-corporate companies as well as small private owned businesses use this program. I am grateful for learning these skills I will carry with me for upcoming purposes.

Taking into consideration that I am a foreigner to Edmonton, the opportunity to come here from Yellowknife, meet interesting scientists, research in a real lab environment and get to know other people with my shared

interest, struck me like a gold mine. From the first day to the last, I have never partook in such an enthusiast group of bright, young students. I can smell the success already!

Meeting brilliant people, such as Dr. Mirza, female role models in science and of course the amazing coordinators from WISEST, truly opened my eyes in seeing life's possibilities after high school and the unpredictable occurrences at university. To experience an actual research facility around the numerous lab technicians and real-life scientist, hard at work, inspired me to pursue more challenges and take on as many opportunities I can handle.

I must admit, most of the residence girls I met and got to know over the six-week period were very different from the people I've grown up with. However, these individuals were different in the best way possible. And by that I mean they were all truly their own person and were never afraid to expose it to the world. The environment at WISEST was always chalk-full of energy; it was almost difficult to get bored! From balloon animals to pizza parties at Athabasca Hall, barnyard games included, having a great time was always on the menu. It has been an honor getting to know all the students, professors and other wonderful people here at WISEST.

The ability to absorb so much knowledge and skill over the past six weeks, through the helpful guidance of Dr. I. Mirza, enables me to step forward into the world of science with a paramount of confidence which would not have been possible without a research program such as WISEST. Thank you for the experience of a lifetime! It has been extremely helpful in terms of finding my future at university!

Magdalene Law

WISEST Supervisor: Dr. Jason Acker, Dept. Laboratory Medicine & Pathology
Sponsor: Alberta Heritage Foundation for Medical Research (AHFMR)

What can I say, my six weeks working with the WISEST summer program was a blast! I have had the opportunity to learn new skills, gain first hand experience in a lab, and best of all, meet some amazing people.

The first couple days with Dr. Acker consisted of learning the basics of lab safety. Once that was "mastered", he laid out similar projects for Daniel, a Heritage Youth Researcher Summer Program (HYRS) student, and myself. In a nutshell, I compared different blood storage solutions and their effect on red blood cells over a period of forty-two days. Dr. Acker's graduate students trained both Dan and I for a week; whereby we learnt assays such as % Hemolysis, ATP, and 2,3- DPG. Once we were able to work independently, we carried out these assays everyday, collected the data, and then entered it into the computer to be analyzed later. We also obtained cryopreservation dates from provinces across Canada to determine the period of time between collection and process dates. The entire project contributed to help determine better ways of preserving blood, and at longer periods of time.



The WISEST Summer Research Program not only enabled me to gain lab experience, but also provided me with insight on possible career opportunities. It gave me a chance to meet peers from around Canada that shared similar interests. The Wednesday afternoon sessions were filled with different activities that enabled us to interact with not only WISEST students, but also professions of all sorts. Another huge benefactor was that WISEST allowed me to become familiar with the U of A Campus. This will definitely give me a heads up next year because my classes will be a bit easier to find. Well...at least I will know if I am in the right building.

I guess the best part of this experience was the people. Over the course of the six weeks, I have been inspired by not only scholars and professionals, but those I have had the chance to work and become friends with. My research team was extremely welcoming and they were always ready to help- even with the amount of work they themselves had. The WISEST coordinators, Emily and Mariel blew me away with their all around personalities. They, along with Grace, made WISEST fun and a valuable learning experience. Last but not least, my friends that I met through WISEST inspired me with their dedication, hard work ethic, and unique qualities. They made WISEST a memorable and fun experience, and I feel blessed to have met these wonderful individuals.

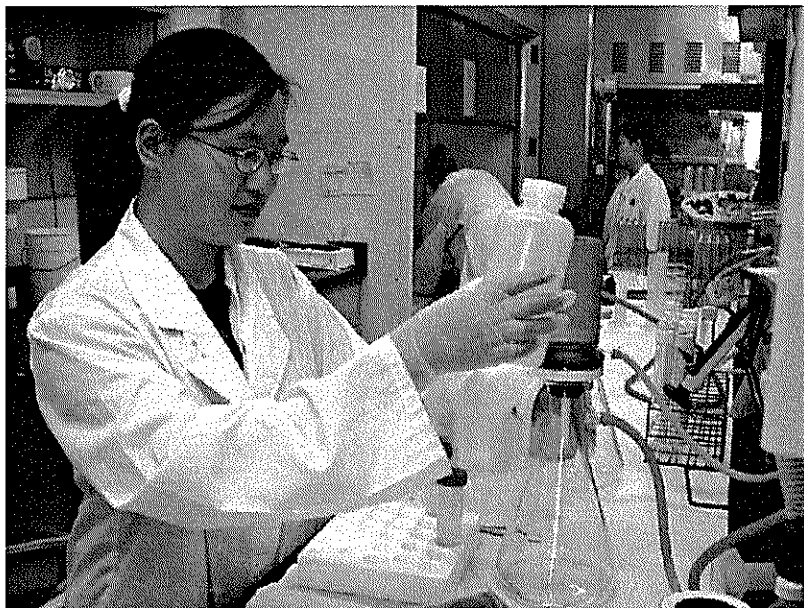
Not many people get the occasion to experience programs such as WISEST, and I feel fortunate to have been given this opportunity. My six weeks of summer with WISEST have been enjoyable and I encourage those who get the opportunity in the future to make the best of it.

"The WISEST Summer Research Program not only enabled me to gain lab experience, but also provided me with insight on possible career opportunities. It gave me a chance to meet peers from around Canada that shared similar interests."

Sharon Leung

WISEST Supervisor: Dr. Rina Freed, Dept. Biological Sciences
Sponsors: Summer Career Placement Program & CN

What do mesocosm bags, thermistors, van dorns, integrated sampling tubes, and secchi disks have in common? They're all things I have worked with during my incredible WISEST experience! During the past weeks, I have worked with my supervisors, Angela Crowe and Erik Allen, on the Lac la Biche project. My



partner Kazz and I split our time between the Limnology lab at the University of Alberta and at Lac la Biche, about 2.5 hours northeast of Edmonton.

Most of the excitement happened at Lac la Biche, where we collected water samples and tested for water quality parameters such as dissolved oxygen, total phosphorus, and light penetration. One purpose of the Lac la Biche project was to determine the sources of nutrients to the lake. By testing water from the streams surrounding Lac la Biche, it would be possible to determine how many nutrients entered and left the lake.

Water sampling didn't seem very exciting at first, but I soon realized that there was much more than just collecting water in a bottle and sending it to the lab. Temperature, light penetration, and dissolved oxygen have to be measured every meter, and water samples are taken in several ways. It took me a while to get used to using all the equipment, especially the zooplankton and phytoplankton nets. Rinse once, drop to one meter above bottom, haul back up (heavy!), put sample into bottle, rinse once, repeat x 2 (or 4) except rinse twice for the last haul.

Another part of the project was to determine the effect of silica on algae growth. To test this, we set up 24 mesocosm bags (3000 L bags) in the lake. Each one was sort of a mini lake, and it was really neat to see the differences in the bags each week. Some would have only a bit of algae in them, but others would be almost black at the bottom.

I learned a lot about fieldwork during the past weeks, especially about how unpredictable it can be. A lot depends on the weather; if it's a nice day, sampling will be fun, if it rains or there is chance of thunderstorms, ouch... If anyone ever wanted to test Murphy's law ("if something can go wrong, it will"), they should definitely come work in the field. Before WISEST started, Angela's mesocosm project was ruined because water entered the bags from the lake. We had to help her start all over again in another location. Also, almost everyone in my research team has dropped something in the lake or in the mesocosm bags, and we have had to find creative ways to get them out. We eventually learned to put buoys on everything!

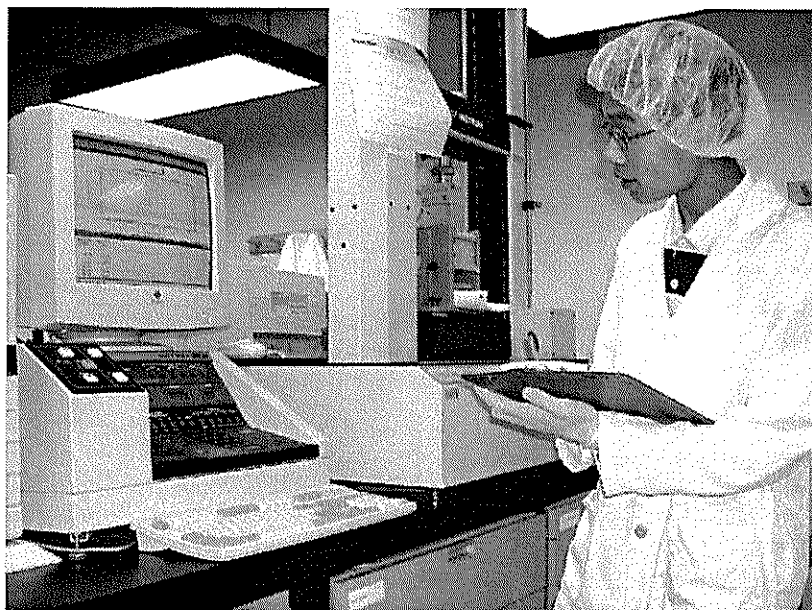
My WISEST experience wasn't all work though. Every Wednesday we would have special activities such as tours and discussions. I wasn't able to attend all of them because we would be out in the field, but I really enjoyed the ones I did. I found that the small group discussions really helped clear up confusion about some potential careers. Because of WISEST, I was able to meet new friends, learn a lot about fieldwork, and I finally know my way around campus!

Mason Lin

WISEST Supervisor: Dr. W. Wismer, Dept. Agricultural Food & Nutritional Sciences
Sponsor: Alberta Ministry of Innovation & Science

When I walked into the WISEST orientation in the morning of July 5th, I wondered where the next six weeks would take me. Strangely, I wasn't placed in the Faculty of Nursing where the other five male WISEST students were placed, but rather into the Department of Agricultural Food and Nutritional Sciences. Nonetheless, I had a great time during my six weeks there.

I was supposed to be under the supervision of Dr. Wendy Wismer, but she was mostly unavailable because she was on maternity leave. Instead I aided Kylie Kidd (a graduate student) in her Masters saskatoon berry project. The overall goal of her project was to evaluate the quality of saskatoon berries that have received modified atmospheric packaging. Fresh saskatoon berries lose their flavour and aroma quickly and are usually processed into products such as jam or wine. This project would determine if MAP saskatoon berries would maintain the sensory qualities of fresh saskatoon berries to expand the market for fresh saskatoon berries.



The project was divided into two parts: sensory evaluation and instrumental analysis. Sensory evaluation involved a trained panel and consumer panel. In order to be selected into the training panel, the panellist had to be screened. I had the opportunity to go through the screening process, which required a test on my ability to discriminate the 5 basic tastes and to rank sweet solutions according to concentration. I got all the 5 basic tastes right, but missed on the ranking of two solutions. I also answered a questionnaire that tested my ability to describe aromas, flavours, and texture.

During the four weeks that the training panel lasted, I prepared reference standard solutions in one-litre volumetric flasks for each of the aromas (such as mustiness) and flavours (such as sweetness) associated with saskatoon berries by micro-pipetting chemical solutions and diluting. I also prepared bamboo shoots and grapes for texture attributes. Training of the panellists included ten one hour-long sessions, during which they were trained to evaluate as a single instrument. After training was completed, panellists evaluated three cultivars of fresh berries in individual booths. The evaluations from the trained panel will provide the sensory profiles of fresh berries to compare against MAP berries.

As part of the instrumental analysis, I worked with Saleem Al-Nuaimi, a WISEST student from 2003, to test for fruit firmness, surface colour, and pH of the same three cultivars that the training panel evaluated. For firmness, I used the Instron Universal Testing System, which measured the force required to crush 30g samples of berries. To assess surface colour and pH, I crushed samples of berries by using a mortar and pestle and squeezed them to obtain berry extract. I placed the extract under a pH meter to get a pH reading of the extract, and then poured six grams of the extract into petri dishes. The petri dishes were scanned by HunterLab Labscan XE to determine surface colour. The results from instrumental analysis would be used as quantitative analogies to the qualitative results provided by the trained panel.

In addition to the lab work, WISEST scheduled many fun-filled Wednesday afternoon sessions, which included informative campus tours, small group discussions, and other workshops. I also had the opportunity to job shadow a nurse one morning at the Grey Nuns Hospital. These events were very informative and added to my WISEST experience about other opportunities I can pursue in the future. By the end of the program, I am glad and very grateful for having had the chance to work in the WISEST program this summer.

"Working in a non-traditional field allowed me to break out of my comfort zone and to consider opportunities I never would have considered before. I also learned what researching in laboratory settings entails. Just as important, I have been well equipped with knowledge and experience to share with confidence to others about a field of research that is non-traditional for males."

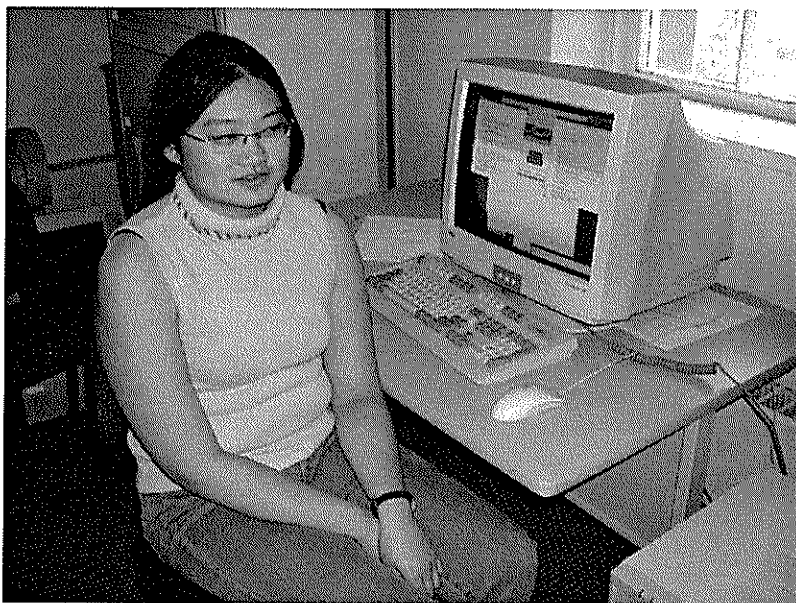
Karen Liu

WISEST Supervisor: Mr. Rob Lake, Dept. Computing Science
Sponsor: Syncrude Canada Ltd.

When I first heard about the WISEST Summer Research Program, I thought it would be an interesting way to get away from my home for the summer. Combined with that, this experience has been one of the most fulfilling and enjoyable I have ever had. I did not expect, however, the amount of learning and the challenges I was about to encounter.

Throughout the past six weeks, I have been working in the Department of Computing Science, supervised by Rob Lake. My project, which was to create a database to help the department catalogue their machines more efficiently, required my partner (Ghazaleh Ashrafi) and me to learn how to write HTML, CSS, and PHP scripts, and also how to use a MySQL database. We also needed to learn the basics of using Linux. Before we started the project, we learned how to script by building our own web pages to get familiarized with HTML,

CSS, and PHP, then created a small database, built web forms, and wrote PHP scripts so that these forms would be able to search and alter this database. The next step was to create a much larger database with three tables in it, make new web forms, and modify our scripts from the previous database.



Do I make that sound easy? There is absolutely no way for me to express the amount of headaches I got from doing this project. I also believe I have no words to describe the overwhelming excitement and joy I (and my partner) felt when something that refused to work before started working (finally!). Next, we had to make the whole thing run automatically every night. If I knew how to explain it better, I really would. There are doubts that this part will be finished in the short amount of time left, unfortunately. I would like to thank my supervisor and my partner for their encouragement and brilliant ideas that got me (actually, it should be "us") through some of the most difficult parts of this project, however fun it was.

Another thing that made this summer so enjoyable was staying in residence. I am sure that the other residence girls agree with me when I say that staying in residence has made this experience much more pleasurable than it would be if we had lived in Edmonton. Residence has made this experience seem like an ongoing... I (almost) hesitate to use the word party, while if we were staying at home, it would be simply a summer job to go to everyday and then go home. I made many good friends this summer because I stayed in residence. I should also thank the residence advisor, Shahzma, for planning so many fun activities for us, and being there when we needed something. And I suppose I should say something about the delectable cookies in residence. Really, those are the best cookies I have ever had in my life.

Perhaps I should apologize for being a bit biased in the last paragraph. I did make lots of friends outside of residence as well. The WISEST activities made it possible for all of us to get together and meet everyone. The Student Coordinators (Emily and Mariel) were constantly encouraging us to go to the weekly lunch gatherings to meet at least half of the WISEST students. Along with these weekly lunches, we had a few tours and got to meet many women who are actually in science and engineering. We also went to "A Taste of Edmonton" as a group activity, which, I must say, was absolutely a delicious experience. By now, you must think that I am obsessed with food, but that is only partially true. I am obsessed with GOOD food.

The WISEST Summer Research Program was probably the best learning experience I have ever had and definitely the best summer I have had. Despite the homesickness and the headaches from work, I am very glad I received "the call" and that I decided I would participate for the summer of 2004. This is most definitely the best way to get away from home for the summer!

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I got from doing this project.
I also believe I have no words to describe the overwhelming excitement and joy
I (and my partner) felt when something that refused to work before
started working (finally!)."*

Faryn Lyseng

WISEST Supervisor: Dr. G. Fasenko, Dept. Agricultural Food & Nutritional Sciences
Sponsor: Alberta Ministry of Innovation & Science



During my six week period in the WISEST Summer Research program, I had the privilege of working under Dr. Gaylene Fasenko, and immediately knew that I was in for summer of fun and adventure. This was reconfirmed when I met the amazing students working for her this summer Patrick, April and Bryanna. I became accustomed to their joking ways I knew that I would quickly find my place in this world of unknowns that I was entering. I worked in the Microbiology lab in the Agriculture, Forestry and Home Economics building part time and at the University of Alberta Poultry Research Centre the remainder of the time.

My project for the summer was to take part in a study that determined the effectiveness of different brand of disinfectants on poultry manure, on wood, steel and concrete surfaces. I quickly learned how to pour and label media plates to grow bacteria on. I also learned the required aspect of a sterile environment to ensure the quality of the sample. We created plates for the negative control (surfaces lacking the presence of any manure or disinfectant), positive controls (surfaces with only manure on them), and samples with both of the different disinfectants (Proquat and Virkon) on them after the manure sample on the surfaces had dried. We then waited the appropriate amount of time to count the number of colonies of bacteria growing on each plate. We repeated this process three times and gathered the data.

I also worked with another WISEST student by the name of Bayan Hussein. Her experiment involved determining the hatchability of rare breed eggs based on different egg turning techniques. This was the farm related part of my summer and I enjoyed it thoroughly. We were there for the day of the hatch of all the eggs. It was amazing to see thousands of eggs hatch with chicks of all different sizes and colors. There were chicks that were yellow, and reddish-brown. Then there were the chicks that looked like chipmunks wearing make-up. But my personal favorites were the chicks that were black with yellow markings on their necks and bum. We also experienced many different things on the farm. We helped to weigh and candle (help to determine whether they were alive by holding a light to the top of the egg in a dark room) eggs. We weighed chicken feed. We also collected eggs and learned about egg quality. We assisted the other professors and students in dissecting chickens and learned how to cut out certain organs without wrecking them, in order to determine weight and length of them.

The WISEST program this summer has opened my eyes to a completely different way of life. The university life that is coveted by many is now a definite must in my future. I learned things that many university students don't know until later on in their university careers. The ability to learn about the endless possibilities at university ahead of time has given me a definite advantage over the other students of my age. I also observed what a career in research is like and gained a better understanding about other careers and opportunities available. WISEST has provided me with educational advantages, a little spending money and wonderful friends that I will have for a lifetime. WISEST was a life-changing experience and I can't wait to let others know about it.

Amanda Martens

WISEST Supervisor: Dr. Cindy Paszkowski, Dept. Biological Sciences
Sponsor: Alberta Ministry of Innovation & Science

My six weeks in the WISEST Summer Research Program saw me studying amphibian ecology under the supervision of Kirsten Norris, a Masters student at the University of Alberta. I had the amazing opportunity to live and work at the Meanook Biological Research Station (MBRS), about 20km from Athabasca. This meant that I was doing fieldwork every day and could see all aspects of life on a research station.

I was responsible for a project called Researching Amphibian Numbers in Alberta (RANA). The RANA pond was surrounded by a plastic fence that prevented amphibians from entering or leaving the pond unrecorded, it also served to guide the amphibians into one of the 20 pitfall traps. Traps, made of PVC containers, were placed in the ground; each trap contained a rock that served as a perch, damp moss to keep the amphibians moist as well as a stick that reached from the bottom of the trap to the surface that would allow small mammals to escape. I checked the RANA traps every day recording the trap number, species, size, weight, sex, age and presence of a mid-dorsal stripe for every frog.

I also worked with Kirsten Norris on her master's project studying the interactions between wood frog tadpoles and northern pike. An impermeable curtain creating 6 individual ponds divided three ponds. Three of the pond halves were stocked with 4 Northern Pike and all 6 ponds were stocked with wood frog eggs. Every day we performed visual surveys looking for tadpoles and pike, and checked invertebrate traps. The invert traps were set in the water for 24 hours and caught tadpoles and numerous invertebrates. The tadpoles were weighed and measured, and the number of invertebrates and their species recorded. Once the tadpoles began metamorphosing into small frogs



we opened a number of pitfall traps to catch them leaving the ponds. Each frog was weighed and measured and released outside the pond. My research team and I spent a great deal of time trying to catch the fish in our ponds. Once we caught a pike, its size and weight was recorded in the Pike Book so we could see if it was growing and when we had caught it last. We also flushed the pikes' stomachs in order to see what they were eating and if any of our tadpoles were being eaten.

My fieldwork at MBRS also included camping trips to Lac La Biche. We used three different LLB lakes to set pitfall traps and gather comparative data. These trips were so much fun, definitely one of the highlights of my summer. After parking our giant U of A truck just off a logging road we quickly unloaded and packed our quads before taking the bumpy, but exciting roads to the lake. We checked pitfall traps on both sides of each lake, weighing and measuring the frogs as well as clipping one of their toes in order to determine which frogs we had already trapped. We also spent time fishing and setting gill nets in one of the three lakes in order to find out about the different fish populations that inhabited the lakes.

Working and living at the Meanook Biological Research Station has been an outstanding experience, which I will not soon forget. I met a lot of really interesting people and made friends that I will always remember. WISEST has helped me to better understand what it means to be working in field biology and I've learned more as to what to expect from university.

Carli Milner

WISEST Supervisor: Dr. M. Suresh, Faculty Pharmacy & Pharmaceutical Sciences
Sponsor: GlaxoSmithKline

When I received my acceptance call from WISEST, I was very excited, but I didn't have too much opportunity to think about it, being busy with everything that accompanies the end of the school year. But about two days before the program was to begin, I was suddenly hit with anxiety, and I was worried that I wouldn't be able to understand and contribute to my project. At the end of orientation day, Sujatha, my supervisor, and Kelvin, a third-year university student whom I would work with for the majority of the six weeks, picked me up. When we arrived at the lab and they began to explain the basics of my project, I really had no idea what they were talking about.



Over the next couple of days the situation improved a lot, and as I read and asked questions about my project, I realized that the science behind it was not too difficult. I was also able to see the value of my project. Over the past year my lab had developed a two-dot filter assay that could detect *Escherichia coli* 0157:H7 in water samples. The purpose of the project was to provide a product that is cost efficient, and could be easily implemented in water testing labs. My assignment with Sujatha and Kelvin was to test the assay on water samples that had been collected from various beaches around Alberta. Three days a week I would pick up water samples from the provincial lab at the University of Alberta Hospital. Next we would filter the samples onto previously coated filters, amplify the bacteria, wash the filters and add colloidal gold or streptavidin beads that were conjugated to an antibody and would give a colored signal. A negative sample would show one dot while a positive sample would show two dots. Unfortunately, some batches of the colloidal gold we used was not working great, and this affected our results. Often our samples gave no signal, but this just made it more exciting when we got a positive result. I learned that research isn't just about success and failure. More often than not you don't get the results that you expected, but that just means you need to find out what went wrong and try again. Towards the end of the six weeks, our lab met with the provincial lab and decided to continue the project, as well as to introduce new means of confirming whether our test was reliable. Hopefully the test will be perfected and implemented some time in the future.

Besides just working on my project, I had a lot of fun and learned many new techniques. I spent a lot of time in the biosafety hood, and worked with live bacteria. I did some cell culturing, bacteria plating, and protein purification, and I learned about some of the important research in my lab. There was diabetes, ebola, and cancer study going on around me, and I felt privileged to work amongst doctors, post docs, masters and graduate students who were performing such valuable research. I attended several lab meetings and even had the opportunity to present to the rest of the people in my lab.

Another great part about the summer was the fun planned by the WISEST office. I met many new friends with similar interests as me, and some who were completely different. We also participated in some really enjoyable activities, my favorites being the Aloha picnic, (even though it was indoors) and the pitch n' putt. I had a great time this summer while still having the opportunity to expand my career ideas, learn my way around campus, and start to think about my future.

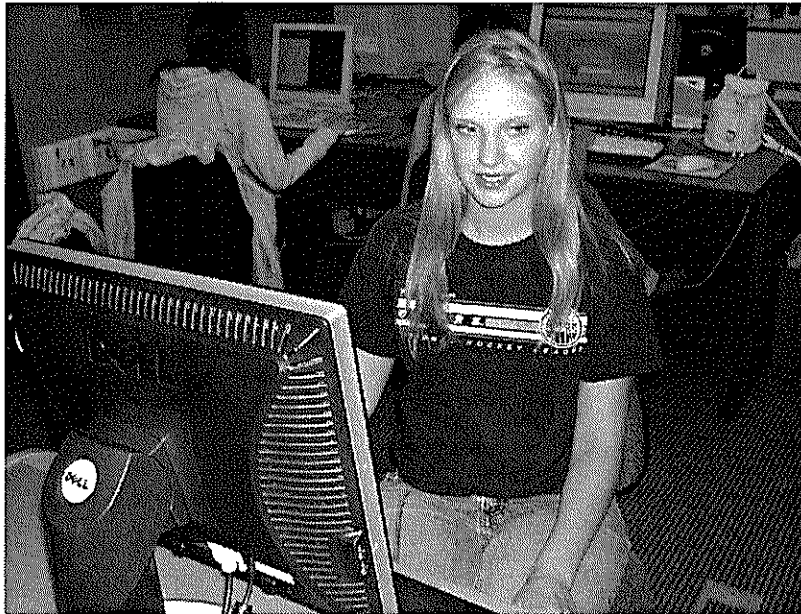
Katie Molzan

WISEST Supervisor: Dr. Martin Jagersand, Dept. Computing Science
Sponsors: STEP & CIBC

During the WISEST Summer Research Program, I worked under the supervision of Dr. Jagersand and his team in the department of the Computing Sciences doing 3D imaging. Tammy, another WISEST student was also working in the same lab as me. Dr. Jagersand's team consisted of graduate students Keith Yerex and Neil Birkbeck, and his partner Dana Cobzas. Going into a lab that was male dominated was a little weird as there was also two other guys that worked in the lab, but they were all very accepting and wanted to teach us all that they could within six weeks. With all of their big, complex words going into our innocent brains, we tried our best to understand what they were talking about, and most of the time we found ourselves simply smiling and nodding until they realized that we had no idea what they saying and went into greater detail so we could understand.

A lot of our research during the program involved using regular cameras to capture objects, and make them like computer games and animations. Our research was the cultural part of the research, while the grad students worked on the technical part. For the cultural, the team was exploring with our help what is the best way and format to capture real world heritage objects and scenes and how to present digital exhibits and animations.

The idea of our research was that we would learn how to use the cameras, plan, capture and organize a piece of 3D media. To start with we made a couple of web pages so we could get used to everything. The final result of our research was hoped to be a website using 3D captured models to illustrate a story. To start with we just captured the objects and imported them into a program called Maya, which is the same



program that Shrek was created with. We played around with the objects in this program moving them around and testing out different textures and lighting etc. to get used to how everything worked. Then, once we got better at it, we made small video clips with the objects moving. Our next task was to then take different, more complex objects, like the seal hunt objects from the museum, capture them, then make a website telling a story using these objects. Once the objects were captured, we once again imported them into Maya and created little clips like mini movie clips with the objects making them animated. Our Websites turned out well and I learned a lot about computers that I didn't know.

WISEST taught me about what it is like to work in a computer lab. By being a part of WISEST and just talking to professors, students and other WISEST students, I learned a lot about different career opportunities and research and about different areas that are of interest to me. I learned more about engineering, science, technology. I also learned a great deal of what University life will be like and just what life in general will be like after I graduate from high school. The program has confirmed with me that although the Computing Sciences is very cool, it is not what I would like to go into, but I know that when I go to University, I will already know some people from the program like students and professors. WISEST has not only provided me with the coolest summer job ever, but also with the opportunity to learn about different career areas for planning my future, while meeting new people and having a great time.

Haley Moore

WISEST Supervisor: Dr. Kim Chow, Dept. Physics
Sponsors: Celanese Canada Ltd. & Lehigh Inland Cement

When a friendly voice told me over the phone that I had been accepted into the WISEST Summer Research Program, I was very excited. I knew the opportunity of getting to work in a real research lab on the beautiful University of Alberta campus and getting paid for it was invaluable to me. My favourite subject being biology, I was a little hesitant when I was told I would be working in physics, but I was up for the challenge, despite being slightly nervous. On the first day of the program, I arrived not knowing quite what to expect. I was excited to find a room full of friendly faces, supportive coordinators, and that all of them, like me, loved science.

In the afternoon, I journeyed across campus to the physics department, where I would be working in the lab of Dr. Chow. I was privileged to meet not only Dr. Chow, but all the graduate and undergraduate students and other people working in the physics building, all who I would be working with for the next six weeks. During the course of the first and second days, I experienced an information overload! Before I started work in Dr. Chow's lab, I had little idea as to what a nanocrystal was. In the first few days and for the duration of the program, I not only discovered what a nanocrystal was, but how a nanocrystal could be made and used.

Throughout the course of the six week WISEST Summer Research Program I worked on a variety of different projects, some very tedious and some very exciting, but all of which taught me about the development of silicon nanocrystals and the fact that when they are created, they can be excited with a laser beam and will photoluminesce or emit light. This is an exciting phenomenon when one considers the availability of silicon, which in its normal state will not photoluminesce, the microscopic size of the nanocrystal, and the fact that light from these silicon nanocrystals could provide a much faster way than electrical current of transporting information in computers and machines.



I began my involvement in Dr. Chow's research by learning about the process of sputtering using an RF Magnetron Sputtering Apparatus. Using this machine, a thin film of silicon and silicon oxide was deposited on to an approximately 0.27 inch square of quartz. One of my jobs was to cut the quartz into these square "slides" using a diamond wire saw. The "sputtered" slides were then annealed (heated) in a horizontal argon-hydrogen oven at approximately 1000°C for various lengths of time. I learned how the oven works, helped in its operation and also assisted in repairing a broken seal. It was at that time that I was introduced to the machine shop and discovered its importance in the success of all the research going on in the physics department. Most of the machines, including the oven and sputtering machine were largely designed and put together by the professors, technicians, and machinists of the physics department. Thus, replacement parts and modifiers could not be bought from a hardware store. When it was necessary to connect a gas tube to the oven, or when we needed to create a new cutting surface for the diamond wire saw, the machine shop's lathes, mill machine, and driller machine were used to create what was needed. I received lessons from the machinist on how to use these machines and developed a test piece using my newfound skills, skills which I

previously had little idea were needed in research, but which were so important since so much of this team's research depended on machines. Another very interesting thing I learned was how to operate an Innova 300C ion laser. Using varying currents, I was able to find all eight laser lines as well as expand the laser to a specific frame diameter using convex lenses. Both tasks allowed for the research team and me to test for photoluminescence in both the annealed and unannealed samples. If fibre-optic cables, which fed information to a spectrometer, did not pick up photoluminescence it meant that nanocrystals had not been formed during annealing and that some part of the annealing procedure, such as temperature, annealing time, or the gas used, would need to be changed. I gained a lot of experience working with computers, which was great for me since I normally deal only with Microsoft Word. I discovered the mass of data collected in research using a Linux computer system to plot, fit, and view trends in data that was being collected from the Triumph Laboratory in Vancouver. I also became acquainted with the Microsoft Origin program that was very useful in plotting and comparing data. I was also given tours of the physics building and The National Institute of Nanotechnology (NINT) where I saw fascinating lasers, projects, and technology.

Being a WISEST Summer Research student not only meant that I got to work in a research lab for the summer, but that I was allowed to meet amazing women who have excelled in non-traditional field in science and engineering. It also meant that I was given the opportunity to tour both on and off-campus facilities that are leading the world in research and innovation. I also met new people my age with whom I shared interests and experiences with during lunch hours and evening activities. Being in the WISEST Summer Research Program not only taught me about physics and nanocrystals. Dr. Chow and his research team showed me that research is not simply looking in a book or manual. Research is hard work – it is sometimes a life-long passion. It requires design, date, detail, determination, and diligence. The program taught me about myself. It helped me realize my interests, strengths and goals for the future. Because of my participation in the WISEST Summer Research Program, I feel much better equipped to enter university after grade twelve, to work with technology, and most of all to embrace my interest in science.

"Being in the WISEST Summer Research Program not only taught me about physics and nanocrystals. Dr. Chow and his research team showed me that research is not simply looking in a book or manual.

Research is hard work – it is sometimes a life-long passion. It requires design, date, detail, determination, and diligence."

Cassandra Penner

WISEST Supervisor: Dr. S. Strelkov, Dept. Agricultural Food & Nutritional Sciences
Sponsor: Alberta Ministry of Innovation & Science

Excitement. It all started one afternoon while aimlessly wandering the second floor of Prairie High School. Then, she caught me. An energetic science teacher raced up to me with a yellow application form. After weeks of apprehension, I received confirmation; confirmation that made me excited. That excitement has continued from the beginning to the end of my WISEST experience. Friends and contacts have been made, familiarization with the U of A campus, lab experience, awareness of educational and occupational opportunities have all transpired within a short six week span. And now ladies and gentlemen, I bring to you, my WISEST experience.

Coming from a rural area where agriculture is the way of life, I moved to the city; where agriculture continued to trace my footsteps. This summer, I had the opportunity to work in the plant pathology lab under the Faculty of Agricultural, Foods and Nutritional Sciences. With Dr. Strelkov's help and many others, I had an exceptional educational experience. In my lab, I worked with a disease commonly known as clubroot. This project gave me an understanding of the diverse areas of research within a lab and familiarized me with many instruments. I had the opportunity to work with several inoculums of clubroot and infected hundreds of



canola and cabbage varieties. I also extracted spores from infected roots, learned how to use lab equipment, such as a haemocytometer, and harvested canola plants.

For the last three weeks of the summer program, I took the roots of inoculated or diseased plants and extracted their proteins for comparison with normal plant roots. This involved processes such as gel electrophoresis and silver staining. Not to mention, hours of pipeting and endless washing. Overall, the educational lab experience I have received has not only been enjoyable, it has been unforgettable.

Outside of the lab, I was informed about the postsecondary opportunities available. When considering a career, I have generally thought about professional occupations, such as doctors and horticulturalists. But being involved in this program has shown me the numerous research possibilities that support those occupations. As a result of group discussions and tours, I have learned about various educational and career paths. The Micralyne tour demonstrated the technological advances in engineering while the IBM tour showed how the acquired education of an individual might not be the key role in the everyday activities of their career. The role model discussion gave a realistic picture of how long and what requirements are needed for education and employment. Listening to the struggles and accomplishments of women in various careers was both intimidating and inspiring. The tours and discussions highlighted several postsecondary opportunities available.

Over the last six weeks, my learning curve was steep. Whether I was getting acquainted with campus or learning how to extract spores, I was being challenged daily. Beyond the educational school setting, the most important lesson I learned over the past six weeks was not how to make a gel, or how to grow fungus, or even who got kicked off of Big Brother 5; it was the interaction and communication of people. Teamwork and communication are two lessons I intend to keep with me for a very long time. Both are vital to the success of a project, regardless of its size. I want to thank every individual who has worked with me, helped and taken part in events with me; especially the IBM team.

Sadness. It all ended one Friday afternoon after the WISEST poster presentations. Then it hit me. It's not over, it's just beginning; an opportunity to share my WISEST experience and help others get one of their own. Hands on lab work, awareness of postsecondary programs, friends and contacts are all benefits I have enjoyed while participating in the WISEST Summer Program.

"Coming from a rural area where agriculture is the way of life, I moved to the city; where agriculture continued to trace my footsteps. . . .

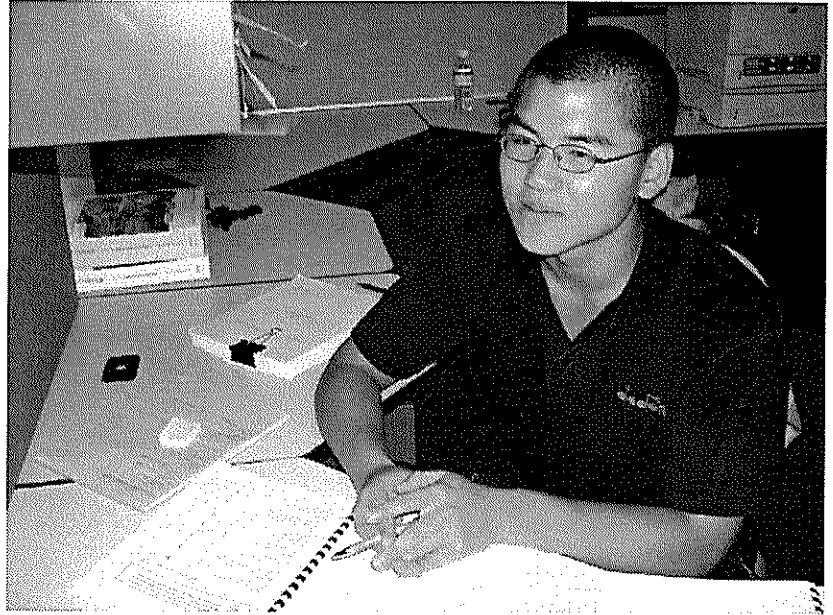
. . . Beyond the educational school setting, the most important lesson I learned over the past six weeks was not how to make a gel, or how to grow fungus, or even who got kicked off of Big Brother 5; it was the interaction and communication of people. Teamwork and communication are two lessons I intend to keep with me for a very long time."

Jason Pheh

WISEST Supervisor: Dr. Linda Ogilvie, Faculty of Nursing

Sponsor: Faculty of Nursing

Six weeks ago, I found my way through the expanse that is the U of A's campus to find myself in a program of sixty-three people, five of which were guys. It hadn't fully occurred to me that this was Women In Scholarship, Engineering, Science and Technology. That aside, I was placed in the Faculty of Nursing with Dr. Linda Ogilvie to work on two different projects. The first was entitled Examining Culturally Appropriate Assessment Practices by Early Childhood Development (ECD) programs (this project was just starting) and the second was entitled the New Canadian Children and Youth Study (NCCYS). Right now, you're probably in partial disbelief of how this fits under the Faculty of



Nursing, and six weeks ago I would have agreed. This is the non-clinical portion of nursing that deals less with physical interactions between the nurse and patient, and more towards changing, and developing policy about how things are done.

"Examining Culturally Appropriate Assessment Practices by ECD Programs" dealt with trying to identify issues that arise when trying to make decisions on formal assessments of children, as well, as trying to identify, and implement a means to deal with it. For example, many of the benchmark tests use commonplace toys to examine manipulations skills. What happens if you try to test children who have no experience with the toy being implemented in the test?

"NCCYS" is a study being conducted by major immigrant receiving cities throughout Canada to compare the physical, mental and functioning of immigrants and refugee children in Canada with the majority culture children, and the multiple variables that can affect this development and how these variables correlate with the passage of time and in understanding so, inherent dangers to that development. Layman translation: a study of immigrant children, how they adapt, and forces that effect this development over a period of time.

Working on "NCCYS" had me deal with the processing of raw research data, by both analyzing and interpreting the data. Sounds simple when the questionnaire has directions written on it. Having tried to process the information when the respondent gave four responses instead of one, not including questionnaires in three different languages, simple couldn't be farther from the truth. Afterwards, I dealt with some of the older questionnaires that needed to be updated. A true round hole square peg scenario. Questions that were created in the new survey that still need to be answered, but didn't exist in the old survey, old questions getting split up into as many as three or four different parts in the new survey each of which have been completely reworded. Actual results aren't available as of yet, as my participation caught the research mid way on the first wave.

Overall, I consider my summer commitment to the program time well spent. I've found direction for my post-secondary (complements of the WISEST tours and discussions) and gotten to know people I would have never seen otherwise. I am grateful for the experiences and opportunities that the WISEST program has allowed me to explore, and form first hand opinions of.

Erin Prenoslo

WISEST Supervisor: Dr. G. Cembrowski, Dept. Laboratory Medicine & Pathology
Sponsor: Merck Frosst

Learning to make balloon animals, building up my arm muscles through pill crushing, and finding my way around Chinatown were not things that entered my mind when I originally thought about what my experience in the WISEST Summer Research Program might be like. However, this program has taught me a lot about research, science, university, and the world of work (including many things I'd never thought of before), and has also been very enjoyable.

I spent six weeks this summer working in the Trace Elements lab in the Department of Laboratory Medicine and Pathology under the supervision of Dr. Cembrowski and Carmen Zimmer. The aim of my project was to test different Chinese herbal medicine products for toxic amounts of arsenic, cadmium, lead, and mercury. I spent most of the first two weeks reading articles about contamination in traditional Chinese herbal medicines, as well as learning to find my way around the hospital and getting an idea of how everything in my lab worked. After that, though, things picked up quickly.

I began my project with a trip to an herbal medicine store in Chinatown. Armed with research I'd done on contaminated medicines and lots of money, I spent two hours reading boxes and buying pills, which was quite a challenge considering that I couldn't read Cantonese. After I'd brought everything back to the lab, I spent nearly three days crushing the pills into powder. Finally, I prepared the samples for testing in the Inductively Coupled Plasma- Mass Spectrometer (ICP-MS), which is a big and very complex machine which can detect small amounts of different elements in the samples. Getting results was very exciting; we found huge amounts of lead and mercury in some of the samples. After this, I repeated the process with another batch of medicines, and then compiled a database of my results.



It wasn't all lab work, though. The Wednesday afternoon sessions were fun and very informative, and I looked forward to them every week. They were a great chance to be exposed to careers outside of the field I was working in, and also to talk with the other WISEST students and compare experiences. We visited some very interesting places and talked to many people with lots to tell us who were wonderful role models. The social events were great too; golfing was hilarious, and the picnic and Em & M lunches were a lot of fun. Thank you Emily and Mariel!

I learned many new skills this summer; specific things like the symptoms of lead and mercury poisoning, how to pipette samples, and how to make a research poster, but also things that will help me even if I choose a career in a completely different area. I got used to taking initiative, having lots of responsibility, and searching for information, as well as becoming more familiar with campus, which will no doubt be helpful to me if I decide to study here in the future. I also met lots of neat people, and made some great friends. I'm really grateful for Katie and Ariel; we met for lunch every day and found our way to all the events together, and it was great having people to talk to who were in the same situation I was.

Participating in this program has been a very good decision for me; it has been completely different and very challenging at times, and has forced me to expand my thinking and learn a lot about myself. This summer has also allowed me to explore my options for after graduation more closely, and though I'm still not sure exactly what path I want to take, I am definitely more confident about my future than I was before I came. I highly recommend the WISEST summer research program to any grade eleven students who are considering it; this is definitely one of the best summer jobs you'll ever have!

Maija Raudsepp

WISEST Supervisor: Dr. Sylvie Quideau, Dept. Renewable Resources
Sponsors: STEP & Faculty of Agriculture, Forestry & Home Economics



Over the summer I worked with Dr. Sylvie Quideau in a soil analysis lab. After my first day of work I felt exhausted and completely bored. Looking back now, it was probably the grey and rainy weather outside that day. I remember thinking to myself, "What have I gotten into? Will I have to spend my whole summer washing dishes and mixing solutions?" But it was bright and sunny from there on in. I had the opportunity to work on three different exciting projects and meet many friendly people. When I arrived on Monday mornings, I was not filled with the dread of another work week, but rather I was curious and eager to know what had happened over the weekend at the lab.

The first, third, and fifth weeks were spent working with Jean on a long-term project that looked at the CO₂ respiration rates of different soil types. From this project, I learned the basics of how to run, and organize a lab, as well as data entry. I got to meet everyone in the area and to talk about what they were doing. I was surprised that everyone seemed to come from a different background in the university, from geology to environmental studies. After getting settled, I started on my own project. I was to find the levels of phosphatase in different soil samples sent down from Peace River. Kirsten and Lucie, the greatest people ever, had gotten samples before I had arrived and they helped me along the way by finishing up that day's testing after I had left. Even though there were lots of samples to test (around 400), I loved this lab. New challenges seemed to occur every day, including trying to get the concentration of the solution down so the spectrophotometer could read the sample and mixing up chemicals for use. As it turned out, this simple lab procedure could have troubles too. I was surprised to see that the results seemed to contrast exactly from other articles and research I had looked at. For the final few weeks, I helped Kirsten on a nematode lab and grinding soil for future labs. Possible the best job I had was the cutting of dried vegetation. During this time a wonderful smell of grass and plants would come out and fill the room, maybe not very scientific, but nice anyways. I also got the opportunity to attend the defense thesis of a student's paper and learn basic statistical analysis.

My favorite day of WISEST was the tour to Micralyne. While I generally enjoy biology related subjects more than chemistry or physics, the idea of micro technology was absolutely fascinating. The staff was so friendly and seemed to be fun people to work with. This afternoon gave me many ideas about my own future and made me consider engineering as a career path to pursue. The whole WISEST experience was so much fun and I would definitely do it again if I could. I learned so much over the summer and now feel confident and excited to be entering university after grade twelve.

Trudy Richert

WISEST Supervisor: Dr. Alidad Amirfazli, Dept. Mechanical Engineering
Sponsors: Summer Career Placement Program & Faculty of Engineering

Thanks to the WISEST program I was able to experience working in a university lab before even finishing high school! Sure I was intimidated and extremely scared about going to the 'big' city, but I made it! I worked in the Department of Mechanical Engineering under the supervision of Dr. A. Amirfazli and Javed Ally. My research dealt with percutaneous vertebroplasty, a surgical treatment I was unaware of until now. During this operation polymethylmethacrylate (PMMA) bone cement is injected into fractured vertebrae, which is basically like getting a cavity filled at the dentist. The bone cement is a mixture of PMMA cement and liquid monomer, which releases a very distinct odor. Prior research has shown that manipulating the temperature delays the solidification of the cement.

My project for the summer dealt with finding the relationship between the inject-ability and flow-ability of the cement, as well as the effects temperature variation has on the cement. To begin the experiment, I had to determine an average force a person exerts on a syringe, so I went around asking people to test their strength on a device, which was a syringe with a spring on the plunger. That was a hoot; I saw the competitive sides of people as some of their faces turned red. Next I used the new mass and tested the cement at the temperatures of -10 , 0 , 4 , and 22 degrees Celsius. At each temperature I completed three trials with about 15 syringes per trial,



so I can definitely say I have seen my fair share of syringes. Before each test I had to let the monomer chill, and then I mixed the polymer and the monomer together. Then I filled each syringe with cement, and had someone else submerge the syringes into a temperature bath. Over a certain amount of time I performed a test that included me fishing out a syringe and securing it in a hole of a piece of wood. Next I positioned a weight on the syringe and dropped it, while measuring the amount of time required for the syringe to empty. I repeated these test with a needle on the syringe too.

Do not panic, I was not locked up in a lab all summer! WISEST has so many fantastic activities planned for us. I loved getting together with everyone at the weekly lunches and listening to everyone talk about their labs. However, the one activity that sticks out the most would have to be the industry tours. Micralyne gave us an inside look at how wafers are made and how important nanotechnology is. I learned how it is all about adding and etching away layers to create the design wanted, which requires patience! Some of my fondest memories were the ones I made with the people at St. John's Institute. Everyone became friends instantly. On our first day we all piled into Shahzma's room and played a few introduction games. I was really nervous and hardly said a word, but now they cannot get me to be quiet! There my summer consisted of too many sleepless nights from staying up talking, great food, great friends and learning how to ride the LRT. (Remember to make sure the machine beeps, flashes, and stamps your ticket!)

I learned so much about all the different paths and decisions I am faced with, by talking with the university students, WISEST students, speakers and the professors. Before this experience I barely knew what an engineer was or even how many different areas of engineering existed, and now I am definitely considering it as career choice! I am very grateful to have been a participant in the WISEST Summer Research Program. I would like to thank everyone who made this experience possible for all 63 of us, the best summer job ever!

Sarah Riske

WISEST Supervisor: Dr. Walied Moussa, Dept. Mechanical Engineering
Sponsor: Edmonton Glenora Rotary Club

During the past six weeks I have had the privilege of working under the supervision of Dr. Walied Moussa in the Mechanical Engineering Department in a MEMS (Micro Electro Mechanical Systems) and Multiphysics lab that uses computer simulations to carry out research. When Dr. Walied Moussa was not in the lab Aman Chahal was there to help me with the project I was working on with another WISEST student, Elizabeth Tang.

It took me a few weeks to fully grasp what the project was attempting to accomplish. The device that the research team was examining was called a Radio Frequency Micro-Electro-Mechanical (RF MEMS) switch

that's used to transmit information wirelessly and can be found in cell phones, and many other devices that utilize wireless communication. The switch functions in a similar fashion to Morse code. It has an "on" position and an "off" position that is manipulated by an electric current flowing through the switch. When the switch receives a signal/electric current, the electrostatic force acting on the switch causes it to bend and come in contact with a grounded electrode. This position, where the switch is bent, is the "off" position. As soon as the switch touches the grounded piece of metal the charge on the switch is dissipated and the switch returns to its initial position. The goal of the research team was to change the geometry of the switch so



that it could withstand the heat created by the higher voltages involved in using this switch to transmit energy.

Elizabeth and I spent the first few days reading information that might help us understand the project a little better. Much of the project involved physics and mathematics that we had not learned in school yet and so it took us a little while to grasp the concepts. However, with the help of Aman Chahal and Jon Lueke, another Graduate Student who was working in the lab, we soon had a clear enough understanding to begin working on the computers.

The RF MEMS switch is very small and is measured in micrometers; therefore we had to use a computer program called FEMLAB to model the switch. This program enables you to create models of structures and determine the effects certain variables such as force, electric current, and heat, will have on that structure. This program was new to both Elizabeth and I, so we spent a few days learning how to use FEMLAB. We followed step-by-step instructions and built different models such as beams and analyzed the stresses resulting from loads placed on them, to become familiar with the program.

Once we had learned how to use FEMLAB we began helping Aman with the models that simulated the RF MEMS switch. She was having difficulties obtaining the results she wanted so we altered variables and conditions on the model until the desired result was acquired. Sometimes we weren't sure what we were changing, but in the end we were able to help Aman obtain the results she desired. Then we started altering the geometry of the switch from a straight beam to beams with slightly different shapes such as I-beams and C-beams. Like in any other research project we ran into a few problems, the program didn't have enough memory to solve the problem or the solutions were not correct, but we worked through them. Using FEMLAB we were able to determine the effects the higher voltages would have on the various structures.

"The WISEST Summer Research Program allowed me to expand my horizons. Whether I was talking with a student from another lab, or listening to a speaker at an event, I was always learning something new. This summer had been a great experience and I feel very privileged to have been able to participate in it. WISEST gave me the opportunity to learn, meet new people, have a great time and get paid all at the same time! "

Alyssa Shariff

WISEST Supervisor: Dr. Sanchez-Azofeifa, Dept. Earth & Atmospheric Sciences
Sponsor: Alberta Ministry of Innovation & Science

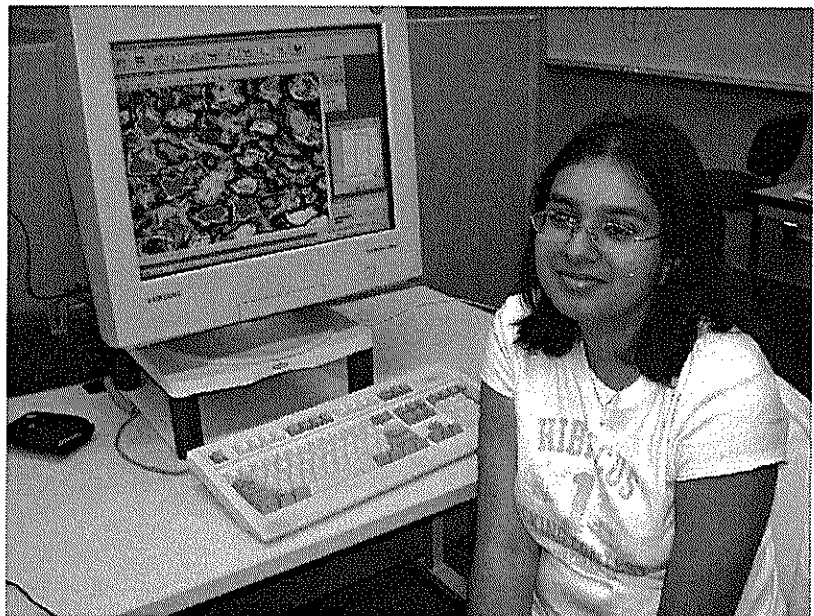
Working under Dr. Sanchez at the Earth Observation Systems Lab in the Tory Building, I got a wide variety of experiences. Though Dr. Sanchez was away for most of the six-week program, the research team was always there to help me when I had a question or was not sure how to do something. They were also fun to talk to, although grad students have the weirdest conversations. Something interesting was almost guaranteed to happen with them around.

During the first week, I got a crash course in ERDAS Imagine, software used for classifying satellite images. To learn the software, I classified images of Grand Prairie and Mexico. I also spent a day in the lab, running chlorophyll samples from boreal

tree species through a spectrometer to find out how much light of certain wavelengths was absorbed by the chlorophyll. This information was then used to discover the chlorophyll contents of the species. Though spending the whole day in a lab would not seem very fun at first, it was one of the most enjoyable days I had in the program. Time goes incredibly fast when it is spent with someone who could very likely be insane. I was very lucky to get out without being put into the "Bucket of Doom" that day.

The project that I was working on involved taking microscope images of leaf cross-sections from lianas (vines) and trees from the Amazon and identifying the empty spaces. Using ERDAS, I classified the empty areas in the leaves and then calculated the percentage of empty space in the spongy mesophyll area. Using the results, I then graphed the wavelengths of the red edge of the spectra of the leaves against the percentage of empty space. I found that on average, lianas have more empty space and therefore a higher red edge. This information is useful for remote sensing of the canopy of the Amazon forest. Knowing that plants that reflect more infrared radiation than others are usually lianas allows for images of the canopy of the forest to be classified into trees and lianas.

The importance of being able to differentiate between trees and lianas in the canopy of the forest is that researchers will be able to record the growth of lianas. To reach the canopy, the lianas use the trees as supports, which kills off the trees. Lianas respond well to increased levels of carbon dioxide in the atmosphere, so an increase in carbon dioxide leads to an increase in tree mortality. If the rate of liana growth is increasing, then it may be a way to measure the increase of global warming and carbon dioxide in the



Near the end of the program, I got the opportunity to spend a day in the field, helping to put up leaf traps in Elk Island National Park. I learnt a new respect for the research team. As if making and putting up the traps was not hard enough, we had to make our own paths into a forest where even the weeds were as tall as me. Thankfully, I was soaked in bug spray so I did not get too many mosquito bites, though they still buzzed around and harassed us as much as they could. I had a lot of adventures that day, like falling into a patch of thorny bushes. On the bright side, they were raspberry bushes and the raspberries were very yummy.

The combination of different experiences that I had at WISEST – the lab work, the fieldwork, the activities – made for a wonderful 6 weeks that I will never forget. I made new friends, met lots of interesting people, and had some weird adventures. Through all the fun, I gained an insight into what I might like to do in two years when it is time for me to go to university.

Ashlesha Sonpar

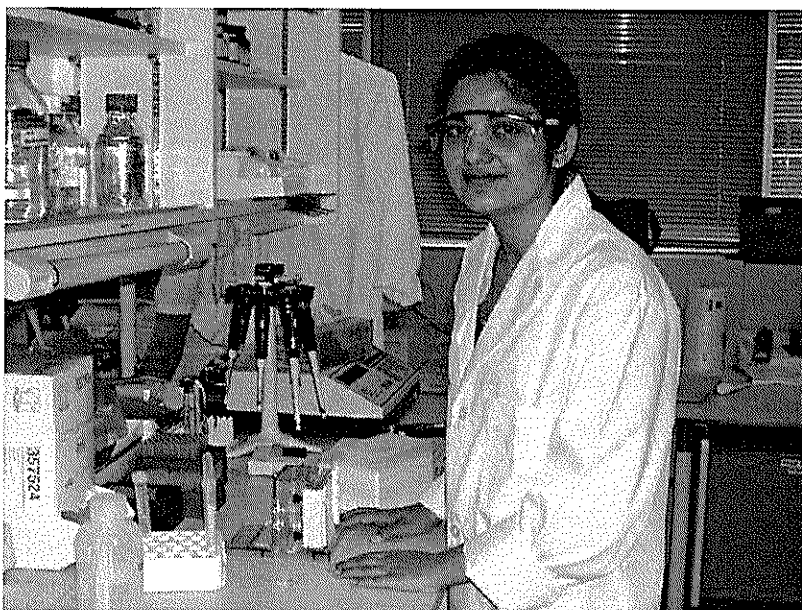
WISEST Supervisor: Dr. Wong, Faculty of Pharmacy & Pharmaceutical Sciences
Sponsor: Suncor Energy Foundation

This summer has been the most educational one I've had. I guess that can be a good or bad thing depending on how you look at it. The WISEST program has given me the wonderful opportunity to work in a lab and learn more about research and stem cells and the new techniques used today. I am extremely grateful and fortunate to have been selected.

I spent my summer working in Dr. Wong's lab in the Canadian Blood Services Building. Their project was to culture stem cells in different environments (with enzyme inhibitors or other pharmaceutical agents) and record the differentiation rates. This would enlighten them as to what effects differentiation and an idea as to how. The stem cells cultured in our lab were donated by the Cord Blood Bank as whole blood or mononuclear cells. The stem cells were then isolated in our lab. There were four cultures set up; one with cell culture, one with cell culture and DMSO (dimethyl sulfoxide), one with cell culture and caspase inhibitor (caspase is a pro-apoptotic family of enzymes that are thought to have a role in cell differentiation), and one with cell culture and calpain inhibitor (calpain plays a role in the mitochondrial pathway of cell suicide). My project was to prepare and stain cell slides of these cultures and analyze them using SigmaScan. At first, we had trouble finding a procedure that worked, but using the cytopsin yielded better results. Unfortunately, we only discovered the cytopsin after my fourth week, so I was only able to include one set of results in my poster.

The results I got from these slides were used in supplement to results of the flow cytometry that my supervisor (John Ma) was doing. Flow cytometry results are generally better than biometric analysis of cell slides because flow deal with thousands of cells whereas biometric analysis deals with a few hundred. I am thankful to Dr. Wong and John Ma for making my experience so wonderful and for all the help they gave me on my project and my poster.

The WISEST program has also provided me with a lot of insight into possible degrees and career paths. The small group discussions arranged by the WISEST program were very helpful. We were shown the different



options we had and given tips for university. The Alberta Research Council tour presented a view on the job opportunities available in research and the education they require. This tour offered a realistic view on research and what it constitutes. The Caps session further added to my knowledge of careers and career planning. It was comforting knowing that most of the people I've met on these tours or during these presentations were as undecided about the future as I am.

Living in residence has been the best time I have ever had. At first, I was apprehensive of what it would be like and all the people I was going to meet. Luckily, the sixteen of us get along well and have shared some good times together. Rez life is never boring, there is always something to do, somebody to do it with. Thanks to all the girls who made it great

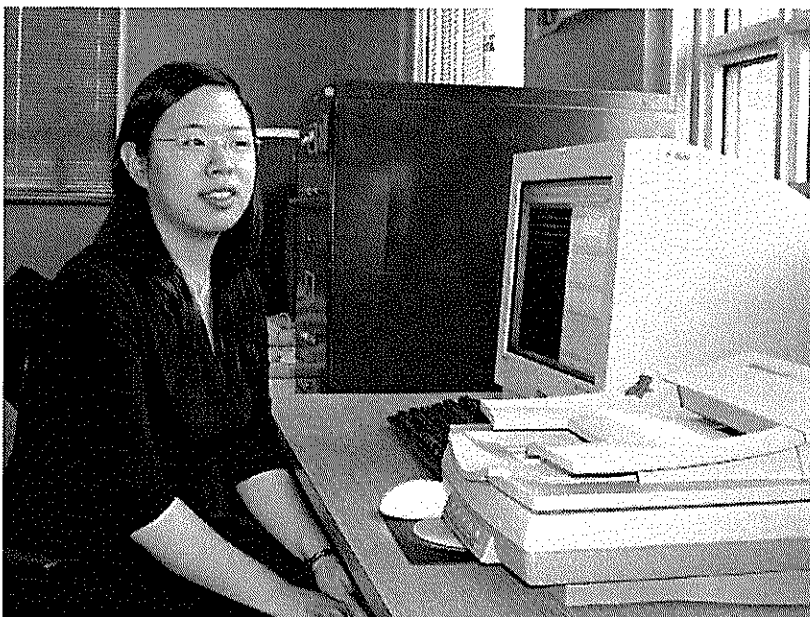
My WISEST experience has been nothing short of great, wonderful and fantastic. All the activities were great fun and work got easier and more gratifying as the weeks progressed. Learning to take pictures on the microscope and trying out all the software to analyze the pictures was fun. I would like to thank Margaret Ann for taking the initiative to start the WISEST program that is a wonderful opportunity for girls like me and Emily and Mariel for making this a fantastic experience. I will miss hanging out with all cool people I met in this program, especially everyone in Rez. And as a note to any future applicants reading this: St. John's Institute has the best food on campus, the people are great, but bring a fan or you will suffer the hot, humid consequences.

Kristina Suen

WISEST Supervisor: Dr. Herbert Yang, Dept. Computing Science
Sponsors: Summer Career Placement Program & Faculty of Medicine

Six weeks ago, I would have never known the range of research areas that the Faculty of Computer Science encompassed, or even what research contributing to computer science included. However, after experiencing WISEST, I would have to say that I've learned more than I could have ever imagined.

During the six weeks of WISEST, I worked under the supervision of Dr. Herb Yang and members of his research team, in particular, Jiayuan Zhu, a graduate student, who served as my mentor. For the first three weeks of this program, I went through tutorials of rendering images with a program called Radiance. As a quick summary, I first learned to render objects and scenes with a traditional light source, and afterwards, with image-based lighting. With image-based lighting, a sphere probe is used to light the object or scene to make it look more realistic, as if it were placed in the setting of the light probe.



For the last three weeks, I worked on making a C++ program to manipulate camera curves and afterwards, seeing the effect this had on images. At first, I wasn't sure of the connection between what I was initially doing and the program, but Jiayuan pointed out that my WISEST experience was really like a two-step program. First, I needed to learn how to render images, and next I could learn how to manipulate them.

Initially when I started to write the program, I was having difficulties and wasn't sure where to start. However,

after two weeks of 'refreshing' my memory of C++ programming with online tutorials and my sister's thick and heavy C++ programming book, I can proudly say that I finally conquered my task. It's funny how I felt so depressed about the difficulties I was having while writing the program, but once the program was finished, I could sit back, and proudly laugh that I had accomplished the task.

Though a typical work day in my lab consisted of staring at a computer screen, going through tutorials, and experimenting with newly learnt knowledge, a week looked upon as a whole was much more exciting. For my research team members, including myself, each week involved group meetings as well as individual meetings with Dr. Yang. In every group meeting, one team member would give a presentation on what they were working on, their findings, or their thoughts related to their research. Though I did not always completely understand the concept they were discussing, being able to attend a group meeting made me think, "Wow! I'm actually a part of this!" It made me feel special that I, only a high school student, could take part in something so professional. The numerous group meetings also exposed me to the many different areas computer science research, in particular computer graphics, encompassed, for example, motion analysis and image-based rendering.

As for individual meetings with Dr. Yang, though I was always nervous in the beginning to step into his office, the mood always immediately lightened up. It was a time that I was able to discuss almost anything. First we would discuss any problems or questions I had with my project, which would eventually blend into Dr. Yang sharing his knowledge on various topics. These meetings opened my mind to the numerous areas math and computer science actually covered and could be adapted to. For example, he mentioned the Four Colors Theorem, a problem to prove that four colors were sufficient to color a map. After learning other situations math and computer science could be used in, it amazed me that these subjects could be so interesting, and did not simply revolve around the basics learned in school.

After surviving six-weeks of working, I am extremely thankful that I was able to participate in WISEST. WISEST allowed me to boost my knowledge about research work and about the numerous different types of opportunities in science and technology. As well, not only was I able to meet new friends, I was also able to encounter old acquaintances from more than 3 and 5 years back.

Revisiting these six weeks, I believe WISEST was not only a worthwhile experience, but one to relive.

"After learning other situations math and computer science could be used in, it amazed me that these subjects could be so interesting, and did not simply revolve around the basics learned in school."

Elizabeth Tang

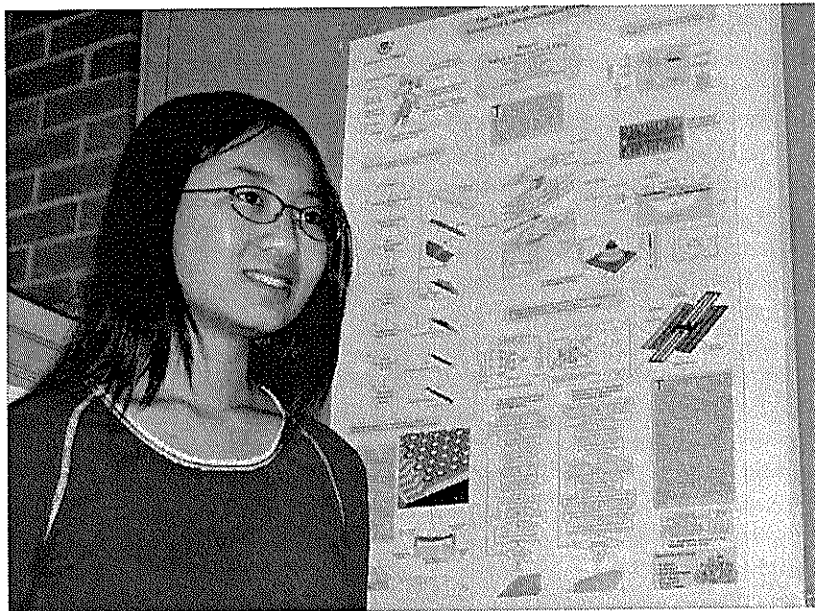
WISEST Supervisor: Dr. Walied Moussa, Dept. Mechanical Engineering
Sponsors: Summer Career Placement Program & Faculty of Engineering

I began work in the six-week WISEST Summer Research Program in the Mechanical Engineering Department, in a MEMS (Micro Electro Mechanical Systems) and Multiphysics lab, with Dr. Walied Moussa as my supervisor, and Aman Chahal as my lab work supervisor.

The first week was bewildering, as Aman tried to teach us the basics of her project, one which involved concepts that we would not officially learn in school for another couple years. This rigorous regime included reading from a "Fundamentals of Physics" textbook, and following the instructions on modules provided by a computer program to familiarize us with the controls that we would be using once we started working.

The project on which I worked was the research of Radio Frequency Micro Electro Mechanical switches, more commonly known as RF MEMS switches. These switches are used in wireless technology such as cell

phones and laptops. Our research was to find a way to improve the efficiency of these switches by changing its properties. However, it is financially unreasonable to manufacture these switches to perform countless experiments. As well, it is difficult to perform these experiments, as these switches are so small that all measurements are in micrometres. Therefore, all experiments were simulated on a computer program called



FEMLAB. Using this program, Sarah and I would vary the properties of the switch, such as the boundary conditions or geometry of the beam; in the modules that Aman provided for us to try to acquire the expected behaviours and numerical results. This often proved to be frustrating, as our grasp of the physics needed to understand these behaviours was not strong, and correct results depended more on luck and patience than on skill or knowledge. Also, several technological problems served as obstacles. For example, solving the simulations would often result in long periods of waiting time, only to receive a rude remark from the computer that it had run "out of memory during the LU Factorization".

Fortunately, the frustration we felt was quickly dissipated with the help of the research team who worked in the lab with us. There would often be times when Aman decided that we all needed a break, and we would find a couch to lounge in and to talk. During those times, we were able to get to know our research team better on a personal level. This provided a more comfortable setting for us to work in, and made it easy for us to ask any questions, work-related or impertinent, whenever they came up.

Another major learning experience I received was the opportunity to attend the research team meetings held every couple weeks. Here, I was able to see the projects of the other members in our research team, giving me a better idea of the variety of directions that could be taken if I do decide on engineering as a career choice. These meetings have also shown how engineering is a part of so many aspects of our world; aspects that are generally considered to be the field of biologists or chemists, but they often depend on engineers to carry out their processes. I was also able to work on my public speaking skills as Sarah and I were asked to present our current work and progress on our projects in front of the team.

These past six weeks have been a rewarding learning experience for me. Participating in the activities WISEST organized, working at my lab, and interacting with other students and with the research team have provided me with a productive, as well as enjoyable way to spend my summer. These experiences also give me more confidence, as the end of high school looms nearer. Being more familiar with the habits of university life, and with the size of campus, going to university is no longer scary, but rather eagerly anticipated.

"Another major learning experience I received was the opportunity to attend the research team meetings held every couple weeks. . . . These meetings have also shown how engineering is a part of so many aspects of our world; aspects that are generally considered to be the field of biologists or chemists, but they often depend on engineers to carry out their processes."

Amanda Thompson

WISEST Supervisors: Dr. Grace Greidanus-Strom & Dr. Peter Mahaffy
The King's University College, Dept. Chemistry
Sponsor: Camille / Henry Dreyfus Foundation

Over the past 6 weeks through the WISEST Summer Research Program, I have been working with Dr. Mahaffy's and Dr. Strom's research teams at The King's University College. I worked mainly with Naomi Jackson and Joel Kelly, both students at King's. They both helped me when I had questions or concerns about projects that I was working on.

To pinpoint the research I did is near impossible because I did more than research a single project, my main project for the summer involved me looking at different types of aloe plants to see if they were biologically active. The next step was then to see if I could figure out what compounds were causing this activity. In the beginning I had tried working with water extracts, but with some failed attempts I moved on to Dichloromethane extracts. The dichloromethane worked well, and as the summer went on I used flash chromatography to separate the compounds of aloe dichotoma in dichloromethane. We decided to go back and work on water extracts; we used a creative method, which involved a blender. It



was a lot of fun we joked about what kind of drinks you could make with aloe. I can't wait to hear later on how the aloe plant work will help with the greater goal of figuring out what are the medicinal qualities of different exotic plants.

The WISEST research project helped me to learn some skills in a laboratory. For the first time ever I setup a schlenk line, to be honest when Naomi first talked about I had no idea what it even was. It was great to learn about all the machines in a lab, like the NMR, or the glove box. I also learned how to do bioassays, which involved me, growing bacteria in a petri dish over TLC (thin layer chromatography) plates to watch for bioactivity of my aloe plants. I actually found it exciting to see that my aloe had inhibited the growth of bacteria like *Bacillus Subtilis*, *E. Coli*, and *Staph Aureus*. I joked with my friends about me turning into a nerd because of that beautiful fact.

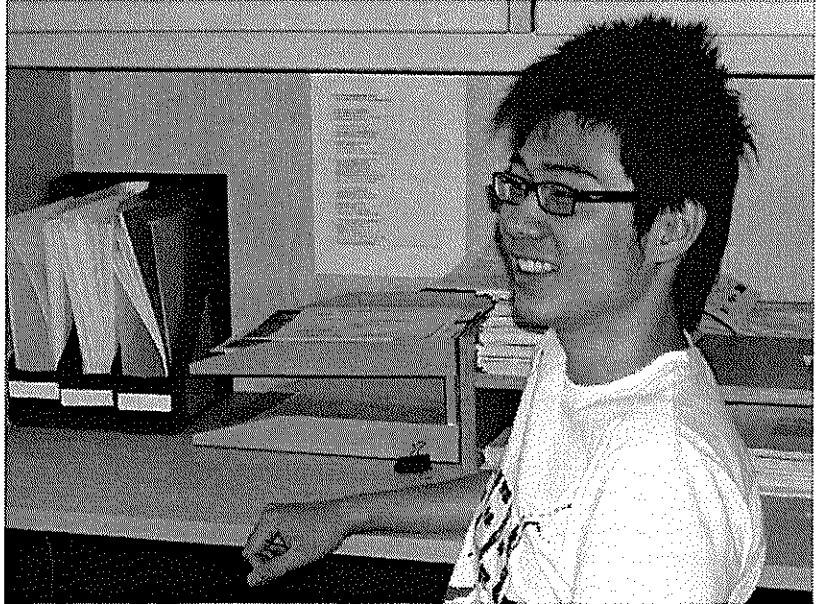
With being located on a completely different campus then everyone else I was kind of afraid at first how it would end up working out. I was lucky enough to end up working with a great team! Joel would always be joking about what it takes to be a chemist and that biology is for losers. Sometimes when we had off time we would do things as a group, for example, we made shirts that said "Team Strom". We also decorated our lab coats a bit. It was nice to be put in such a great environment and I wouldn't have wanted it any other way!

Before my six-week adventure in WISEST, I had a general idea that I wanted to work in the field of science. Now though I see more defined ideas as to what I want to focus my career and learning on. I love to share this newfound knowledge with people; I especially find it fun to explain it in all the technical terms first to get the confused look. Then I offer the explanation with a bit more simplicity; altogether I can't wait to talk to future WISEST students to let them know about the great times they will experience.

Brenton Tse
WISEST Supervisor: Dr. Wendy Austin, Faculty of Nursing
Sponsor: Faculty of Nursing

If someone had asked me what nursing is about six weeks ago, I would only have thought of the nurses in the hospital. But thanks to WISEST, I have gained a whole new perspective on nursing.

During the six weeks in WISEST, I have spent my time on doing ethical nursing research. I was being placed in the department of nursing with Dr. Austin research team. The research team consists a principle investigator, Dr. Austin, a graduate research coordinator, Erika, and a post-doctoral researcher assistant, Gillian. They are all very friendly and I had such a great time with them.



My project is on relationships between family/friends and health care staffs in continue care settings. The first few days was only reading and doing literature reviews because I needed to get familiar with the project and learned the steps in doing research. But after the first week, I got to create a focus group handbook to teach the research team how to facilitate a group of people, because our research requires interviewing families and professional staffs in long-term care. Another part of my job was to go to the libraries to look for articles and books on my topic and so I became very familiar with the campus. Also we got to watch movies every Friday and we would discuss how it relates to the research and the discussions often inspired me into more critical thinking. Sometimes our research team would do a presentation and I would take part in it as well.

Through the participation in WISEST Summer Research Program, it did not only allowed me to learn the procedures in doing a professional nursing research, but it also gave me an insightful view on University campus life and study. It is crucial that the person in a research team to be organized, has great communication skills, and self-disciplined. I also had a chance to meet other graduate students, professors, and research team members. Their expertise in research will help me in future study.

I didn't just stayed in my office all day for six weeks. WISEST had planned some very great activities for us, which all were fun and educational. My favorite activity was the tour of Micralyne, a nano-technology manufacturing company. They do all sort of interesting stuffs in there like producing the censor in air bag, and healthcare technological tools, and mini-microscopes. Every Thursday afternoon, we all go to the CAB in campus to have lunch with Emily, the WISEST student coordinator, and shared our experiences with each other. It is interesting to listen to the other person's work.

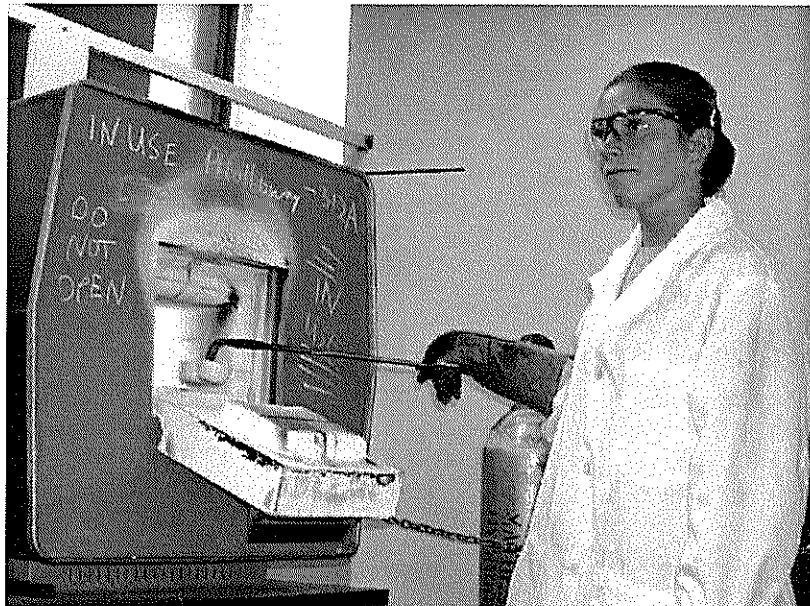
Near the end of the program, Emily and Mariel had organized a work shadow for us in clinical nursing. We were put in the intensive care unit and we watched the daily routine of the professional staffs. I had a chance to meet many amazing people like nurses, respiratory therapist, pharmacists, dietician, and surgeons. It was a very interesting day.

Before my six week in WISEST, I had no idea that there could be so much about nursing. WISEST gave me a chance to find out what's out there and a new opportunity to explore many new career options. In additional, I had made friends with many other WISEST students and got to look around the campus.

Kathryn Twyman

WISEST Supervisor: Dr. Tom Etsell, Dept. Chemical & Materials Engineering
Sponsor: Faculty of Engineering

For the 6 weeks of the WISEST program, I worked in Chemical and Materials Engineering in Dr. Etsell's lab. The project I worked on directly relates to a lead, zinc and copper mine located in Peru, called La Oroya. Approximately 48 000 tonnes of zinc ferrite waste is produced in the operation of the mine each year, with an aggregate total of 1.3 million tonnes. Although labeled a "waste", significant profit potential exists through recovery of zinc, indium, silver, and gallium. The goal for my lab group was to develop a technique that would yield the maximum economic extraction of these metals



A technique used in extracting the target metals from the zinc ferrite is called roasting, or salt roasting. Samples of the zinc ferrite and varying amounts of Na_2CO_3 , SiO_2 , CaCO_3 , and MnCO_3 are carefully weighed into crucibles and then placed in a furnace for five hours. Porcelain crucibles were initially used for lower temperatures (900°C) until we corroded the bottoms and formed glass from our samples which reacted with the glaze. Higher temperatures ($900^\circ\text{C} - 1100^\circ\text{C}$) are now completed in Aluminum oxide crucibles. Most of the sample then undergoes a process called leaching. This involves adding H_2SO_4 acid and setting the samples on a magnetic stirring plate for $1\frac{1}{2}$ hours (thank goodness for magnetic stirrers, I would hate doing it by hand!) Having recently been deemed competent to begin the leaching independently, catastrophe hit. Unknown to me at the time, it seems that this set of samples contained significant amounts of un-reacted carbonate which reacted violently with the acid. Unaware of the impending crisis, I rapidly poured all 75 mL of acid into the beaker and watched to my horror as the sample bubbled up, over, and out of the beaker and onto the counter. I have since learned to add the acid gradually and have been able to avoid further catastrophe.

Filtering comes next, which can be a slow process that requires patience, and an abundant supply of bubble wrap. Titrations followed, which required a great deal of concentration, as one small distraction could result in overshooting the end point, which thankfully has not yet occurred (knock on wood). However, leaving the jug for de-ionized water to finish filling *has* slipped by mind more than once. Consequently, I have returned to an overflowing jug and a huge puddle on the counter. Fusions are conducted in our four platinum crucibles, identified by their degree of deformity. After 10 minutes in a 900°C furnace, the crucibles are cooled in water before using acid to dissolve the solids, along with the help of heat and stirring. After adding some more hydrochloric acid and filling the volumetric flask to the line with de-ionized water the fusions are complete. Analysis is the final step. Filtrates, washes, and fusions must all be analyzed using the atomic absorption machine. Unfortunately our supply of acetylene ran out right at the start of our set. Unable to carry out any analysis, more and more bottles began accumulating on our lab counter. The variations in colors made the dozens of bottles look pretty cool, but as the days went by and still no acetylene arrived our limited counter space was rapidly disappearing. A few days had to be devoted solely to analysis when the acetylene arrived.

Minor catastrophes aside, I had an absolutely fantastic time working in the lab during the WISEST program. The people I worked with in the lab were incredibly helpful, and truly made my WISEST experience better than I ever imagined.

Lisa Vagi

WISEST Supervisor: Dr. Jingli Luo, Dept. Chemical & Materials Engineering
Sponsor: Alberta Ministry of Innovation & Science

At the beginning of my six weeks at WISEST I had no idea how many new and interesting things I would learn in my research lab. Looking back now, these six weeks may have been the most valuable six weeks of my year. And I'm not talking about my paycheque. I learned more about myself and many interesting future careers I might choose. These things are truly priceless.

Under the supervision of Dr. Jingli Luo, in the Department of Chemical and Materials Engineering, I worked alongside brilliant researchers on cutting-edge technology to develop the fuel cell of the future. In my first week I quickly learned, among other amazing things, that a fuel cell is

basically a battery that does not need recharging. As long as hydrogen and oxygen fuel are supplied, it can continue to supply heat and an electrical current indefinitely. A fuel cell is made of an electrolyte between an anode and a cathode. Once activated by a catalyst (which is platinum in my research), the hydrogen gas ionizes into protons and electrons, and the electrons travel through a wire, forming an electrical current. The protons move through the proton-conducting electrolyte (made of lithium sulphate), where they combine with oxygen and other electrons to produce heat and water.



Parts of my research included making the electrolyte by grinding up the lithium sulphate powder, sintering, pressing and sintering it again. This produced a salt composite disc composed of a special crystal structure in which only protons can be conducted, therefore forcing the electrons to travel across a different pathway in the form of electricity in an electrical circuit. Onto the disc, platinum paste is screen-printed and the sample is dried before setting it up in a testing oven. The oven is heated to temperatures between 400°C and 800°C. There the sample is tested for electrical resistance and the voltage it produced. Results were positive; the sample showed low resistance and achieved an optimum voltage between 600°C and 650°C.

I know how important fuel cell research is because the world's non-renewable resources like crude oil are estimated to run out in about a hundred years. The major advantages that fuel cells have over gasoline engines are the high efficiency of operation and the lack of harmful pollutants. The only waste from fuel cells is water vapor, which is much less harmful than the greenhouse gas, carbon dioxide, produced by the combustion of fossil fuels. The fuel cell that I researched is only one of many different types that Dr. Luo is working on simultaneously in order to find the best method. While I worked on composite solid electrolyte fuel cells, other researchers in my lab were researching solid oxide electrolyte fuel cells and other types that I did not have time to learn more about. I really enjoyed meeting people from different countries such as: Russia, Ukraine, and China. Eventually, I got accustomed to the various languages that were spoken in my lab. It really made me realize that this research is also going on in many other parts of the world because of its great importance.

The weekly Wednesday activities were always learning made fun and I enjoyed every one. WISEST has been a valuable experience for the choices I will make about my future career and has inspired me to consider a career in engineering.

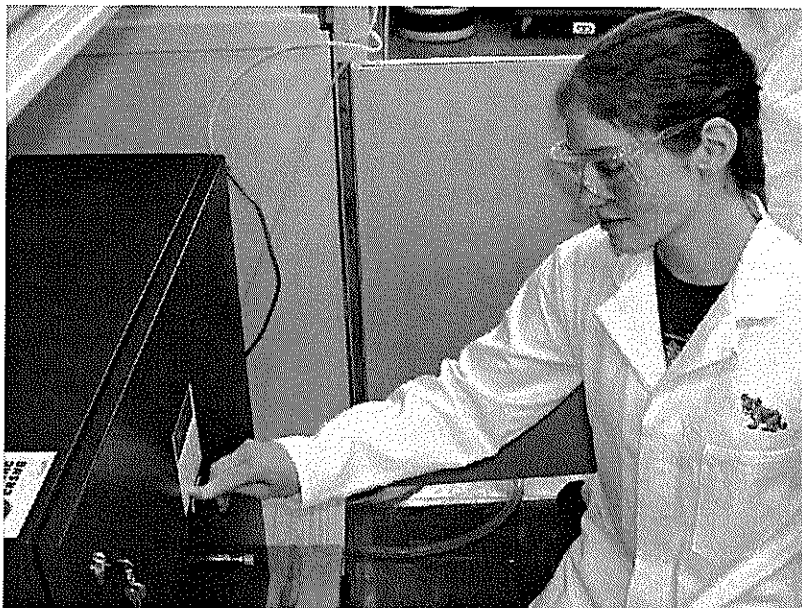
Jessica Vatcher

WISEST Supervisor: Dr. Gamal El-Din, Dept. Civil & Environmental Engineering

Sponsor: Edmonton Glenora Rotary Club

The WISEST Summer Research Program has been one of the best experiences of my life. This summer, I worked in a laboratory in the Department of Environmental Engineering. My projects focused upon water and water treatment.

One of my primary projects was using advanced oxidation processes (AOPs) to treat water contaminated with perfluorinated surfactants (PFOAs). Advanced oxidation processes are treatments that purify the water through oxidizing contaminants. The main treatment used in my project was ozonation: the use of ozone to oxidize. Other advanced oxidation processes include UV photolysis and hydrogen peroxide. Many of these treatments are



often combined so they become more efficient. Perfluorinated surfactants are small pollutants that bioaccumulate and are found globally in the water system. Little is known about perfluorinated surfactants, but they are often used in industrial settings. These industries often release perfluorinated surfactants directly into the water with little effective treatment, since conventional methods of water treatment are futile in the removal of PFOAs. The main focus was to determine what concentration of ozone oxidized the perfluorinated surfactants enough to remove them from the water. This required the use of methods such as COD and indigo to measure both the ozone concentration and the concentration of the surfactant. Due to the great difficulty of working with perfluorinated surfactants, it was necessary to test for differences between a standard concentration of the contaminant when contained in glass, and when contained in plastic. This project greatly demonstrates the need to further advance commonplace technology in the industry of water treatment. Advanced oxidation processes are the treatment of the future, enabling water to be safer for our use.

My secondary project was working with Artificial Neural Networks (ANN), a mathematical modelling program that enables things such as forecasts and virtual monitors. A form of artificial intelligence, ANN simulates the human brain's problem solving process. Using a great deal of history from a problem, it takes previously solved examples, applies learned knowledge, and develops that ability to correctly classify new data. ANN has a variety of applications in the field of Environmental Engineering, such as forecasting the concentration of a water contaminant and virtually monitoring the amount of ground-level ozone for an area at high risk. One of my major modelling projects was to teach the ANN to correctly forecast the concentration of $PM_{2.5}$ in a water treatment plant in Calgary. This project was highly successful, as it yielded a good R^2 value of 0.74. ANN is an amazing technology in Environmental Engineering. With correct application, the need for over-qualified workers to manually test and analyze water samples can be eliminated. The ANN will not only be able to analyze current information, but will be able to utilize this information for forecasting. Artificial Intelligence is the new and promising technology for efficiency and success in Environmental Engineering.

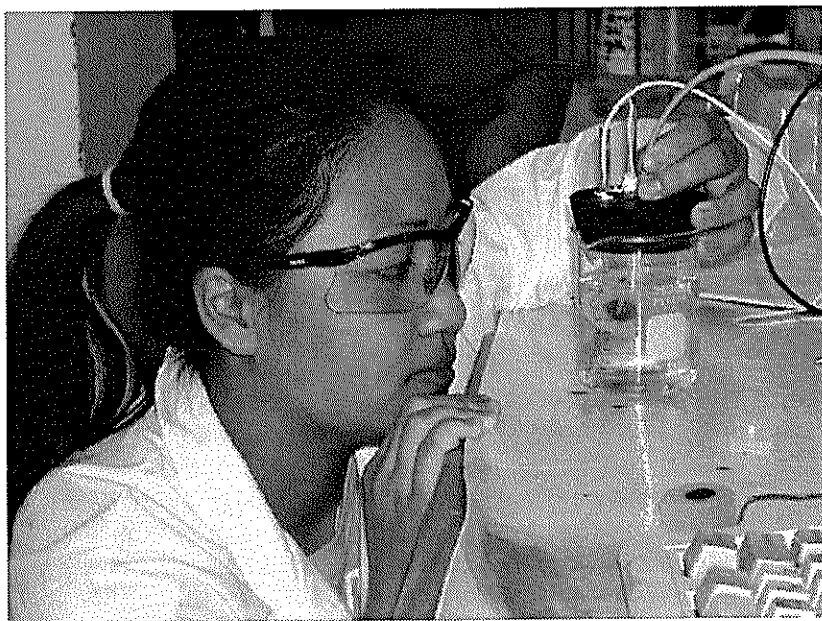
Overall, my experience with WISEST has been amazing and it was made possible through the generosity and kindness of sponsors, laboratory workers, the WISEST office staff and through the wonderful visions and actions of Dr. Armour. Not only have I gained knowledge about my specific projects and other WISEST student's projects, I have gained interpersonal skills and acquired a new networking of people. This experience will be extremely useful for the rest of my life, as I will never forget the wonderful time I have had.

Sarah Vilay

WISEST Supervisor: Dr. Jingli Luo, Dept. Chemical & Materials Engineering
Sponsor: Petro-Canada

During my six weeks at WISEST Summer Research Program, I worked with my supervisor, Dr. Jingli Luo, and even more closely with Dr. Baotong Lu. Whenever they were not around to assist in answering my questions, Haixia and Adeleke were always ready to help me through a problem.

Everyone in the lab was working with a wide variety of metal alloys to study the different corrosion properties. My project included the study of corrosion properties by looking at a variety of electrochemical processes on different compositions of Carbon steel alloys.



In my first week of research, I managed to make myself into a sponge and absorb as much information as possible. I learned about compositions and different techniques to prepare samples for a variety of tests. One preparation step that affects composition and microstructure the most is which type of heating and cooling technique is used to prepare all the Carbon steel samples. The way that all of my samples were to be heated was called Normalization. The process of Normalization is when all Carbon steel samples are put into an oven that can range in different temperatures (my samples were heated in an oven that was 850-900 degrees Celsius) and then left in the

oven for about an hour to an hour and a half. Once time is up, the metal samples are then taken out and left to cool by room temperature. Another way to heat metal samples is called Annealization. The process of Annealization is when all the metal samples are heated and left to cool in the oven. Lastly, there is Quenching. The process of Quenching a metal sample occurs after heating. One must take the metal sample out of the oven and cool it in water.

Before all of this information, I did not realize that heating could affect Carbon steel because I thought it was all the same no matter what. However, in Carbon steel (Fe_nC_n) the Carbon atoms like to group together to form "Greens". The quicker the sample is cooled the less spread out the Carbon atoms become, making the steel alloy more diverse in microstructure. As well, when looking at the microstructure of Carbon steel alloys, there are so many different types of Carbon compounds. At certain high temperatures, Ferrite (Carbon that is soluble) is formed. When cooled to lower temperatures, but above room temperature, Pearlite, the combination of Ferrite and Cementite (Fe_3C), is formed from Ferrites. Lastly, at room temperature, Austenite is formed from Pearlites and Ferrites. This information can be seen when looking at the sample through a microscope. The compounds react differently to certain chemicals and therefore turn into different shades. Ferrites become a lighter shade and Pearlites are darker. Austenites were not seen on any of my samples, so I have no clue what shade they are.

Once heating my samples was done, it was off to prepare resins for my samples. These resins make grinding and polishing samples much easier. One thing that is a downer about this part is that it took my supervisor and me three tries before we could finally have properly hardened samples. Cleaning all of the sticky resin was so hard! It does not come off with just any regular soap!

After hardened samples were produced, it was off to the polishing room on the sixth floor. A majority of my time was spent grinding and polishing all of my samples. It takes forever! First one must grind in order of 240 grit, then 320grit, after 400 and (for me it was last) 600 grit. Each time, grinding or polishing must be done perpendicular to the previous grinding direction. Most of the time, others will go on to polish even further but for my samples it was not required.

Now it was time for me tests to begin. I had done two types of tests on all of my samples. The first test was a Potential dynamic scan. This test plots when the passive film of the metal is created and when it deteriorates. There is a specific point at which my project is most interested in. This point is called the Pitting Point. Since all of my metal samples are of different Carbon concentration, the Pitting Point is very different for each metal. In summary, the Pitting Point shows when the passive film deteriorates. By plotting this point, we are able to determine other characteristics of the passive film.

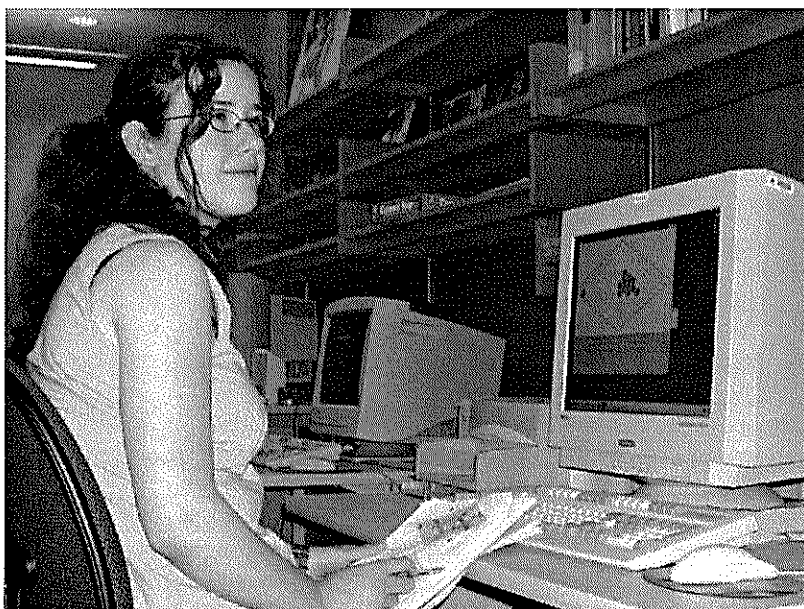
Another test that I operated was called Mott-Schottky. This test first required to be pre-passivated. Pre-passivation is when a constant current is applied to the metal sample to create the passive film. Once pre-passivation preps are done, Mott-Schottky tests begin. These tests plot the defects of a metal's passive film. With this information one is able to connect composition and microstructure with the passive film.

Lastly, I finished with computer work. All of these tests were plotted and are in the process of being analyzed. I feel privileged because most of the work I was doing has not been done before and is not in any textbook right now.

In conclusion I would like to say that this summer rocked! I met so many new people and had an awesome time getting to know everyone. It's hard to write about what I will be missing because I will be missing it all! So I will finish my time here and let everyone know that it was a great pleasure to be a part of this all.

Malka Wrigley

WISEST Supervisor: Dr. Ryan Hayward, Dept. Computing Science
Sponsor: Allard Foundation



This summer, as part of the WISEST Summer Research Program, I worked with Felicia Gotobed, in the Computing Science Centre under Dr. Ryan Hayward's supervision. Dr. Hayward's two graduate students, Jim Nastos and Sean Kennedy, also helped us. Working from the Algorithmics lab, which supplied us with our computers as well as plenty of table space and whiteboards with which to work, we were involved in various ongoing projects taking place in this part of the university. Both of us were somewhat daunted at first by the ambiguity of the tasks and the foreign university environment, but once we got settled in we were able to occupy ourselves with various tasks concerning the projects.

One of these projects involved the board game of Hex, a game in which players try to connect two sides of a rhombus-shaped board composed of hexagons. The game appears simple but requires complex computer programs to play well. We worked with several of these programs; including the university's own "Mongoose". Unbelievably, it only took a few weeks of reading books and papers on strategy, practicing against each other, identifying complex virtual connections based on "and/or" rules, plotting out which types of moves were in a position to ensure a good chance of winning, and playing about fifty games against the computer before us mere humans were able to defeat one of these programs. Despite being a worthy challenge for any game-enthusiast and a worthy accomplishment in technology, these programs are not perfect players, and there were some virtual connections that Mongoose did not find. We helped identify these so that Dr. Hayward could implement them into the program and make it stronger and more able to win competitions against other programs.

Another project we were involved in dealt with learning about the branch of mathematics known as graph theory, and working with several theorems found within it. While I was hesitant to spend my summer working with math as I had already done this outside of school and I was looking forward to trying something new, this type of study was different from any I had ever encountered before. A graph is simply a set of vertices connected by lines called edges. Again, this concept seems simple, yet the possibilities are truly endless. Graphs can be used to represent any number of things, including train or bus stations and the routes between them, cities and highways, people and the relationships they share, circuits in an electronic device, atoms and bonds in a molecule, events and the conflicts that are dealt with in scheduling, even phrases that are to be translated from one language to another using translation software. There are many classes of graphs, each of which obeys certain rules and has unexpected properties, which take much working and explaining to understand. I was surprised to learn that many of the ideas presented in graph theory were only discovered in recent years, and some have yet to be proven.

Over all, this research program gave me a chance to learn new concepts, as well as gain information about Computing Science and other university fields. I met other students in the program with similar interests as well as business professionals who have used their university education to build careers. This information is very important coming out of grade eleven as big decisions are right around the corner.

Raymond Yan

WISEST Supervisor: Dr. Linda Ogilvie, Faculty of Nursing

Sponsor: Faculty of Nursing

During the six weeks for the WISEST summer research program, I worked with Dr. Linda Ogilvie's research team in the Faculty of Nursing at the University of Alberta. With this group, I contributed in two projects that involved newly landed immigrants and one other project that concerned a possible therapy to the chronic condition called Rheumatoid Arthritis.

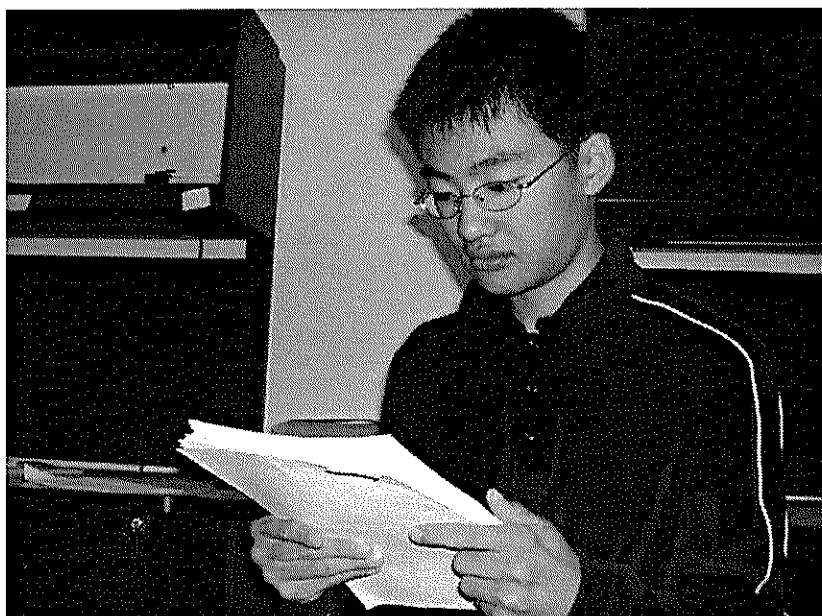
The bulk of my time was spent working on one project called the NCCYS (New Canadian Children and Youth Study), which is a longitudinal study of more than 4000 immigrant and refugee children living in Toronto, Montreal, Winnipeg, Edmonton, Calgary and Vancouver. With between 200,000 and 250,000 people coming to live in Canada every year, almost a quarter of them are children below the age of 15. Many of these people have special needs as they arrive, but these needs are often ignored and still remain neglected. Thus, the NCCYS researchers help create questionnaires for these immigrants, hoping that these surveys can help to identify these immigrants' necessities.

My role in this project was to help code the questionnaire survey responses into number values, which could then be entered into a computer and plotted out into a graph or chart for data analysis. I also helped to compile articles for the research team from the University libraries, which include the John W. Scott Health Sciences library, the Rutherford libraries, and the H.T. Coutts Education library. Through this, I was able to

get familiar with the University campus resources and references. Sometimes, I would also help create presentations for the research group.

Another project that I worked on was the investigation of the effects of taking an alternative therapy called Elk Velvet Antler (EVA). Evidence suggests that the EVA could effectively be able to control or subdue Rheumatoid Arthritis, a disorder that can lead to inflammation of joints, tissue around the joints and can potentially lead to permanent disability. Thus, researchers are now currently collecting data by testing this suppressant with Rheumatoid Arthritis patients. This data

collected, can also be coded into number values, to be easily entered into a computer so that an analysis can be done in regards to actual measurable results. My partner (Jason Pheh) and I were the ones that did the data-entry into the computer for later analysis.



Near the end of the WISEST program, we had the chance to participate in a job shadow with clinical nurses at the Grey Nuns Hospital. We had the opportunity to see the daily routines in the intensive care unit and were also able to meet many interesting people such as respiratory therapists, nurses, physicians, pharmacists, surgeons, and dieticians.

In conclusion, the time spend in the WISEST Program was enjoyable. WISEST helped open my eyes to the vast amounts of future career possibilities that can be available to me in the future, gave me a chance to explore the University campus, and was a great time to make new friends.

TsionYegletu

WISEST Supervisor: Dr. Margaret-Ann Armour, Dept. Chemistry
Sponsor: Syncrude Canada Ltd.

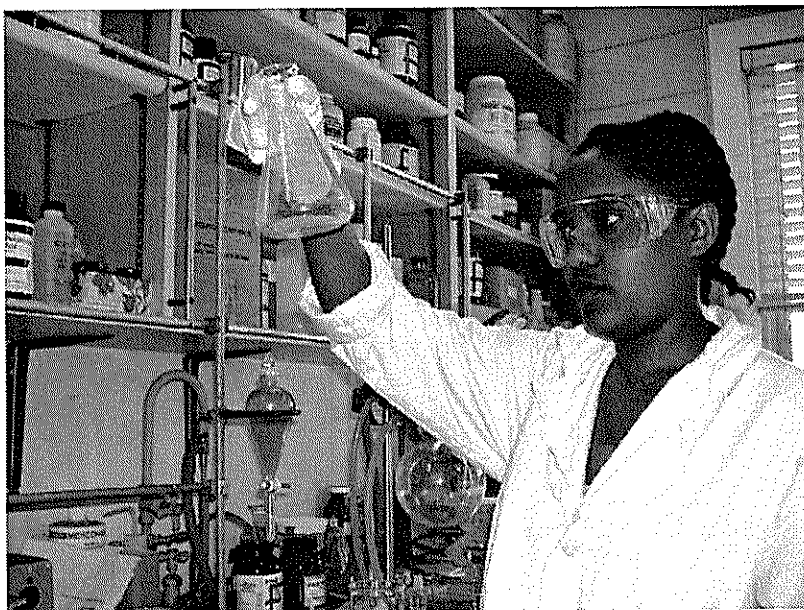
A guy I know once said that once every ten years a person would get a very inspiring opportunity that would change his or her life regarding the moves they make, and that this opportunity would require dedication, strong personality and sacrifices. It is all about the perception and how you interpret the quote, but for me, I started my ten-year adventure six weeks ago with excitement, anxiety and a dream to fulfill. Although the WISEST Summer Research Program's objectives speculate on giving science lovers a chance to gain a hands-on experience in research, it also gives most students the chance to develop communication skills, a foundation for team work and it provides support for future career choices.

I worked in the Chemistry Department, in a research lab organized and supported by Dr. Margaret-Ann Armour and Dr. William Hunter. Our team set out to prevent the pollution that appears to affect Mother Nature due to substantial amount of chemical wastes. The first part of my project was mostly an introduction to the lab safety policies, getting to know the different devices and result analysis. As we went along it become very practical and real. The second project involved extracting heavy metal solution using strong acids and bases, which in turn would give us salt (sent for proper disposal) and a non toxic solution that could be drained safely. The last one involved dealing with a cancer treatment drug and finding a precise time and method to

dispose of it. This cancer-treating drug, Mitotane, was found to have a chemical composition like that of DDT. Therefore by destroying its concentration with potassium permanganate, we would have a tremendous way of disposing of it.

Before this opportunity came along, I would feel confused and unknowledgeable if someone talked about the use of gas chromatogram and Atomic Absorbency, but now I can hold my head up and say "I know that stuff too". It is all due to the efforts of the people at the University of Alberta.

Besides my work in the lab, I went on tours to very well known and profitable companies like IBM, Micralyne and Syncrude. These companies gave freely of their time and shared with all of the WISEST students their commitment to encourage young women in the sciences, engineering, and technology.



There are other instances that stand out in my memory. It was my very first day, just right after the WISEST safety orientation and the presentation about fire and related accidents. One of the WISEST girls, Jody, and I went to see our lab, and unfortunately Dr. Hunter (our research advisor) left us alone in the lab for a second. At that instant, we heard a bell ring and thought it might be a fire drill. I still remember how terrified and at the same time surprised I was that no one in the next room seemed to bother. We started laughing when we found out it that it really was a bell.

WISEST also organized fun activities that provided a depth of understanding for what there might be in a student's future. It gave us the chance to find out about many new career options, a chance to meet great spoke persons from different companies, and to have great friends as well. I cannot conclude my report without sending my best regards to all the people, who made my wildest fantasy into reality.

WISEST

women in scholarship, engineering, science & technology

