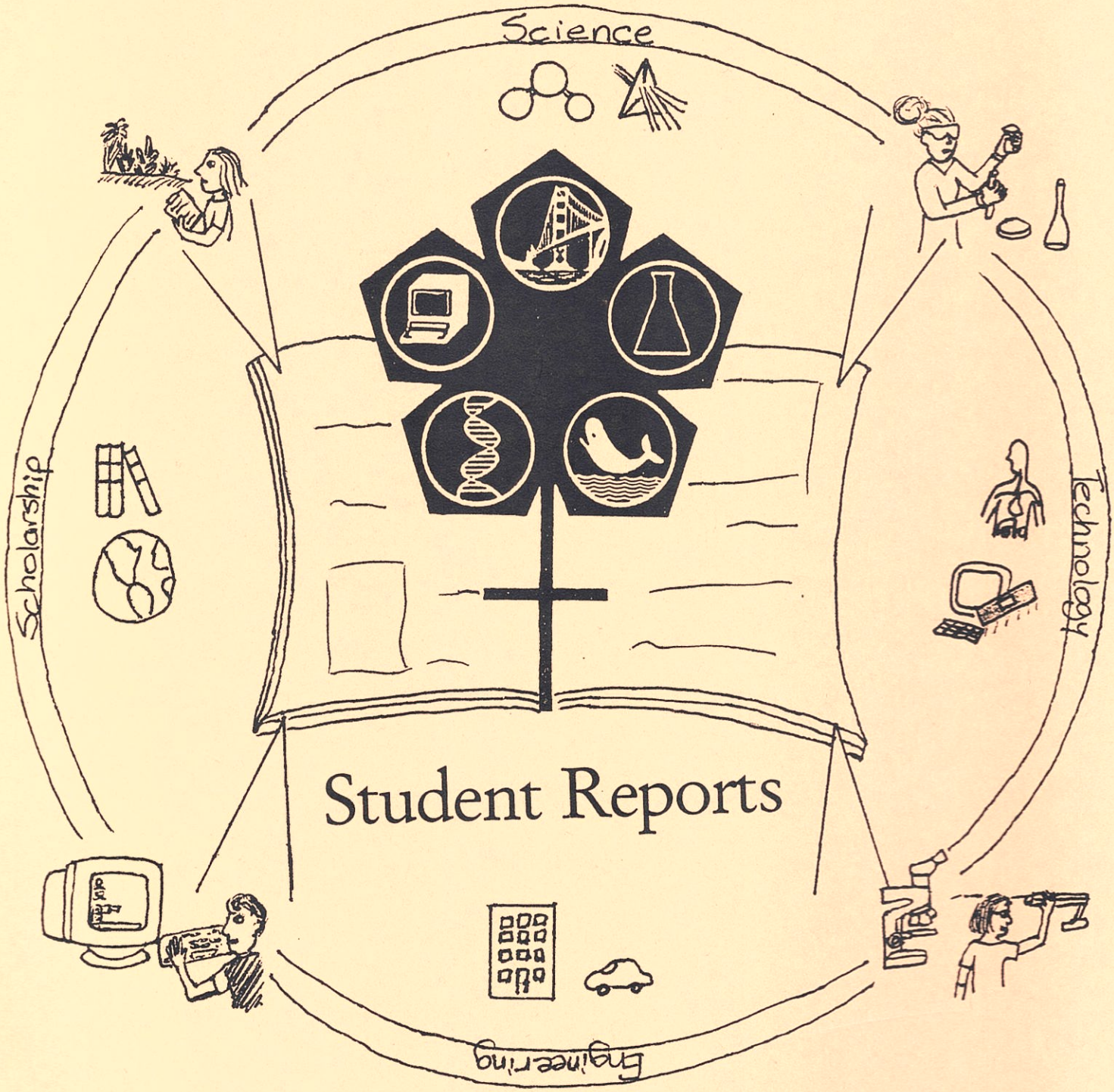
WISEST

Women in Scholarship, Engineering, Science, and Technology



Student Reports

WISEST Summer Research Program 1999

Cover design by Stefanie Lee

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Joy Wang, SARAH TAYLOR, Joanne Montpetit

JOY WANG, Sarah Taylor, Joanne Montpetit

Joy Wang, Sarah Taylor, JOANNE MONTPETIT

Felicia Owakalu, Wynne Leung (Alumi 1995)

Kendra Marr, Treena Hill

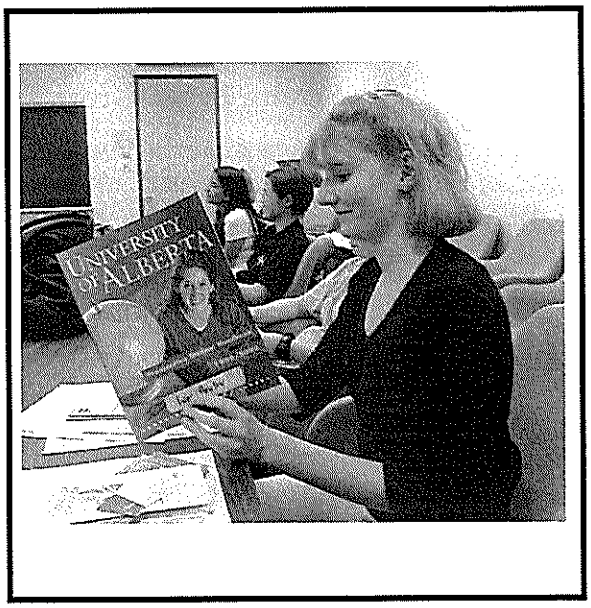
Kristina Pearson, Alaina Booth

WISEST

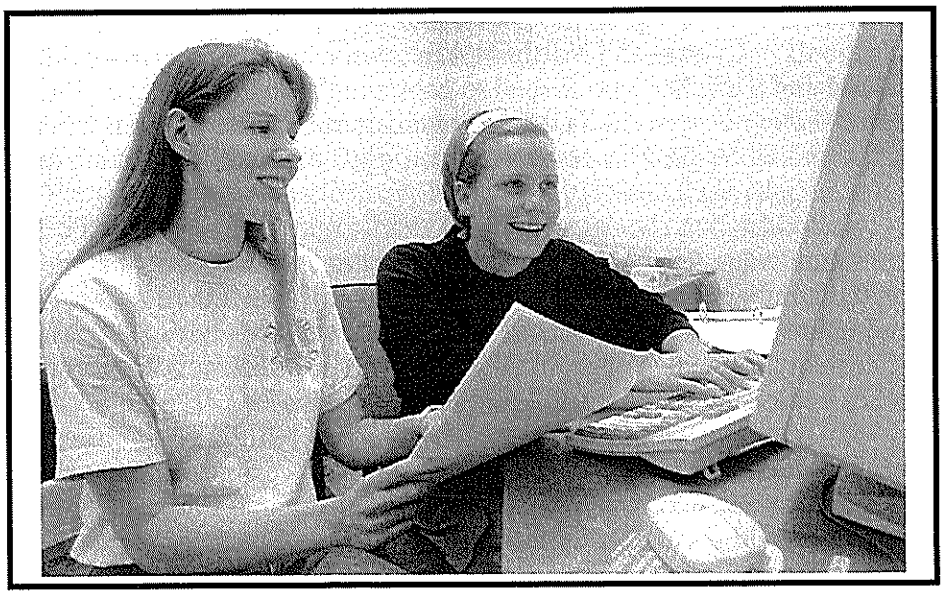
Women in Scholarship Engineering, Science and Technology

Summer Research Program 1999 Student Reports

"Since the start of this program I have been way more inclined to continue in science and engineering ... and then get an MBA. Ever since this summer I love the university, I feel as if I am a small part of it!



"This has been the best experience "work wise" I've ever had. It was a once in a lifetime chance to become acquainted with the U of A, have the chance to meet professors, grad students, and other scientists, before actually entering into University."



"I feel that I immensely contributed to my research team's work. No one questioned my results and everyone took my work seriously."

Dr. Sandra Zohar, Grace Ennis, Dr. Margaret-Ann Armour, Renate Pfiefer

WISEST was formed in 1982 by then Vice-President (Research) at the University of Alberta, Dr. J. Gordin Kaplan with a mandate to increase the proportion of women in all fields of scholarship. Since women are still markedly under-represented in decision making roles in the sciences and engineering, WISEST has developed initiatives to encourage young women to consider careers in these fields. The WISEST Summer Research Program is one of the major initiatives of WISEST.

This year marks the 15th year of the WISEST Summer Research Program. It has evolved into a Program which provides a valuable research experience to high school students who are making decisions about their field of study at post-secondary institutions. In the Program, students who have completed grade 11 spend six weeks working as a member of a research group at the University of Alberta, the girls in the fields of engineering, science, agriculture and the health sciences and the boys in the fields of human ecology and nursing.

The success of the Program is a reflection of the support of many, many people. Each year WISEST receives about 200 applications from schools in Central and Northern Alberta for the positions available. Each of these applications represented a school and a teacher who helped to promote the Program, made information available to their students, and encouraged them to apply. As well, the teachers submitted detailed letters of reference. Thank you to all of the supporters of WISEST who have encouraged their students to pursue this opportunity.

The students were paid at the minimum wage for their six weeks of work and the number of students who could be accommodated depended on the number of sponsorships available to pay the students. WISEST thanks the several local industries, philanthropic groups, Deans of Faculties at the University of Alberta, and the Provincial and Federal governments for their financial support in the 1999 Summer Research Program. A detailed list of the WISEST Partners has been included in the Student Report Booklet.

University faculty members were recruited as supervisors of the students and we appreciate their continuing strong endorsement of the program as they included the WISEST Summer Research Program students into their research teams. We are very pleased to add our thanks to those thoughts of appreciation expressed by the students towards their research teams in the following student reports.

The students' experiences in the research labs were complemented and extended by a variety of weekly afternoon activities. The students toured the campus, learned about the library system, had discussions with women and men in non-traditional careers, toured research facilities on campus and they toured a facility specializing in technology (CompCanada Inc.). The students presented their research posters to their fellow research team members and WISEST students, and again at the 15th anniversary celebration to an audience of family, friends, Program alumni and WISEST funding Partners. At the poster presentation sessions, members of the audience had an opportunity to see and ask questions about the students' research work. We would like to thank the numerous people whose participation made all these activities such good opportunities for learning.

In addition, several social events were planned to give the students an opportunity to get to know one another better. These included: a picnic in the park before attending a Shakespearean play in an amphitheatre, an evening at the Edmonton Space Sciences Centre, and a picnic social following our visit to CompCanada. Each Tuesday at noon, the students were encouraged to bring their bag lunches for an informal gathering with the WISEST Co-ordinator at the Students' Union Building.

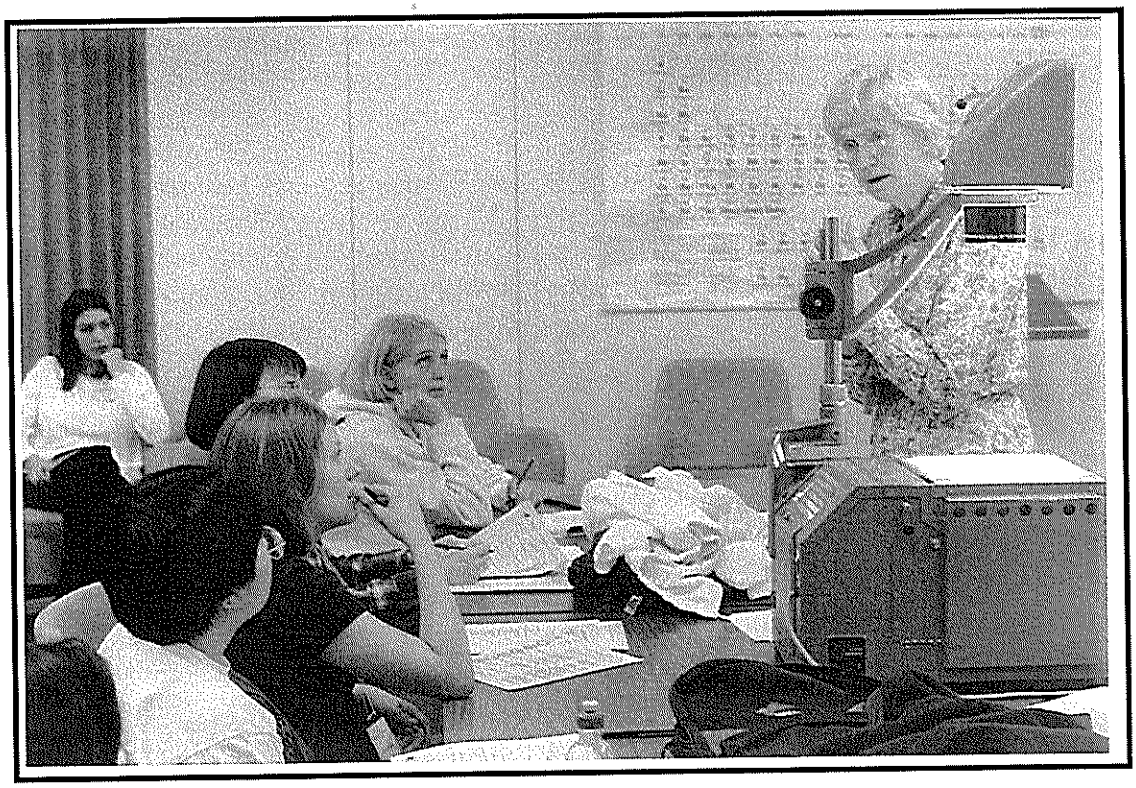
Many of the students participating in the Program were from areas outside of Edmonton and they arranged accommodation for the summer with friends, relatives or at the University's Student Housing (Lister Hall). To help these students in their transition to living in Edmonton and working on the University campus, WISEST was fortunate to the have the enthusiasm and friendliness of our "Big Sister", Sarah Flynn. She offered support, direction, and at times, entertainment for these out-of-town students.

To serve as a reflection of the WISEST students' experience in their research labs and in the Program, the WISEST Student Report Booklet is produced and shared with the students, teachers, supervisors, sponsors and other people who have expressed an interest in learning about the Program. The students have helped to make it their own reflection by submitting articles about their work in the research lab, their weekly afternoon activities, their experiences in Lister Hall or at the Meanook Biological Research Station, and the various WISEST social activities. Photos are contributions of the students or of our photographer, Paul Dolphin. These personal observations are the heart of the booklet as they illustrate the quality of the research and the variety of the projects that the students undertook. Stefanie Lee's artistic design for the booklet cover was chosen from many creative entries to the "Cover Design Contest"; other submissions have been included throughout the booklet.

The Alberta Heritage Foundation for Medical Research (AHFMR) sees the WISEST Summer Research Program model as an excellent way of introducing high school students, their teachers and their parents to medical research. As a result, simultaneous with the WISEST Summer Research Program, WISEST is contracted to run in the summer of 2000, a Heritage Young Researchers Summer (HYRS) Program, funded by AHFMR. The HYRS Program will be open to both male and female students who will spend the six weeks in the research groups of AHFMR investigators.

We have very much enjoyed getting to know all of the young women and men who spent the summer with the WISEST Summer Research Program, exploring non-traditional fields such as science, engineering and nursing. We wish the students the very best as they pursue their education and work towards fulfilling lives, and WISEST strongly encourages them to tell their friends and schoolmates about their experiences.

Best Wishes from the WISEST team:
Dr. Margaret-Ann Armour, WISEST Vice-Chair
Dr. Sandra Zohar, WISEST Coordinator
Grace Ennis, WISEST Coordinator
Renate Pfeifer, WISEST Coordinator



WISEST Summer Research Program Celebrates 15th Anniversary.

It is 15 years since WISEST first invited 10 students who had completed grade 11 in Edmonton schools to spend six weeks working as a member of a research group at the University of Alberta. The idea behind the program was to give young women an opportunity to have a hands-on experience in the sciences and engineering and young men a chance to find out about nursing and home economics. In this way, when these young people were making choices of what to study at University or what career to pursue, they would be doing so with a wider knowledge than before they participated in the program. In particular, we hoped that the experience would help to develop in young women a stronger curiosity and interest in the sciences and engineering.

That first summer we were not sure what to expect. There were many unanswered questions. Would university faculty volunteer as supervisors of grade 11 students? How many students would be interested in such an opportunity? How would we contact the students to let them know about the Program? How would we select the students? Would the Program meet the expectations we had of it? There were certain principles that we worked from. The students had to have high academic qualifications and be keen to experience research since we realized that if we wanted the Program to continue, the supervisors would have to be pleased with what the students could do. The fields of research the students would work in had to be non-traditional ones. We would pay the students an honorarium for their work and that would be at the rate of the minimum wage. Gordin Kaplan, Vice-President, Research and the first Chair of WISEST, who was one of the promoters of the program, agreed to provide funding to pay the students for the first year. He expected us to find at least partial external funding for future years. The students that first summer set a remarkable pattern which has allowed the program to continue for 15 years and to spawn similar programs at other institutions. The faculty who agreed to take the students, sometimes with some trepidation, were amazed by what a keen and bright young person from grade 11 could accomplish. Most supervisors have continued to take students over the years.

The first program was bare bones. The students arrived on campus at the beginning of July. They were introduced to their supervisors and they worked for the six weeks and left. We did have a questionnaire for the students and for their supervisors, and the answers to those certainly let us know that the idea was a winner all round. Over the years, the number of students in the program increased to a high of 50. The Federal Government sponsored half of the students through their Summer Employment program. The Alberta government supported four students each year through its Summer Temporary Employment Program, and gradually more industrial sponsors have been found. The University has provided essential on-going support of the program through the office of the Vice-President, Research and External Affairs, and more recently Faculty Deans have each sponsored one or two students.

Since that first program, many additions have been made to provide an even more valuable experience for the students. A weekly Wednesday afternoon get-together allows students to tour the University, learn about the library system, hear from women and men in non-traditional careers, tour other laboratories in which they are interested, and share the research they have done with the other students in the Program. On one Wednesday afternoon there is an industrial tour followed by a picnic. Since 1990, ten places in the Program have been reserved for students from high schools in Northern Alberta outside the Greater Edmonton area. Two generous women established an Endowment Fund to help subsidize the travel and living expenses for a rural student who could not afford to participate in the program without such support. Rural students who do not have friends or relatives in Edmonton with whom they can stay, live at Lister Hall under the care of a Big Sister. The Big Sister organizes a social program for them; all of the students are invited to attend a performance of Shakespeare in the Park and to visit the Space and Sciences Centre among other activities. These activities allow the students to get to know one another and some strong friendships have developed.

For the past two years, the students have prepared posters describing their work and during the last week of the Program, an Open House is held at which the posters are on display. Parents, sponsors and supervisors are invited. This year, the Open House was a celebration of 15 years of what is now called the WISEST Summer Research Program and attracted about 200 people.

With 15 years of experience behind us, where do we go from here? Two years ago, the Federal Government cut the budget for the Summer Employment Program and drastically reduced the number of students sponsored in the WISEST Summer Research Program from 25 to 10 and this year to 5. They had warned us that this would probably happen since no other group received this level of funding. Thus, one of the challenges for us is to find sponsorships so that we can continue to accept 50 students into the program. We are making good progress in this direction and are most grateful to the companies and philanthropic groups who are both providing funds and taking an interest in their students. This summer, we received exciting news. The Alberta Heritage Foundation for Medical Research wanted to provide high school students with an opportunity to experience the kind of research funded by the Foundation. They decided that the WISEST Summer Research Program provided the model they would like to use, so in the summer of 2000, there will be a second Summer Research Program called HYRS, Heritage Youth Research Summer, based on the WISEST model. Students will be able to attend HYRS Programs at the University of Calgary and the University of Alberta. The latter Program will be administered from the WISEST office and direction will be provided as needed to the coordinator of the Calgary HYRS Program.

A six-year long project funded by the Social Sciences and Humanities Research Council has allowed an interdisciplinary research group to follow the 50 students who participated in the 1994 WISEST Summer Research Program together with two groups of their peers, one of whom spent one day at the University and the other a control group. We look forward to the final report of this project. The findings may enable us to further refine the WISEST Summer Research Program, thus to continue to fulfill Gordin Kaplan's dream for WISEST: to increase the percentage of women in decision-making roles in all fields of scholarship.

Dr. Margaret-Ann Armour WISEST Vice Chair

Many thanks

to the following partners

for their financial sponsorship of the

WISEST Summer Research Program, 1999

Alberta Heritage Foundation for Medical Research

Alberta Science and Research Authority

Canadian National (CN)

Chieftain International Inc.

Dow Chemical Canada Inc.

Edmonton Glenora Rotary Club

Margaret-Ann Armour Fund for Rural WISEST Students

Syncrude Canada Ltd.

The Winspear Fund

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Summer Temporary Employment Program of Alberta (STEP),

Advanced Education and Career Development

Summer Career Placements Program, Human Resources Development Canada

The University of Alberta:

Vice-President (Research and External Affairs)

Faculty of Agriculture, Forestry and Home Economics

Faculty of Science

Department of Computing Science

Faculty of Engineering

Department of Civil and Environmental Engineering

Faculty of Pharmacy and Pharmaceutical Sciences

Faculty of Medicine and Oral Health Sciences

PARTNERSHIP WITH WISEST

- **The WISEST Summer Research Program students are paid an honorarium 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, Deans of Faculties and Chairs of Departments at the University of Alberta, and Provincial and Federal governments sponsor students.**

- **Sponsorships are $2,000 per student. The money is used to pay the students an honorarium, 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 at Lister Hall 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.**

Contacting WISEST is now easier than ever.

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wisest@chem.ualberta.ca

The First Day

by Erin Tremblay

All first days are nerve racking but I think my first day of the summer program was a little easier because I stayed at Lister. Facing a room full of people is always easier when you have three friends standing next to you. It was actually kind of exciting to be a part of the program and to get a folder full of papers to go over and fill out (I know the prospects of a folder full of papers isn't what most people find exciting but odd things amuse me). The atmosphere was not surprisingly welcoming and it was nice to see some of the women from SET.

The orientation succeeded in making things a clearer (when we weren't filling out forms) and it had me a little worried about all the things I would need to get done. However, the expectations seemed high enough to challenge yet not unrealistic or higher then logically possible.

The safety course was funny and made me feel a little more confident though I was worried about how much I would remember and wondered if I knew enough to work in the lab. In actuality the information from the course helped a lot and anywhere I wasn't sure the people in my lab helped me out.

I'd have to say that meeting my professor was one of the best parts of the day. I was nervous about it, but really shouldn't have been. Dr. Tonn and his two students Kim and Andy were really down to earth and didn't fit the stereotype usually associated with professors and grad students. I had a great time touring the labs I would be working in and they cleared away any worries I was having.

As far as first days go I had more fun then nervous jitters and I'm really glad I got to be there.

Erin Tremblay

Opening Session

By Katie Martin

I can still recall how nervous and excited I was as I tried to find the room where our Opening Session of the WISEST Summer Research Program would take place. It seemed to take forever until I finally reached the right room. I was one of the first people there, and everyone else that was already there was too shy and nervous to say anything. So we all kind of stood there, feeling awkward and wondering what the program would be like. After a few minutes, more people started showing up, and finally some greetings were exchanged. We all took our seats nervously, not sure who to sit by, since none of us really knew one another, and soon the session started.

Once Grace and Renate started taking about the program and the things we would be doing through out the six weeks, I could feel the tension in the room start to ease up.

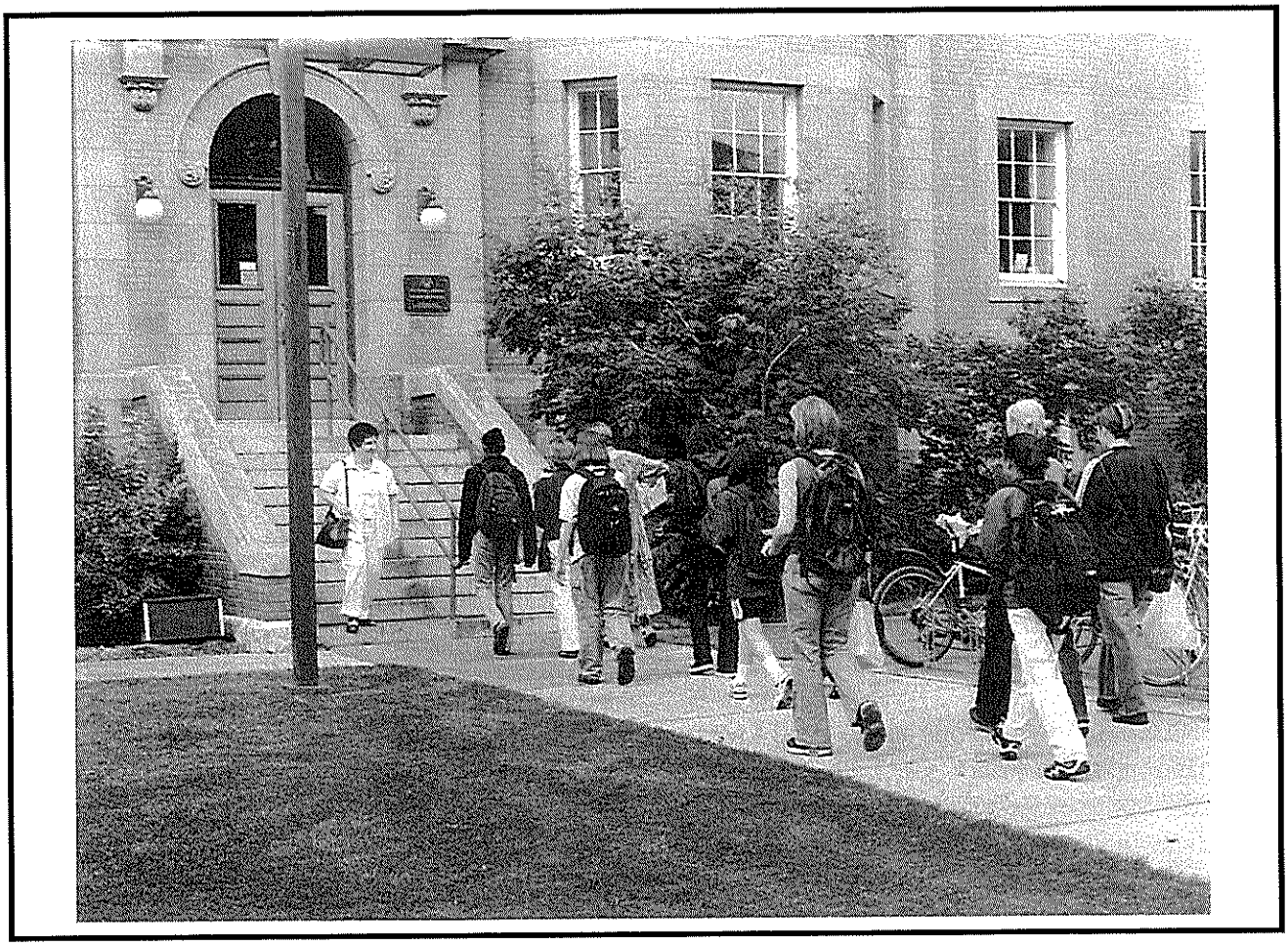
We were also spoken to by Dr. Sandra Zohar and Dr. Dallas Cullen as well as Margaret Ann Armour.

There were lots of forms to fill out and sign, and we were filled in on all the important financial information (like when we would be paid, and how much). We also met Paul, the photographer that would be taking pictures of all the WISEST activities. Then Margaret Ann took the floor. She went over all the rules of safety when it comes to chemicals as well as other bio-hazards. The safety lecture took up a good portion of the morning, and soon it was time to break for lunch.

We all headed down to the HUB mall where we had an awesome lunch at Taco Time... we got to build our own taco salads!! By that time, everyone had opened themselves up more, and everyone started to get to know each other a bit better. However, soon it was time to go back to our meeting room.

We learned more about safety, with the help of "Danger Drew" and "Safety Sue" and went through a couple of worksheets to make sure we understood the general rules of safety in the lab. By that time, every one was getting restless, so it was time to take a break . We had a granola bar and juice, and we all got to talk some more. And then, it was time for us to head down to meet our supervisors.

Everyone was feeling anxious as well as nervous... questions like "what if they don't like us?" and "what if our supervisor is really mean?!" were running through our heads. As we stood in line to meet our supervisors though, we started to feel more at ease as we saw all the friendly looking people our fellow WISEST students were being paired with. After we met our supervisor, and asked all the questions we had developed through out the day, the Opening Session was officially over. As I drove home, I was really excited for the next day to start. I wasn't scared at all anymore; I was anxious to get on with summer, because I knew that the Opening Session was only the start of an incredible summer. And it was!

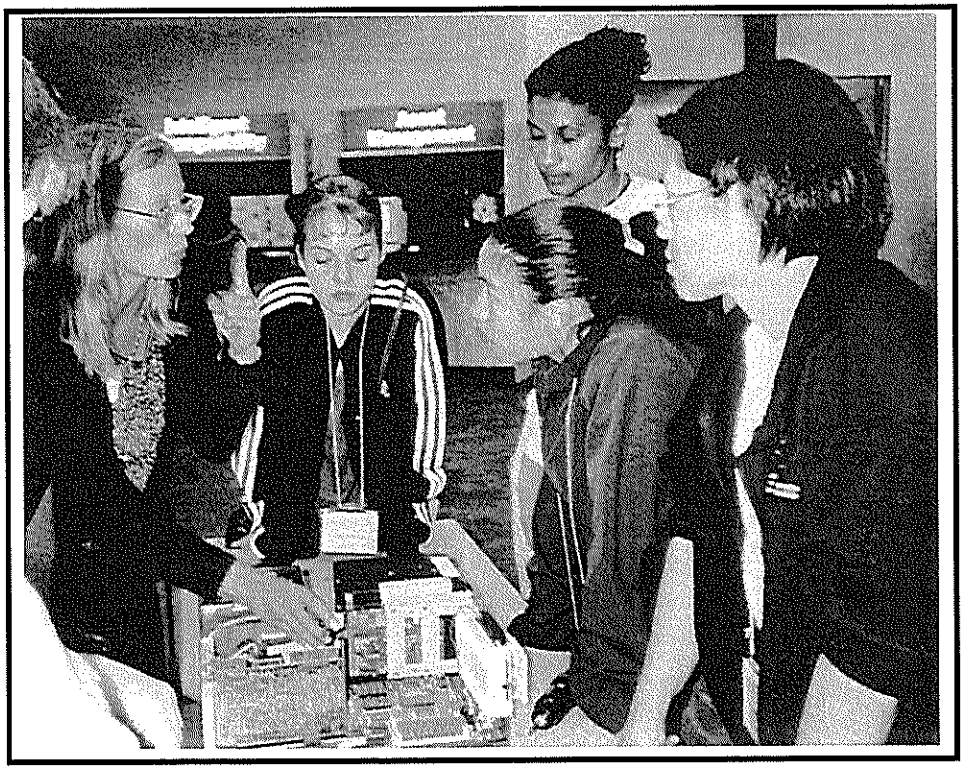


Campus Tour

by Denise Ng

Being the first of many memorable Wednesday afternoon gatherings, we were treated to a rather useful tour of university campus for which we are all undoubtedly grateful. Finding where we were to meet that first day, however, was the first challenge. Sick of getting lost and of the icky weather to which we were subject, our brigade of WISEST girls headed inside, opting for a drier tour as it drizzled outside.

During our daring adventures, we happened upon the aptly described greenhouse at the Agricultural building where we also saw the overly friendly bird Sam, whom we were repeatedly warned not to feed. It was very warm, and forever may we find sanctuary there on cold, winter mornings. Traversing the entire campus, we were acquainted with the various engineering and sciences buildings. Amongst the buildings of note were the Building of the Uncooperative Architects, the Building where We Went on First Day, the Building Connected to the Building where We Went on First Day, CAB, SUB, and HUB also known as the Place to Get Coffee. While our helpful guide spoke of the wonderful architectural aspects of the many buildings from the inside, we became acquainted with both the institution where we were to work, and with the other students who were chosen for the WISEST program. I can remember being introduced to several new faces and names, both of which I hope I will not allow to fade into obscurity as time goes along. May we all keep in touch.



Curiosity at Comp Canada

by Allison Stedford

What is CompCanada? On July 14, 1999 we (WISEST students) took a field trip to find an answer to this question.

CompCanada (Technology Solution Center) is an organization, lead by Salma Rajwani, that carries the latest in computer technology and tries to sell it to other companies to better their day to day operations. CompCanada has a large variety of opportunities in all areas including computer technology, IT and business – ideal for both men and women. On our trip we were able to see this through both talking to employees and participating through the use of the technology itself. Some of the highlights were seeing what the inside of a computer looks like, participating in conference calls, wall paper designing and computer handwriting.

This experience was definitely one of the most memorable during our WISEST experience. It has given us a new insight into the world of It and computer technology. THANK YOU CompCanada for enabling us to learn about your unique business!!

Trip to Comp Canada

By Kendra Marr

One of our Wednesday activities was a tour of Comp Canada. After we all found the right meeting place, which took a little time, we loaded onto the bright yellow school bus to escape the rain. After driving for quite awhile we arrived at Comp Canada. We were all still a bit nervous of each other, but after we saw all the cookies, pop, and juice on the table we all had a common interest.

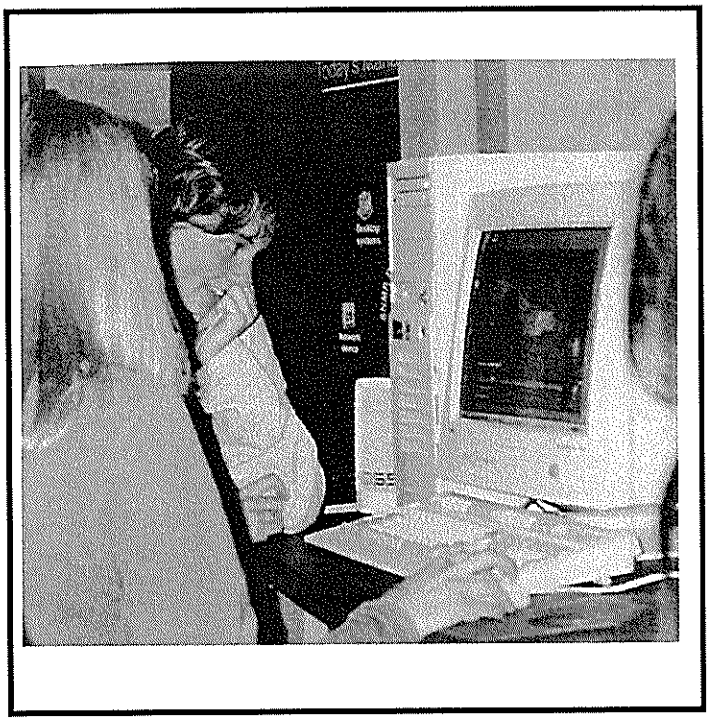
The tour involved us all going into this big room, (with a strange smell) with computers lined along all the walls. We went to various stations, like video conferencing, digital camera editing, multimedia training videos, and voice & printing recognition. We all had fun playing with all the computers and giving each other orange hair and tacky clothes, but our group's favourite was the police multimedia training program. You would watch a video of a crime scene and then choose what you would do in that situation. Let me tell you, it's really good we are all considering science rather than a job in the police force.

The people there were great and did their best to explain and show us how to use everything. After awhile, we all loaded back on to the bus and headed home. This was a great experience and it allowed me to see the fun aspects of a job in Information Technology.

Tour at Comp Canada

by Michelle Trommelen

When we first left for Comp Canada, none of us were to sure what we were going to see. However, it turned out to be lots of fun. The video conferencing on line was very interesting. Our debate topic was " is it morally right for chickens to be dissected" (thanks goes to Katie for that one) and, well, that got us bringing chickens into every conversation after that. We tried to get the speech recognition on the computer to say chicken, but had no luck. I hear that someone else finally managed it though. Congratulations to them! Later, we pretended to be cops in a Calgary training session on the computer, and actually did pretty well. Maybe a future career there right girls? Overall, the tour at Comp Canada was very interesting, and we all had fun.



Comp Canada and Beyond...

Again engaged in our Wednesday afternoon adventures, WISEST was fortunate enough to frequent an information and technology centre called CompCanada. There, we were able to explore various areas of technological development. In spite of the early Where-is-the-Stadium-Parking-Lot-Anyway?-Confusion, we were able to have a marvelous time. It was a wonderful opportunity to learn about the new fields of application in computers and other forms of technology. The women there were of great help, and were obviously a great asset to the company. Their hospitality and friendliness were fully appreciated.

The speech recognition technology should be especially remembered for its intriguing value in terms of technical applications and as well for its pure entertainment. I myself can recall the hours we spent trying to get the program to recognize the word chicken. Other new avenues of technology approach were in multimedia, where computer programs were used for job training modules, teleconferencing, telecommunication innovations, and several more. In addition, the written recognition and hardware developments were interesting to see as well. Noting how far computers have advanced since those Apple II's with black and green monitors I remember using in elementary school, the technology and information field was seen for its rapid development and the newly blossoming creations.

Afterwards, our field trip continued on to the stylish Athabasca Lounge where we "picnicked indoors on delicious submarine sandwiches as the weather proved balky. Licorice, cookies, and punch in hand, we continued to discuss the events of the day, and to get to know each other better, chat amiably amongst ourselves.

Trip to Comp Canada

During our Wednesday afternoon session of July 21st, we all went to Comp Canada. It was a business that sold computer accessories and other technological advances.

Before we left, we all met at the Stadium Parkade. It was drizzling that day but that didn't dampen the fun we had at Comp Canada. The bus ride was about 25 minutes long.

As soon as we entered the building past the front desk, we saw all these computers set up along the wall. After the CEO of Comp Canada spoke, we got to go around to different stations and see what kind of technology was in the present market. Each group had one or two ladies that would explain to us the technology and then allow us the try it.

One of the stations required a program called Dragon Speak Naturally (...I think). That was where the computer typed everything you spoke but before that, you have to adjust the program so it understands what you're saying. If not, everything (... I mean everything) you say will come out wrong way. Some people tried to say chicken but after about 50 tries, one person actually managed to accomplish this task.

Another station was like a "doodling on pictures" station. One of the ladies would first take your picture as soon as you got there. Then she would take the camera, connect it to the computer and load the picture onto the computer. After that, we were free to crop, draw, or do anything we wanted to the picture. It created some pretty wacky photos.

The third station was a networking station. They had cameras set up at three different locations around the room. So the people at each station could see the others and type to each other at the same time. It's kind of like chatting on the internet but you get to see the person's face.

This next station was like watching TV. This program was designed so people can get trained through a computer. The one we were watching was asking us to solve a murder case. This program will be used quite a bit in the future.

During this fifth station, we got to practice our printing. It may seem like nothing but it's harder than it sounds. This was because it was programmed to read a certain person's style of writing. So when all of us tried to print, it didn't pick up our letters. Sometimes our ugliest writing was picked up but our nicest printing wasn't recognized at all.

The last station was where we got to take a look at the inside of a computer. Since I've only used one and not taken apart one, it was pretty informative.

Wait – actually this station was the last station. (— the best one, I'd say). That would be the food station. The cookies were delicious and the juice was doubly appreciated after a cookie. That rounded the trip quite nicely.

But the best part I would have to say, is the generous hospitality of the volunteers. The ladies were so kind and willing to show us around. Overall, this was a truly worthwhile experience.

Submitted by Tania Tam

WISEST Picnic after our visit to Comp Canada

By Allison Pelensky and Michelle Po

Theoretically the afternoon of Wednesday July 14 was supposed to be a sunny beautiful afternoon and upon our return from CompCanada we were to go to Hawerlak park for a picnic. One step outside told us a different story, it was pouring rain. So rather than brave the out of doors weather, we were told out picnic would take place in the luxury of Athabasca Hall.

When we got to Athabasca Hall we had juice, fruit (watermelon especially), cookies and licorice waiting for us. After a few announcements from Renate and Grace we were ready to have fun. I think that the trip to CompCanada was a bonding experience for all of us because looking around the room that Wednesday afternoon it was hard to believe that these were the same faces that snuck sly glances at eachother a little more than one week before. From the laughter rising from the Lister girls' table to the smiles and giggles from the big group in the center of the room it was obvious a great time was being had by all.

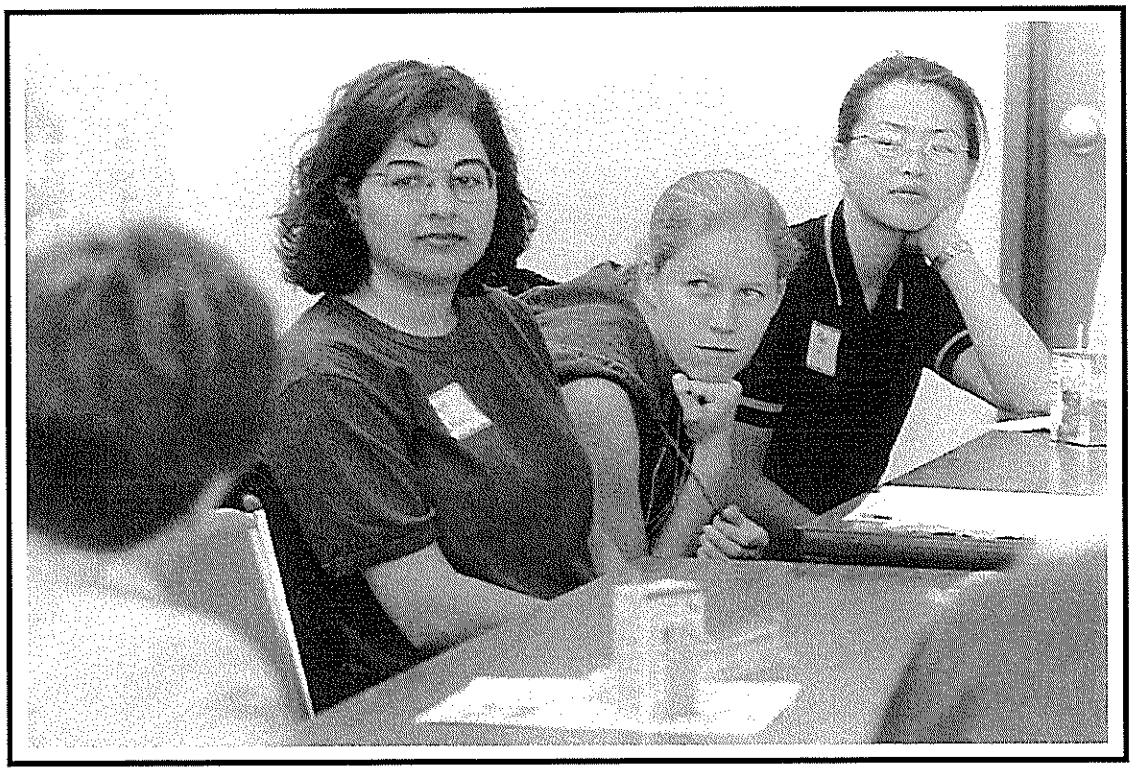
Some moments that stick out in my memory from that afternoon are trying to figure out everyone's' names, especially when Michelle Po knew who almost everyone was. The taste combinations, like watermelon, iced tea and licorice, and (this one is a little embarrassing) locking myself in the boys bathroom.

But all in all I think that the WISEST picnic on that Wednesday afternoon was a good time had by all.

The Small Group Discussions

by Allison Pelensky

On this Wednesday afternoon the whole WISEST group met and then broke up into groups of about 6 or 7. We all then went with our group to talk in a small group with another 6 or 7 people working in non-traditional roles. From male nurses, to female computer programmers there was a whole spectrum of interesting people. Our group went from quite awkward at the beginning to very interesting by the end. At first we were all a little shy, no one wanted to ask question, but when the geologist in our group realized that Michelle was interested in geology the atmosphere of the whole group lightened up. These women were all very different, some believed certain things about the sciences and careers within them and others believed the opposite things. This caused a bit of tension within the group, but the tension was necessary to see all the different sides of an issue. Though our group did not get deeply into the "non-traditional roles" issue, we noticed that similar to the WISEST students, the younger women (grad students) noticed a very small to almost non-existent bias against them because they were female. On the other hand the older women felt they had experienced some discrimination at one point or another during their careers. Meeting these women was an excellent experience, we learnt of different career opportunities in the sciences, to various routes that we could take, like and engineering degree followed by an MBA, or going out and working on the field for geology. This afternoon was a great experience.



Small Group Discussions

By Jamie Relland

The small group discussion session was very informative and enjoyable. It was truly wonderful to be able to talk with professionals who are currently working in interesting scientific fields and know what the work world is like. The sage advice which they imparted included such wise words as:

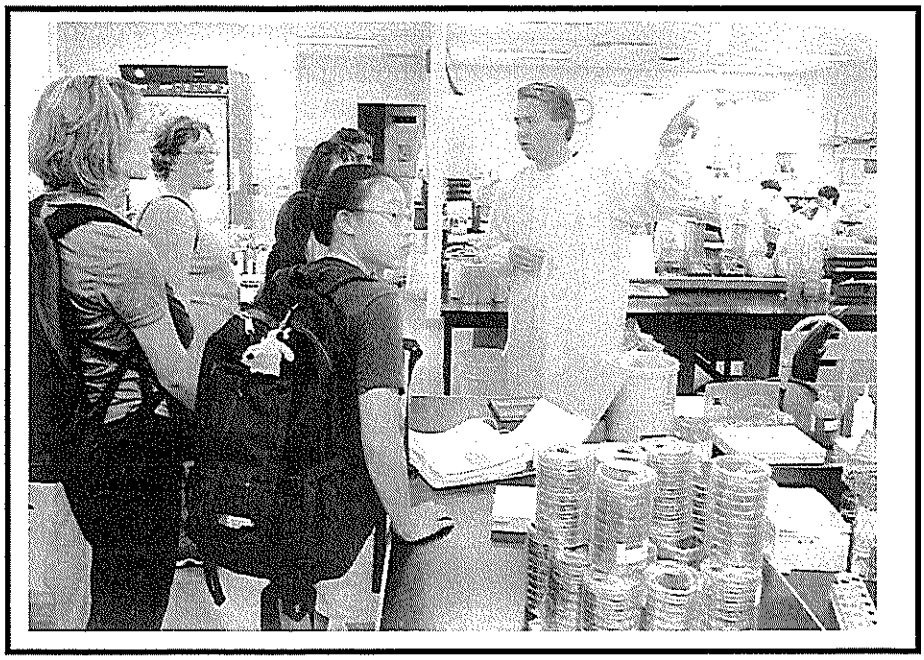
- search until you find something that you passionately enjoy;
- talk to as many graduate students, professors, or industrial employees as you can;
- build a broad educational base upon which you can structure your career;
- leave your options open and never lose sight of the large picture; and
- make all of your decisions with your priorities in mind.

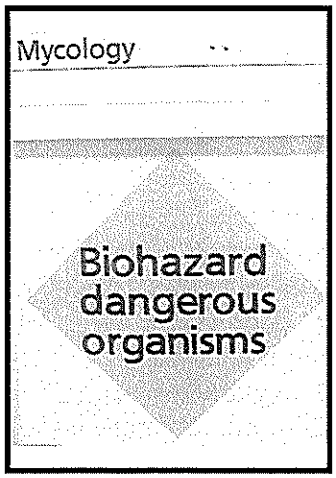
All of the speakers within my group were so wonderful and very willing to share their knowledge. I feel that I must thank Martha Watson., Anna Shoveller, Terry Allen, Mary Fairhurst, Shelly Simpson, and Edwin Birse for sharing their personal stories and insights with my group and I.

Laboratory Medicine and Pathology Tour

It was a hot and sunny day when we walked to the U of A Hospital for a tour of the Laboratory Medicine and Pathology labs led by Dr. Bamforth. Once inside, the labs turned out to be vast areas filled with machines and equipment for analysis and benches on which rested computers and test tubes. First was the microbiology area, where we were able to watch researchers at work culturing and testing for all sorts of microorganisms. Then it was off to another discipline dealing with microscopic entities, hematology. Our guide showed us the inner workings of a blood analysis machine, which printed out a sample report. In pathology, we could look at and even touch organs which had been taken out during transplant operations. Finally, in the biochemistry labs, we learned about tests for certain chemicals indicative of various diseases. It was a fascinating, in-depth look at a part of the hospital one would not normally have a chance to see, and special thanks go out to Dr. Bamforth and all the helpful people who were willing to show us around their workplace.

By Stefanie Lee





Research Lab Visits

by: Felicia Owokalu

As I stood listening to Dr. Underhill, my guide for the research lab visit, I couldn't help but marvel at what he was saying. I had the opportunity of visiting a medical genetics lab which was somewhat new to me. I didn't know there were so many different branches of genetics. Dr. Underhill's lab studies deformities, specifically neuro tube defects that mainly affect the spinal cord area. We were shown several slides that showed the different steps involved in the process of forming deformities.

We were also shown around the lab and we saw how cells were cultured. We saw how slides were prepared and finally what was on the slides by looking through a microscope. The slides contained the genetic material of a patient; the patient's chromosomes were being studied to check for abnormalities. By capturing a picture of the slide on the computer, the chromosomes could then be put in order and any abnormalities would be noted. A diagnosis could then be made as to what kind of deformities were present.

The work done by this lab is useful for expectant parents who may be worried about abnormalities in their children. This lab visit was beneficial and a very great learning experience.

Lab Visits

Treena Hill

One of our fun Wednesday afternoon activities was going to visit different research labs of our choice. It was really good to be able to see what other faculties and departments do, not just what you are doing. I had a really fun time going to see a chemical engineering lab. Four girls went and we squished into a small office where Dr. Kresta, a really nice lady, answered our questions. Then we went down to their lab, where Vera, a summer student, showed us around her lab and some other ones too so that we could get a general idea of what they do there. She answered our questions about the classes and stuff like that. Being able to see this lab helped me realize that engineering is something that interests me and that I might like to go into it someday. It was a really good experience seeing what they do first hand instead of someone just telling you, and I hope everyone had a good a time as I did.

Shakespeare in the Park

On a bright and sunny (and hot!) Monday afternoon, most of the WISEST students trekked down to Hawrelak Park for a picnic. After finding Grace, (which was an adventure in itself), we sat down to eat. The hot dog sticks were immediately snatched up and most of the talking stopped while we ate. The watermelon was a definite hit, but only Sarah (the Big Sister), and Margaret-Ann were brave enough to eat the veggie dogs. Most of us were turned off by them when Allison S. gave us a detailed reading of the ingredients. Then, full of the hot dogs and watermelon, we walked over to the long line up for "Two Gentlemen of Verona". Some of us were anxious as to whether or not we would get in but it turned out to be much ado about nothing. (The rest of us who knew we would get in just chatted informally.) The play was a hit. From Howard Stern to Mexican beauties, the actors entertained us. We were all swept up in the action and love affairs of the two heroes. And of course there was a happy ending, which left everyone with a contented feeling. (The picnic also gave us a contented feeling in our stomachs.) But, all in all, it was a blast, and also a great "get-to-know-you" activity.

Karen Diepeveen

The Joy of Shakespeare

July 12th, 1999, marks the day when the first WISEST social activity occurred. The evening consisted of a picnic in Hawrelak Park, along with a theatrical presentation of Shakespeare's "Two Men in Verona" at the amphitheater. It was a gorgeous day and an even more beautiful evening. We met at the SUB info. booth, and, being the brave individuals we are, we partook in a **long** journey from the U of A to the park. The walk was most beneficial because we got to know each other better and had an opportunity to socialize.

When we arrived at the site, we all had one thought in mind after a hard day's work....FOOD!!! Several memorable events occurred hereafter: the eating of nearly raw hotdogs, an intriguing discussion of the history of the hotdog, an attempt by some to eat TOFU dogs, then marshmallow roasting contests, and much, much more.

After the barbecue, we walked towards the theater to see the production. To our surprise, we found ourselves at the end of an exceptionally long line-up. The turnout was unimaginable, with over 1000 people attending. The play itself was nothing short of brilliant. "Two Gentlemen in Verona" is a story of two young men, Proteus and Valentine who travel to a Mexican border town. The two friends soon find themselves falling in love with the same woman, Sylvia, despite the fact that Proteus has left a lady back home with a promise of love. The play is filled with intriguing minor characters, and a hilarious plot line. Let's not forget the dog. Yes, there is even a message somewhere in the midst of the numerous quirks, jokes, puns, etc.

All in all, the evening was an enormous success and a true joy to all of those who attended.

Daria Kotovych

Shakespeare in the Park

On July 12 th, 1999, a group of us WISEST Summer Research Students along with Grace, Renate, and Margaret-Ann, gathered in Hawrelak Park to have a barbecue and take in the River City Shakespeare Festival '99.

Erin Brennand and I met everyone there since I had my car. The rest of the WISEST gang walked, and they beat us! Erin and I have no sense of direction... we missed our turn off twice! After wandering around the park searching for everyone, Renate came to the rescue by spotting us and directing us to where everyone had set up for the barbecue.

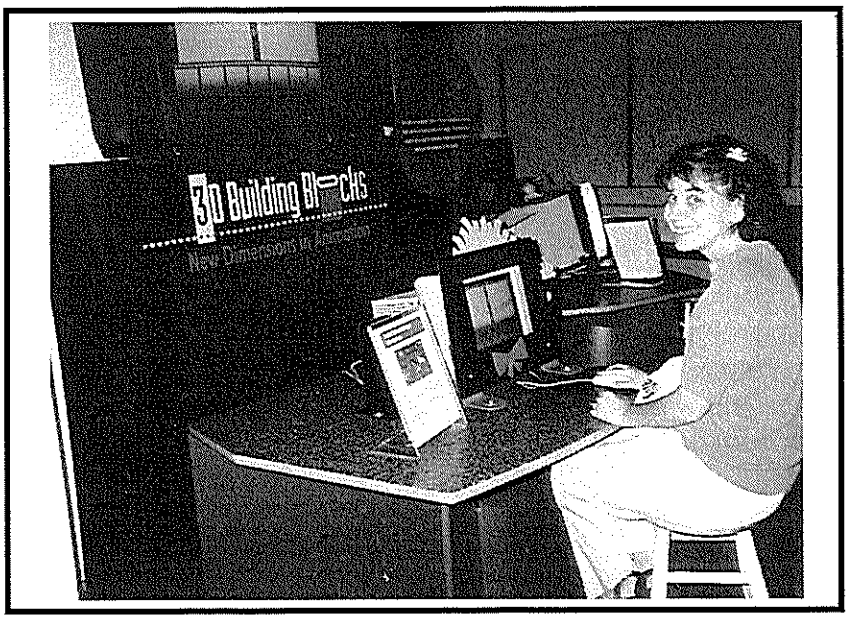
After stuffing ourselves with hot dogs (root-extract-tofu-hot-dogs for the vegetarians in the group), watermelon, chips, nachos, and plenty of licorice and iced tea, we walked over to the amphitheater. Fortunately, it was donation night, so we didn't have to spend much of our hard-earned money.

The play we saw was called The Two Gentlemen of Verona, and I must say, the cast proved that this piece was one of Will's finest. I don't think anyone had a hard time interpreting the language because the actors spoke with such expression and character. Nonetheless, I felt quite proud of myself for being able to follow what was going on.

I think my favorite actor was John Ulyatt, who played the character Launce, Proteus' servant. John's quick wit, and his four-legged friend Woody, made the mood of the play light and humorous.

I found the whole evening extremely enjoyable. I got to know the other students in the program, I stuffed myself full of free food, and watched a terrific play (from front row seats!!). I think the Shakespeare in the Park Festival is something that the WISEST Summer Research Program should continue to attend. I'll bet next year's students will enjoy it every bit as much as I did.

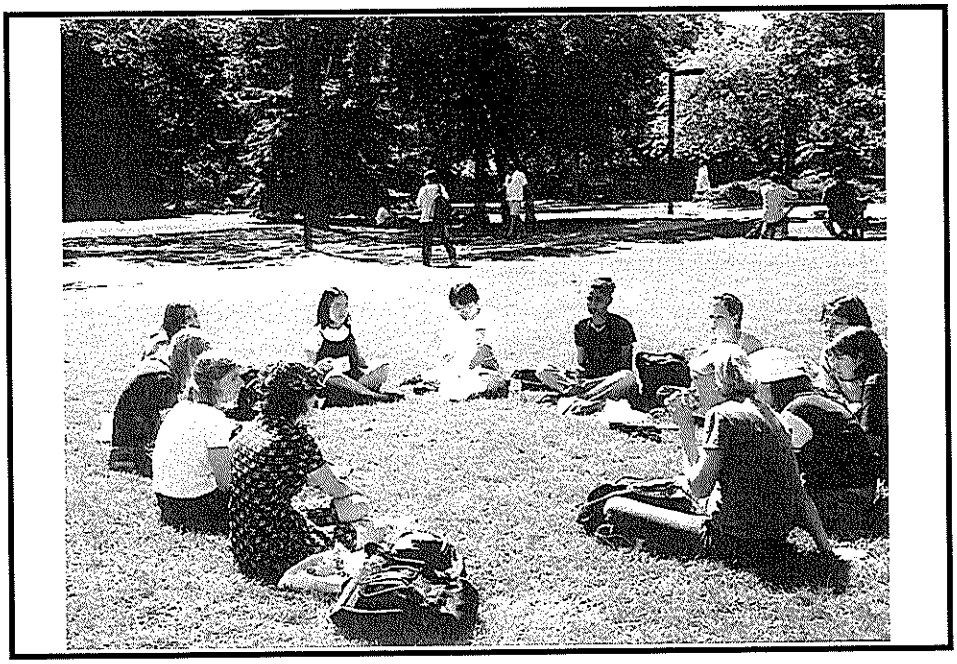
By Katie Martin



Space: Above and Beyond

The Space and Science Center is by far one of Edmonton's most talked about attractions. Everything from the variety of displays to the IMAX shows illustrates how it is able to draw many people of all ages. So many WISEST people arrived at the Space and Science Center that we became concerned that the facilities would not be able to contain us, nevertheless we had a great deal of fun. We had the opportunity to solve a murder in which some of us were successful, and some (not to mention any names) were not. We enjoyed an IMAX show on fires and firefighting and played around a little in Discoveryland (which is definitely not just for kids). All in all, it was a fun and interesting way to spend an evening.

by Jasmine Krysak



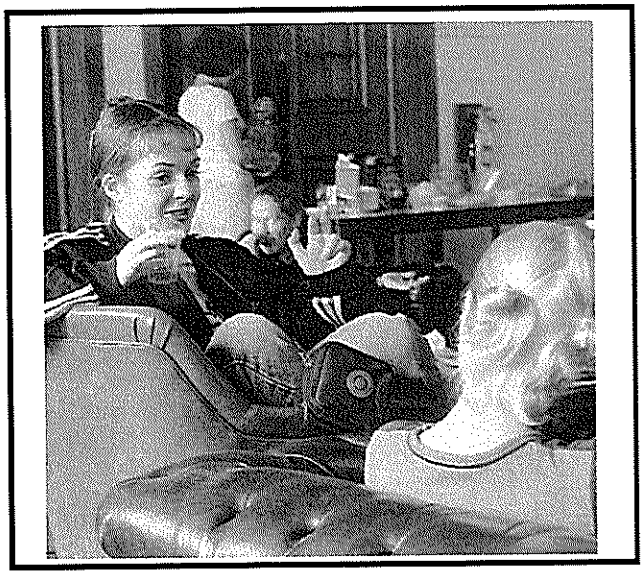
Tuesday Bag Lunches

The Tuesday bag lunches were an optional activity for those participating in the WISEST Summer Research Program. Every Tuesday a group of us met at SUB and went out to the Quad to have our lunches together with Renate. It gave us a great opportunity to meet other participants and learn more about their projects. It was unstructured and informal; everyone came out to enjoy the weather and each other's company. Topics of discussion ranged from mishaps in the lab to weird and wonderful vacations. At first, it was very quiet, but soon we were having a great time getting to know one another.

We had a potluck on the final Tuesday of the program where we each brought in a dish of our choice. The resulting meal mainly consisted of chocolate and candy, though none of us complained. We had a lot of fun that day even though most of us left feeling quite lethargic due to our overeating.

All in all, the Tuesday bag lunches helped us get to know one another, as did the other WISEST activities. We will all leave the program with new friends and fond memories.

Thulasy Balasubramaniam



Tuesday Bag Lunches

by Michelle Trommelen

For some of us, the Tuesday bag lunches were the highlight of the week (besides the Wednesday afternoons off of course). It was a time where anywhere between 8-20 some of us got together and got to known each other better. It was also a time where we could lie around and suntan (weather permitting of course). I know I had a lot of fun, and stayed as long as I possibly could every week (right Alison?). Thanks to Renate for taking the time to eat lunch with us and for starting conversations when we were all to shy to speak up and say something.

Life at Meanook

By Joy, Sarah, and Joanne

We just thought we'd start off by saying we had one truly awesome summer here at the Meanook Biological Research Station. As we write this we only have a week left, but we're already thinking about how much we're going to miss it here. It's hard to explain to someone who's never been here just exactly what goes on, and why it's so special, but we're going to try anyway! J

Life has been anything but typical for us this summer. It was the first time living away from home for all of us, and it seems like we've been living in a different world. Each of us had our own room, one of many in a trailer. Sarah and Joanne enjoyed their cozy, but somewhat snug bedrooms with single beds and closets while Joy (that lucky girl!) got a luxury suite with an astounding two beds!!!! (It wasn't actually much different, just bigger.) At times it felt just like summer camp, but the food was so much better. Glad, our cook (and gourmet chef...) made us feel right at home with her wonderful meals and tasty desserts. It actually wouldn't surprise any of us if our scales at home aren't "working properly" when we try them out after a summer like this! We had some favourites: Sarah's insatiable craving for the peanut butter cookies, Joanne's desire for the melt-in-your-mouth butter tarts, and Joy's near display of withdrawal symptoms when she didn't get her pie! Also, the weather was nothing to complain about. We had entire spells where it was over thirty degrees! _ Sometimes the whole crew went down to Narrow Lake, Alberta's cleanest lake, to cool off and joke around after a long hot day at work.

Work itself was surprisingly interesting and fun; as a matter of fact, we each fit into our jobs perfectly. You'd almost think they planned it that way! J We thought it was going to be tedious, repetitive work that only paid off in the end, but it turned out to be exciting *all* the way. We were all so enthused about our work and discoveries that we'd run around the station looking for each other to share it with. The people thought we were crazy to be having so much fun working.

Now to the people; this is what made Meanook a home, and it's what we're all going to miss the most. To start off with, everyone welcomed us right away and they all showed interest in what we were doing, which was something we hadn't experienced much of before. It was awesome to see that they cared about our work *and* understood our new scientific language without us having to explain any of it! They always made us feel like "part of the team" and we never felt like young, inexperienced high school students who were overwhelmed by all these university scholars. We had our toenails painted, like many others on the station (including the guys!) We were sometimes teased and tickled until we were rolling on the ground in laughter by the other researchers there. Glad was our surrogate mother, she fed us with yummy goodies until we were past being full but then scolded us if we were late for dinner! All in all, the Meanookies were some of the greatest and most interesting people we believe we will ever have the chance to meet. We made great friends with each other over the seemingly short summer and we will definitely miss it!!!

Living in Lister

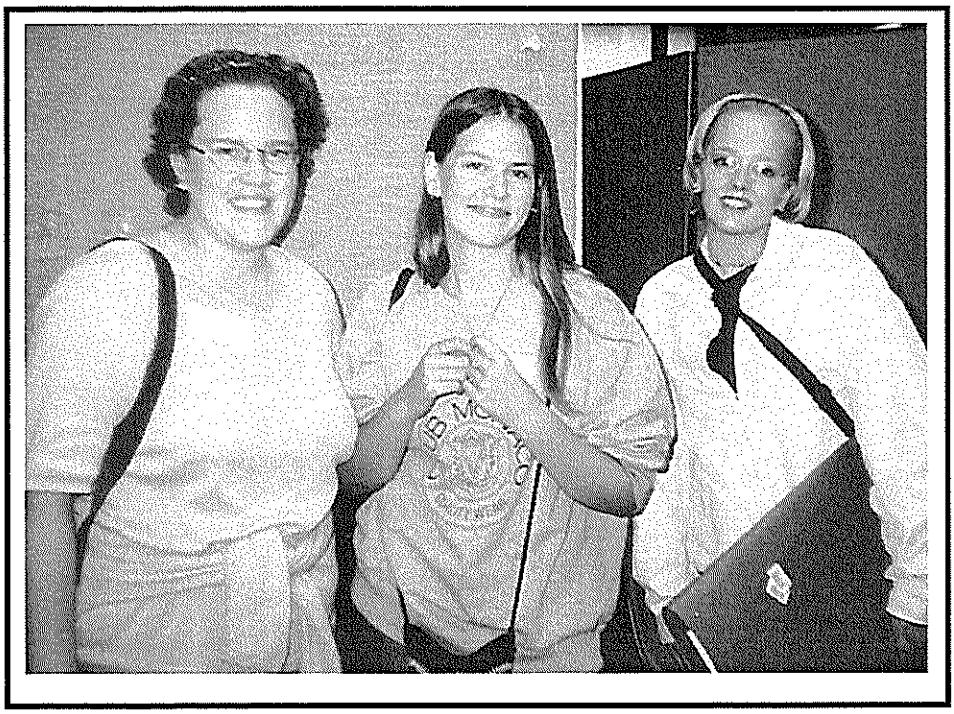
We thought the only way you guys could really see what it was like at Lister was for each of us to say what it meant to us and what we will remember:

"My experience living at Lister Hall was something to remember. Having the other girls there made it easier to be away from home, especially when I felt homesick or simply when I needed someone to talk to. For this reason I think that
the most memorable times here at Lister were not when we went out to movies or the mall but when we simply stayed up late and talked."

-Jennifer

"Well I'd have to say that my stay at Lister has been extremely exciting. I was worried at first about having no one to talk to, or being bored, but the past six weeks have been far from boring. Allison you really need to watch were you're walking. Jenn I'll put your name into gamblers anonymous, just so that they know you're coming. Shannon the hand means stop, not walk. Erin be on the alert for foreign boys in pink towels. A big thanks to Sarah, for watching over us??? I've had so much fun over the last six weeks as well as we've all learned a lot about university life. Thanks to all the girls for all the good advice and great talks. I know I've made 4 life long friends."

-Janelle



"Life at Lister is one of the experiences I will never forget. I will always keep with me the memories made here. The things I will remember most are the deep discussions we had, the Olive Garden and the numerous times we almost got lost. Allison I will miss your optimism and energy. Janelle I will miss your ideas that no one else could think of and your ability to spot a good looking guy. Erin I will miss your laugh and the way you always lightened our moods. Jennifer I will miss your ideas and opinions. I hope we keep in touch, I will miss all of you and I will cherish the memories made at Lister Hall."

-Shannon

"Lister Hall has been a unique experience for me. My most memorable moments include long talks in the ship – while cutting up newspaper, hitting my head on a pipe, Klondike days, the art museum and working out at the gym. Thanks to everyone at Lister for being so friendly. I had a blast."

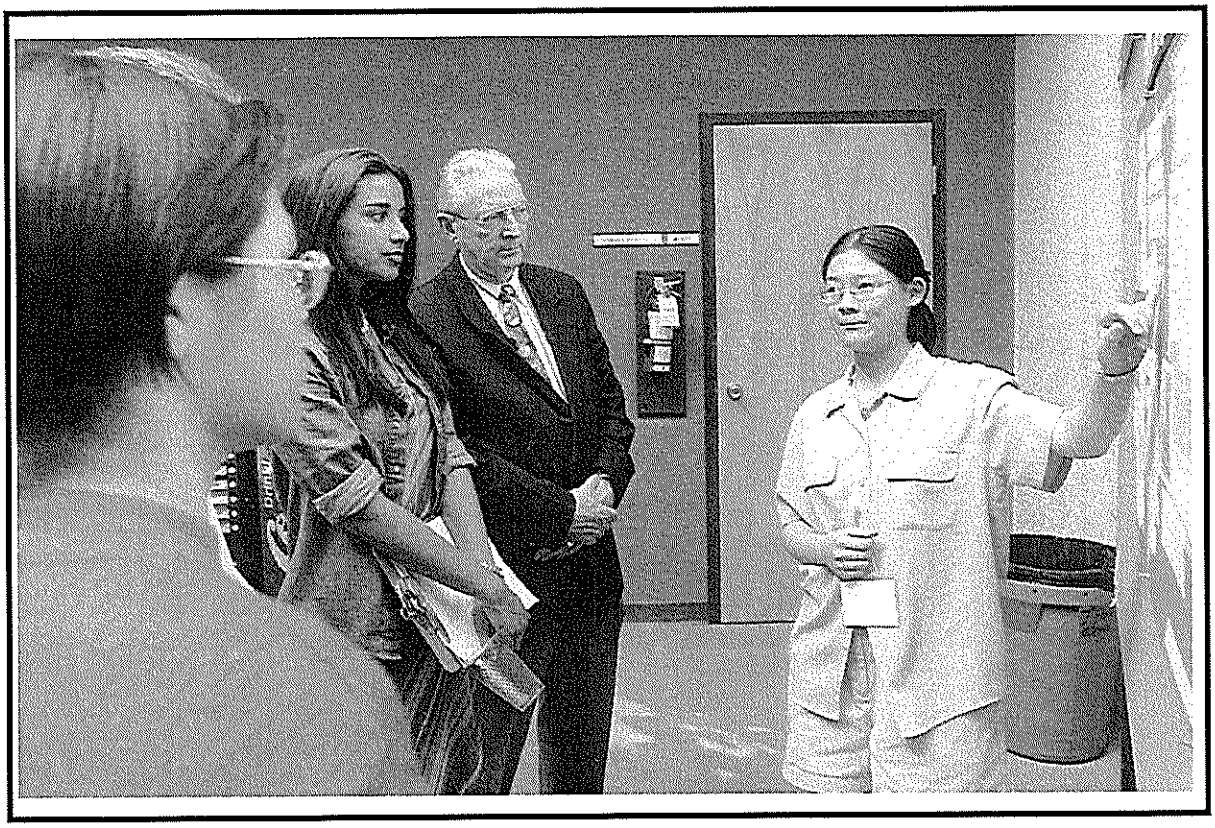
-Allison

" This has been a rare experience and I am so glad that I got to be part of it. I want to thank Allison for always encouraging us and for her help in the gym (even if we did look like peeing dogs). I want to thank Shannon for some how always making things fun and everyone feel good. I want to thank Janelle for always turning things back to guys and making sure we knew about all the good ones in the complex. I want to thank Jenn for giving me chocolate milk even when she hated doing it and letting us watch movies in her room. It is impossible for me to put into words how much all of you mean to me or how neat you all are. All I can say is it is a good thing Telus has Yaks!"

-Erin

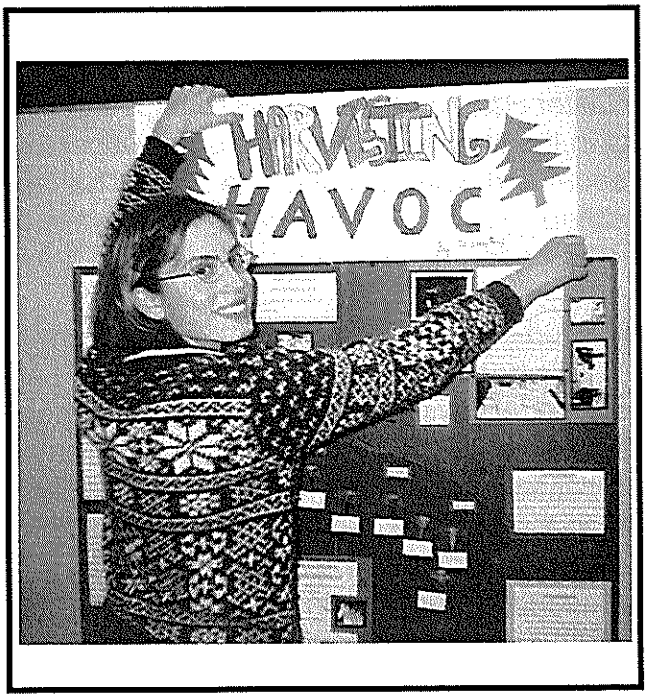
We hope that all of you had summers that were as great as ours. Good luck with everyting in the future.

-The Lister Hall Girls

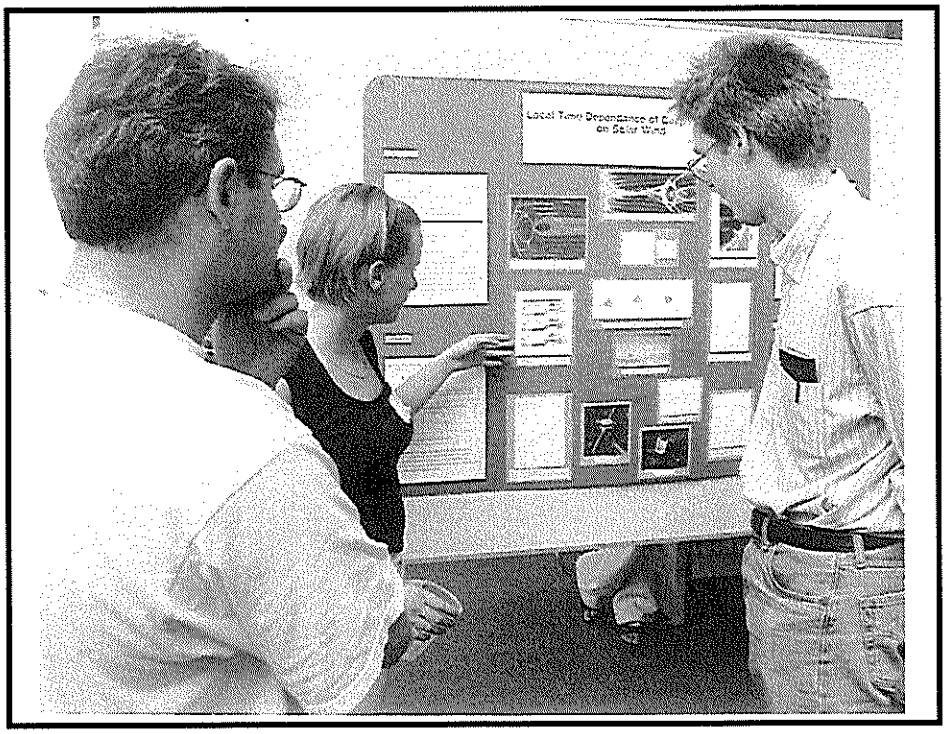


Poster Session

It was the beginning of the second week of WISEST and our summer projects just getting underway when we assembled in the room where it all began, Chem E3-25. This was one of two sessions on how to present (and more importantly, how to create) a research poster, given by Sandra Zohar, director of WISEST. She spoke to us about the purpose, content, and layout of a good poster, also giving us a chance to examine and learn from two model specimens. After imparting many useful tips and guidelines, Ms. Zohar left us with one final bit of advice - start early! What was learned at the poster session proved to be of great help when actually making the posters and was evident in everyone's work at the big presentation a few weeks later.



By Stefanie Lee



The Research Poster Session

Sonia Kang

From the first day of the WISEST summer research program, we had been preparing ourselves for one dreaded event, the poster session. How big did the posters have to be? How much information did we need to put on them? Was it possible to contract the chicken pox for one day and stay home in bed? We all had questions about the poster session, and more importantly, how to avoid the poster session.

In truth, the poster session was a lot easier than most of us had imagined. About three weeks before the poster session, we attended a workshop on how we should prepare the poster. Although I doubt that anyone went home that night and made their poster, the workshop answered most of our questions and started us on our way to completing our posters.

The day of the poster session was bright and extremely humid. When we assembled in the education lounge and started setting up, we learned the true value of our posters: they can be used as fans. Our supervisors and members of our research team arrived about an hour later. Dr. Armour made a wonderful speech in which she thanked our supervisors and sponsors and made everyone feel welcome and appreciated. The WISEST participants were split into two groups, each group taking a half hour shift beside their posters. After everyone had browsed through the poster displays, we helped ourselves to punch, cookies, and fresh strawberries.

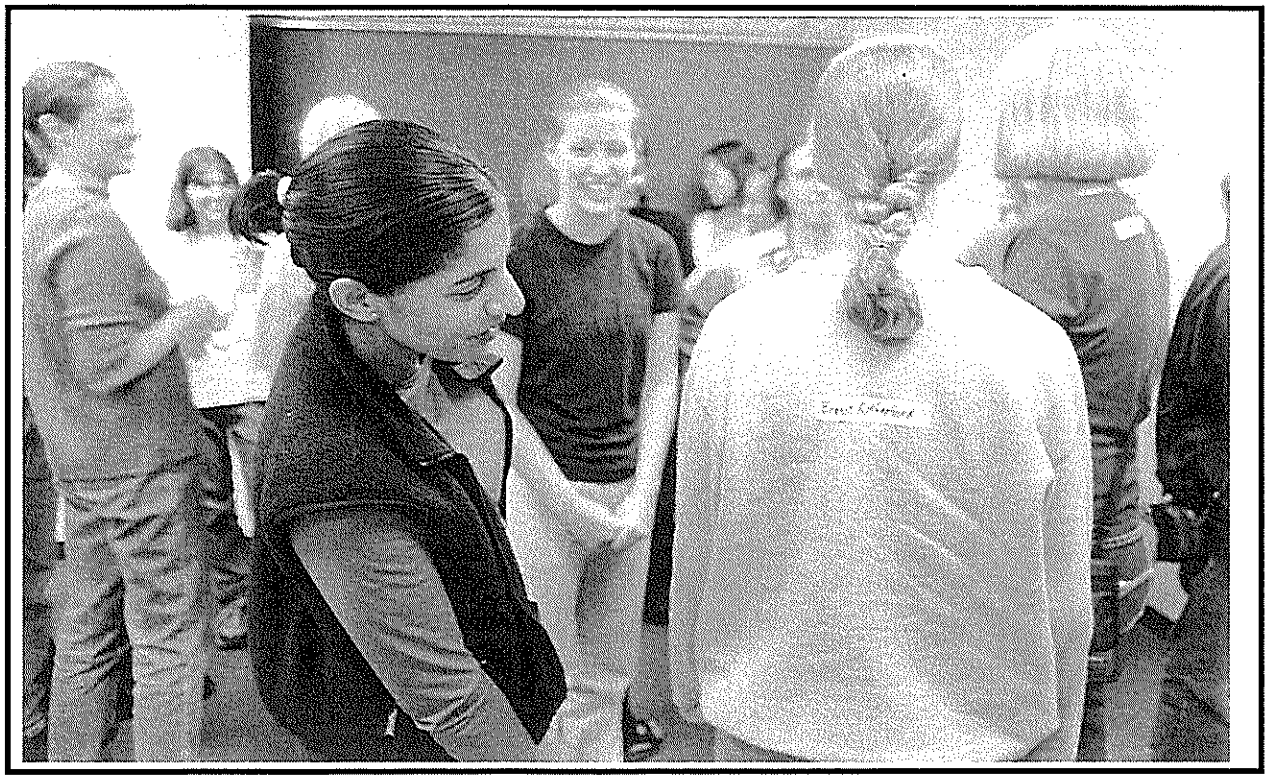
Despite our initial fear of the poster session, it turned out to be a success. It gave us a chance to see what everyone was doing and to learn a bit about each project. At the end of the day, we all walked to Athabasca Hall to take our group photo. With the stressful poster session over, we were able to relax as we forever captured our WISEST memories on film.

Welcome to the U of A: University Orientation

Jeeshan Chowdhury

For the WISEST students there is only one year left in our now conquered domains we know as high school. But in less than one year, we will be leaving our small and familiar high schools and enter the world of university, some of us who live out town will be leaving home as well. A fairly frightening thought to leave high school, where the biggest has a population of almost two thousand, to a university of almost thirty thousand, from a school where there is one building to huge campus with tens of buildings, an entire maze itself. Even with many of us with brothers and sisters in university we are fairly unsure and unaware of the changes, expectations, choices, and costs that come with university. However, on August 11, 1999 on the last of our regular Wednesday weekly activities WISEST presented a number of speakers for the WISEST students. The speakers, who came from the University Registrars Office, WISEST Alumni, and the Student Union's Student Financial Aid and Information Office provided information and advice on a number of topics from admission to student loans.

Our first speaker from the Registrars Office spoke about the general information of the University of Alberta, programs offered, and admission. He gave us some impressive and equally frightening facts about the universities including the size and population of the university. We received a quick overview of the programs and faculties offered at the universities and you could see the students already beginning to ponder which program they will take. To our benefit we received a crash course on applying for admission to the university and registering for courses at the universities. Fortunate for us as we will have to apply and register in beginning in January. For our out of town students and those thinking of moving out there was a section on housing and the costs for housing which the speaker from the Financial Aid Office also talked and warned us about. With the increasing price of an university education our speakers talked about a number of scholarships, of which all the students quickly wrote down. Thankfully we were reassured about our indecision in choosing a career or program at the university since only three students

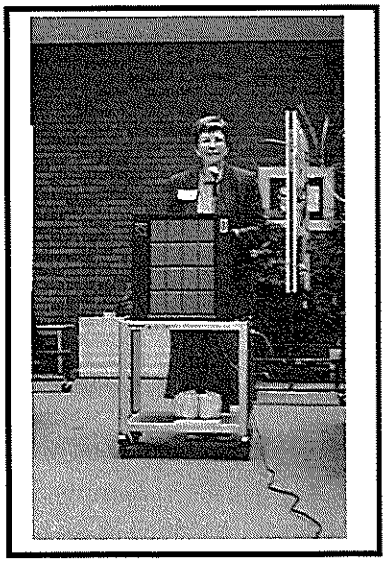


were brave enough to share their future career aspirations. Nevertheless, all the speakers stressed the point that we had plenty of time to make up our minds and that changing our minds was perfectly normal, a reassuring thought.

The second speakers, an alumni from the WISEST program and her associate who provided us with a tour of campus earlier in July introduced us to the quirks and quarks of campus life. We opened with an icebreaker where each of us had a famous scientist written on our backs and we had to guess them from clues. For some reason the famous and influential scientists and inventors ranged from Albert Einstein, Florence Nightingale to Steve Urkel? We received information about campus life, registrations, classes, professors, and the non-academic side to campus life. These speakers as well as the others all stressed the value of staying involved in the community and school, a point well taken by the students.

Our last speaker from the Student Union's Student Financial Aid and Information Office talked and shocked many of us with the cost and expenses of a university education. We were extremely warned of the cost of moving out and staying at home but at the same time provided with valuable information for those looking to move out or come from out of town to the university. Our last speaker focused on financial aid and possible routes for those looking for financial aid. Here again we learned the value of scholarships and being involved. Our last speaker was a bit of shock, learning of the huge costs that university brings, but the information and her advice, such as making sure to talk to parents about university, were invaluable in help planning our future academic careers.

When entering any new situation, any and all information is an advantage. In this University Orientation put on by WISEST we received invaluable information that we will have to put to use in the next year as we finish high school. Although this was the first of such University Orientations put on by WISEST, it went smoothly and quite well providing with a valuable opportunity to prepare us for university. Armed with this information and advice, we will have another advantage besides the experience and skills we have gained from our research experience in the past six weeks.

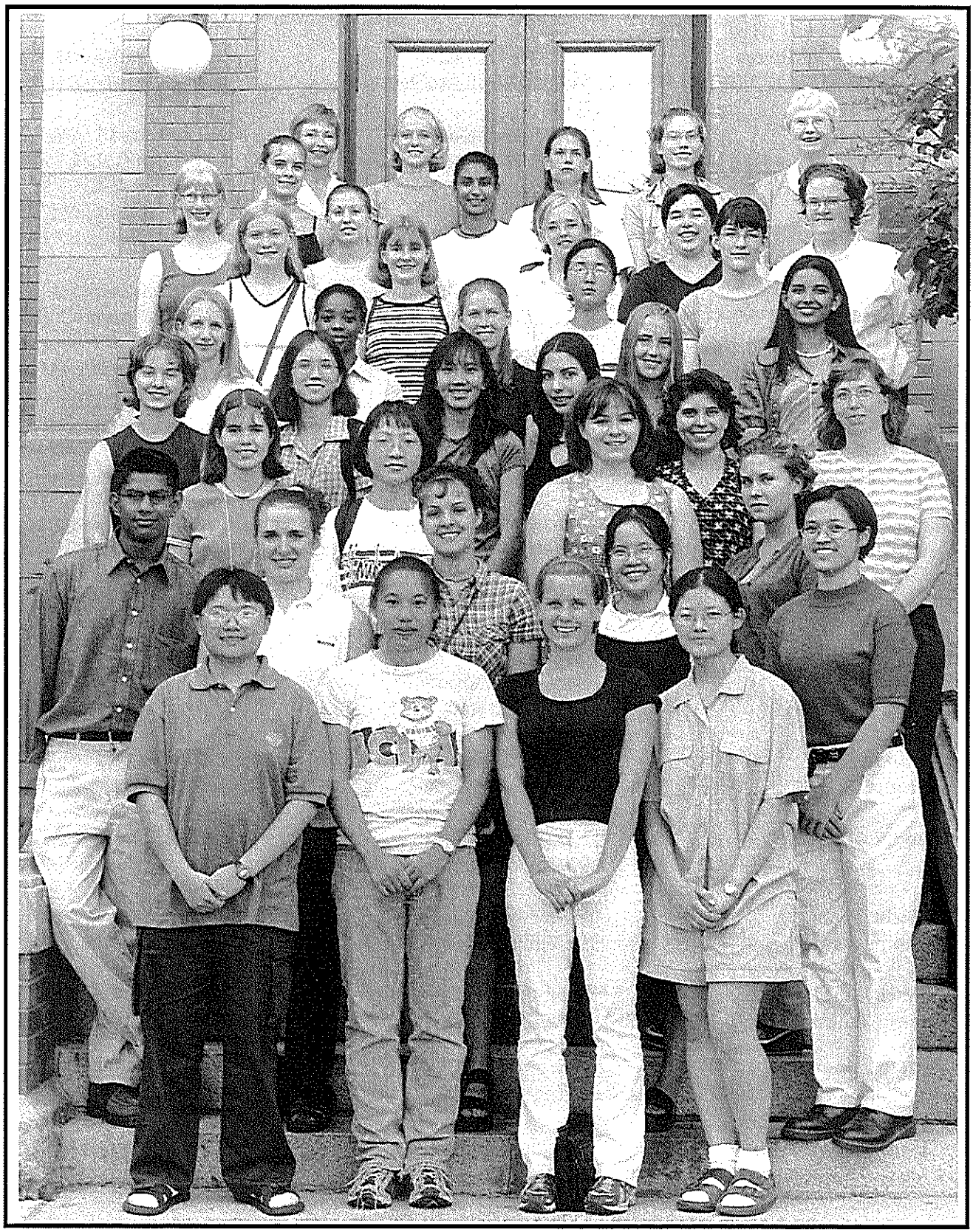


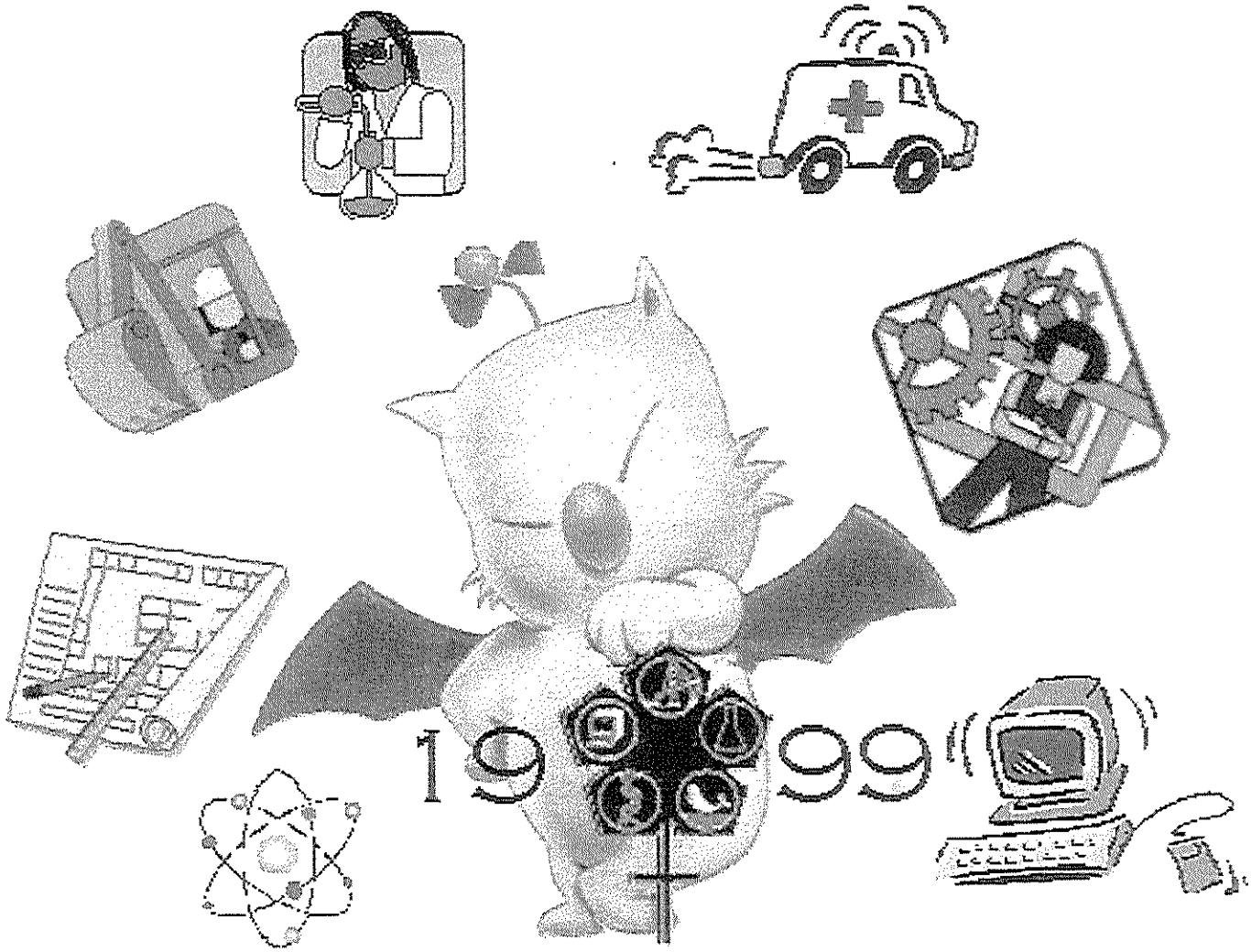
15th Anniversary Open House Tea

by Jamie Relland

On August 13th, 1999, the 15th Anniversary of the WISEST Summer Research Program was celebrated at an Open House Tea. In attendance were all the current year's WISEST participants with their families and friends. As well, invitations were extended to all WISEST Alumni. Happily, many were able to attend. Dr. Margaret Anne Armour was Mistress of Ceremonies and her unfailing good humour shone through. The Key Note speaker was Dr. Bill McBlain, Associate Vice President (Research) of the University of Alberta, whose story of his Grandmother touched us all. Dr. Mary Fairhurst represented Dow Chemical which is a very generous supporter of WISEST. Wynne Lynng, a 1995 WISEST participant, entertained us with her story of life as a medical student. Many other Corporate Sponsors were also in attendance. Commemorative pins and mugs were issued in celebration of 15 years of excellence.

WISEST Class of 1999





WISEST

(Women in Scholarship, Engineering, Science, & Technology)

Summer Research Program

Student Reports

by Cleo Espiritu

Summer in the MADLab

By Alaina Booth and Kristina Pearson

The past six weeks have provided us with the invaluable experience of life as a research engineer. The first day in the MADLab (Micromachining Applications and Development lab) was spent reading and learning the terminology and skills that we would need for the next six weeks. With new people to work with, new friendships were quickly being formed. It took a few days to become comfortable with our new surroundings in the lab. We were anxious to begin work on our project, but before we could begin there was a lot of knowledge we needed to acquire. The rest of our stay at the MADLab would prove to be more interesting.

Our project involved the use of polysilicon microresistors (small devices found on microchips that create a voltage difference). It was our responsibility to measure the Temperature Coefficient of Resistance (TCR). TCR is the measure of the effects of temperature on the resistance of these microresistors. To perform this experiment we were introduced to three pieces of equipment: the hydra data acquisition unit, the Omegalux oven and a computer (dos only) with the hydra program installed. Learning to use these high tech pieces of machinery and becoming familiar with their many potential uses would prove difficult. There were three manuals to read filled with useless information, so Dr. Robinson had us write our own once the trial and error method had taught us how to use them. We needed to measure the resistance as the temperature increased to 120°C. To set up the experiment we first needed to place the chip in the

oven on a breadboard and connect it to the data acquisition unit. To make this connection the wires from the data unit were inserted through a hole in the roof of the oven and attached to the breadboard. A thermocouple was also placed in the oven to measure temperature more accurately. We then programmed the oven to increase to a temperature of 120°C and set the computer to record the results taken by the data

Kristina Pearson, Alaina Booth

acquisition unit at ten-minute intervals. In analyzing the data we had to save it to a disk and transfer it to a newer computer with the Microsoft excel program. We then graphed the data and calculated the TCR from the graph. After determining the original TCR we then ran approximately 1.0 miliAmp of current through the resistor enough to restructure the molecules within the resistor and change the room temperature resistance. We then tested the TCR again using the oven process. Due to the slow heating and cooling of the oven (0.5°/minute) each data run took about five hours to complete. This led to our second project: Matlab.

Matlab is a computer program used by engineers in the problem solving process. It is a useful tool in graphing and matrices calculations. Unfortunately we had had no previous experience in programming or in matrices, so this became an interesting learning experience. We were in charge of learning how to curve fit and graph an equation used to determine the first harmonic frequency of cantilevers at various

pressures. Cantilevers are microscopic diving boards that vibrate at certain frequencies. This was a challenging project with several different versions of Matlab manuals to use as resources, which were again almost useless. We were finally able to understand the basic concepts of programming as well as curve fitting (fitting a curve to a set of data points) and matrices, which was what the program used to calculate all of its values. We successfully programmed a curve fit for the equation we were given.

The results of our experiment were interesting. We were able to accurately measure the TCR of many varying polysilicon microresistors. Using the results obtained by the computer we made numerous graphs that aided us in our conclusions. We concluded that, based on the reliability of our TCR measurements, these resistors could potentially be used as temperature sensors. These sensors have many potential applications, including being used as thermometers or as a heat sensor for devices such as fire alarms. We discovered that the microresistors have a critical negative temperature. After this temperature is reached, our results no longer followed a linear path. We also concluded that it was, in fact, possible to permanently change the TCR of the microresistors by adding current to the resistor. This current increased the calculated TCR. In fact, we managed to change it several times on one resistor. The process was, however, irreversible and we did burn out a lot of resistors in the process of running as much current through them as was feasible.

Over all, the summer of 1999 is one we will never forget. Working in the MADLab has provided us with a vast amount of invaluable work experience that we will carry with us forever. Through the WISEST program we had the opportunity to meet many other high school students who, like us, have interests in science or engineering as careers. The Wednesday group sessions and Tuesday bag lunches presented us with many opportunities to make new friends and acquaintances. We would like to thank the WISEST staff for being so supportive and helpful to us throughout the summer. We would also like to thank our sponsors, our supervisors and the other members of our research team for providing us with this wonderful opportunity. This summer has been a terrific success.

"The search and analysis of satellite and ground-based data for the purpose of understanding auroral arc formation and structure." Those were the words that echoed through my head for the two weeks leading up to July 5, 1999. Those twenty little words were enough to cause an indescribable amount of self-doubt. I was convinced that I would not be able to complete my project and that I would be an embarrassment to myself and to the WISEST program.

When I finally met my supervisor she spent hours going through the basics of space physics with me, I realized that I had worried for nothing. She understood that I am still in high school and that this was basically the first time I had ever heard of Space Physics. We talked about two or three prospective research projects for the six weeks I would be in the lab and we chose the one that suited me best. The problem was what are the solar wind conditions, interplanetary magnetic field (IMF) directions and local times during periods where there are latitudinally coherent pulsations noted in the cusp? Quite a confusing idea, so to start my summer I got introduced to some basic space physics terminology. First I wanted to understand the cusp, but before I could do that I had to understand the magnetosphere. I had to imagine a bar magnet, then picture placing a sheet of paper on top of the magnet. Next I imagined dropping a handful of iron filings on top of the sheet of paper and visualizing the arcs that attach the north and the south poles of the magnet. Those arcs represent the bar magnets magnetic field lines. Now on a larger scale I pictured the earth. The earth has these same sorts of magnetic field lines, yet because of the solar wind (a plasma emitted by the sun at around 400km/s) our planet's magnetic field lines (the magnetosphere), become(s) compressed on the dayside of the planet, and elongated on the nightside. This elongated nightside area is called the magnetotail. The regions between where these magnetic field lines connect with the magnetic poles are called the cusps. One cusp each extends far into the ionosphere out of the northern and southern magnetic poles. As the earth rotates the higher latitudes pass through the cusp, this generally occurs in the morning. At the moment the cusp regions and the pulsations that occur within them are not well defined, therefore our project's ultimate goal is to further advance the understanding of the magnetosphere as well as the solar-terrestrial interaction.

My role in the project was to find periods of Doppler velocity oscillation in the cusp using Super Dual Auroral Radar Network (SuperDARN) data. SuperDARN is a network of high frequency radar pairs used to study the ionosphere. The pairs measure the two dimensional convection, the electric fields and the field aligned currents over a four million square kilometer area. After I found about seventy events I went onto the internet and found a useful web page called "4 day combined orbit @ 200 RE" this site shows the four day orbits of the IMP-8 and WIND satellites (among others). Using this web page, I chose the satellite that was between the earth and the sun on the days I noted cusp pulsation. I did this for all seventy events. The next step was to find the magnetic field and solar wind data for the times that the events were occurring. I went to a web page called "CDA Web" that provided me with the necessary data from the satellite that was between the earth and the sun during the events. I downloaded the magnetic field data, the solar wind data and the densities for all the events that I found. The next step in the project was weeding out all of the events that were not very good. My supervisor and I sat for a few hours to choose the best/clearest events to study; sixteen of the seventy matched our criteria. For each of these sixteen events I then found more detailed SuperDARN data, I made plots for Doppler velocity, width, and line-plots for the velocity. I also plotted the magnetic field intensity in the B_x, B_y and B_z directions, the clock angle(θ) of the magnetic field, using $\tan \theta = B_y / B_z$ and the density of the solar wind. We then determined the latitudes at which these events were happening, and we also converted the Universal Time

measurements into Magnetic Local Time. Using the clock angle we determined the direction of the IMF, we then created a plot showing the Magnetic Local Times, the IMF direction, and the latitudes of the occurrences. We also created another plot that showed the average clock angle vs. Magnetic Local Time.

These two plots showed some fairly clear results. The events that occurred in the morning were eastward IMF, the events that occurred in the afternoon were generally northward IMF. Far fewer events occurred in the afternoon than in the morning. All the events lasted three to five hours. The events all occurred at latitudes higher than 60°N. Depending on the source of these pulsations in the cusp, these details can provide information about where merging is occurring on the dayside. Further investigation is needed to determine the cause(s) of these pulsations in the cusp.

I learnt so much in the six weeks I spent at the University this summer, not only about Space Physics, but about life at the University as well. This summer has been an excellent experience for me and I am very thankful that I had the wonderful opportunity to participate in this program. I would like to thank my supervisor, Dr. Frances Fenrich, the WISEST program, Grace Ennis, Renate Pfifer, and Sandra Zohar, and I would also like to thank my sponsor, the Glenora Rotary Club for giving me the chance to work in Space Physics for the summer. Words cannot express how appreciative I am. I am sure that the memories will last a lifetime.

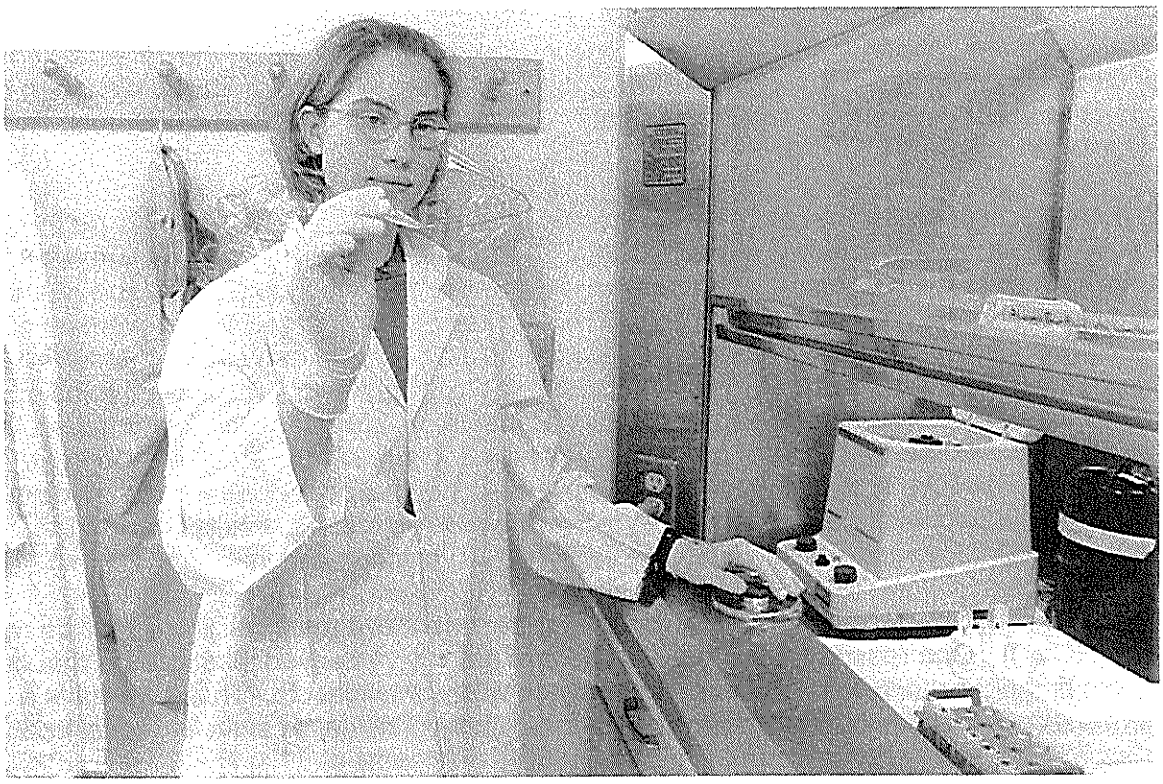
Allison Pelensky
WISEST student, 1999

Studying the Effects of Harvesting through DNA Extraction

BY ALLISON STEDFORD

Harvesting? DNA? Extraction? – Were just some of the questions I had while first walking into my lab. Fortunately after just a few days in the lab everything seemed to come clear. My lab team, lead by Om Rajora, as part of the Renewable Resource Department, was trying to find out what effect harvesting has on the genetic diversity of certain plant species. Although six weeks is not long enough to get any definite results, my job of collecting data through DNA extraction of the Eastern White Pine was a fundamental part of the research.

DNA is a relatively simple process. First a sample is taken and Extraction Buffer is added. Afterwards the sample and Extraction Buffer is broken down with a air hammer, poured into a tube and centrifuged to produce a pellet. The pellet is then dissolved in Lysis Nuclei Buffer, and 5% Sarkosyl is added. After that it is heated in a warm bath for about ½ hour. Once time has lapsed Chloroform/Isoamyl is added so that when centrifuged two layers will form. The top layer is then precipitated in Isopropanol. There it will precipitate for about one hour. After centrifuging once again, the precipitated DNA is washed with 70% Ethanol for 10 minutes,



centrifuged and placed in the vacuum until dry. Once dry the TE Buffer is added and the DNA is stored in the fridge for further use.

The extraction process was a large part of my project but not the only part. I also was able to do some PCR, make and load gels, take pictures of DNA under UV light and assists with other projects in the lab. My experience on a whole was very fulfilling. Thank you to everyone on my research team for making my experience truly amazing.

Messenger RNA Expression In Rat Cultured Mast Cells

Amber Ross

Mast cells are important cells in allergic reactions and asthma because they are packed with granules containing histamine and other mediators which are released from the cell when the cell is activated (mast cells are activated when the IgE receptors on the surface of the mast cell are crosslinked by an antigen).

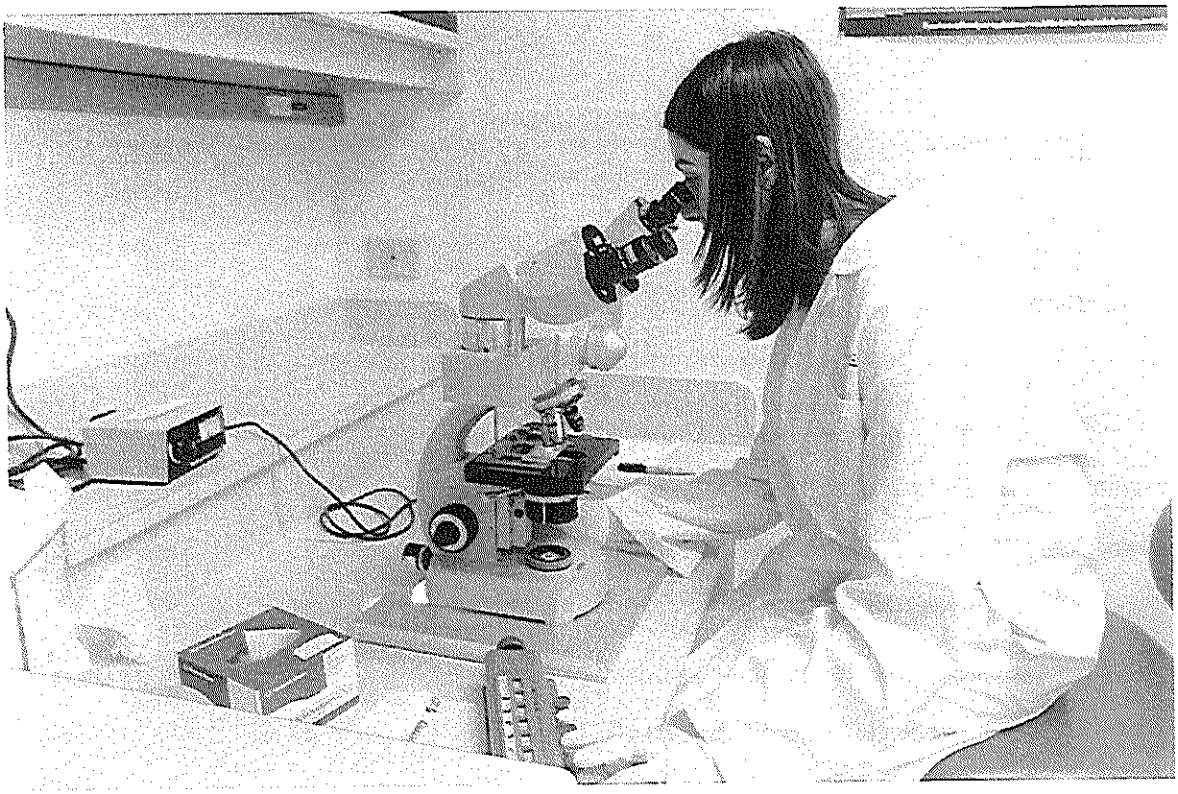
When the mast cell is activated by IgE crosslinking, stores of calcium are released from the endoplasmic reticulum. This causes a net positive charge inside the cell. Because there is a positive charge inside the cell, by mechanisms not well understood, chloride channels open and chloride from outside the cell comes in to negate the overall positive charge. The movement of chloride into the cell causes calcium channels to open and calcium also moves into the cell. With even more calcium moving into the cell many intracellular signalling events results in the fusion of the granules with the cell membrane and the prestored mediators are released. The intracellular signalling also induces the synthesis of many non-stored mediators which can take as long as several hours after cellular activation. Many of these newly synthesized and prestored mediators stimulate and propagate allergic reactions. We recently observed that mast cells express the cystic fibrosis transmembrane conductance regulator (CFTR) chloride channel.

My project will study the role of CFTR following treatment of a mast cell line – rat cultured mast cells (RCMC). One reason for using a cell line and not in vivo derived mast cells is that cells derived from primary culture do not last as long, they die off as they get old. Thus I will have a supply of mast cells that can be maintained in vitro indefinitely. The cells I am using were frozen on October 5, 1998 and were unfrozen on June 15, 1999.

RPMI is the growth media for RCMC. However, a few other supplements must also be added. To a 500 mL bottle of commercially available basic RPMI 25 mL of FBS, and 5 mL each of glutamine, pen/strep, and HEPES are added. RCMC grow best at a pH of 7.4. Therefore, NaOH may also be needed to bring the medium to this pH. The cells usually need to be passaged into a new flask and more media added every three or four days.

After the cells have been grown, the RNA will be extracted from them. Two methods to do this will be employed. One method of RNA isolation is the Trizol method and the other is the Modified Chomczynski and Sacchi method (MCS). The second method gives a higher yield and much purer RNA. However, this method also takes longer. Using the trizol method I obtained an average of 8.79 μg RNA/10^6 cells compared to 21.53 μg RNA/10^6 cells using the modified Chomczynski and Sacchi method. As well, the average purity using the trizol method was 1.44 compared to 1.63 using the modified Chomczynski and Sacchi method.

Once the RNA has been isolated, RT-PCR will be used to amplify the CFTR message. Reverse Transcriptase (RT) uses an enzyme which is isolated from MMLV (viral) to take the single stranded RNA, which has been isolated, and change it into cDNA. Polymerase Chain Reaction (PCR) takes the cDNA and uses high temperatures (92°C) to break up the double strands into single strands. To make copies of specific pieces of the DNA primers must be designed that will recognize only that piece. Since I will be looking for the expression of CFTR, I will only make copies of the CFTR gene. The primers then find the piece they want to copy and they attach there. The primers allow the taq polymerase (bacterial) to also attach to this point and it is the taq polymerase that actually does the copying. This cycle is repeated 30 times and the number of copies of CFTR message increases exponentially.



Once the RT-PCR is finished, agarose gel electrophoresis is used to analyze the amplification products. The gel is placed into TAE buffer and an electric current is run through the solution. The DNA is put into small slots in the gel. The DNA is negatively charged and so it runs down the gel away from the negative electrode. Once it is finished the gel is stained in ethidium bromide. Ethidium bromide works to stain this because it sticks to the spaces between the pieces of DNA. After the gel is stained the DNA can be seen under UV light and a photograph is taken. A DNA ladder is used to measure the size of the DNA fragments. The more negatively charged the DNA is, the larger the band will be.

When double stranded DNA breaks up into single strands and a complimentary strand to one of the strands of DNA is made this complimentary strand is called mRNA. This process is called transcription. When more protein is needed the mRNA is released and it travels to the ribosomes. The ribosomes read the mRNA and they start producing more proteins. When the message to produce proteins is increased it does not necessarily mean that there will be more proteins produced.

I will be treating the RCMC with dexamethasone and determining if the expression of the CFTR message is upregulated or downregulated. Dexamethasone was chosen because it is a glucocorticoid that is used to treat asthma. Dexamethasone is an effective treatment because it inhibits mast cell mediator release, among other actions. The cells I treat will be at a concentration of 1.5×10^5 cells/mL and the dexamethasone will be at 1×10^{-6} M. As a positive control I will also treat some cells with interferon-γ. I already know from work done by other people in this lab that interferon-γ upregulates the expression of CFTR message. The cells will be treated for 24 hours at 37^0 C. I hypothesize that dexamethasone will increase the expression of CFTR mRNA. After I completed the RT-PCR and the gel electrophoresis I found that cells treated with dexamethasone do express more CFTR mRNA. The next logical step in my experiment would be to check and make sure that if the CFTR message is increased, the amount of protein is also increased. Because of the limited amount of time I have I will not be doing this.

An Extremely Informal (plus a ton of grammar mistakes!!) Report

By Cleo Espiritu - Department of Computing Science

Wow, it's been six weeks already?? Time sure travel fast....a few more days and I'll be done with the program and go back to my normal boring life...and school as well...just makes me want to cry * sniff sniff * .....well, it's been fun, and I guess it's time I share my WISEST experience with everyone.

When I first found out that I got the job, I was extremely nervous and scared. My mind was thinking "It's been half a year since I've done any sort of programming and I forgot everything already!!! Now I'm working in Computing Science??? What am I going to do??? How can I survive the job??? Aaaaarrrrrrrrgggggghhhhhhh!!!! " So needless to say, I was worried. REALLY worried.

I was a bit relieved when they gave me my job description, because there wasn't any Turbo Pascal or Delphi programming involved. (for people that doesn't know what I'm talking about, these are programming language I have learned (and sort of forgotten ^_^) for creating programs.) They told me that I'll be converting course descriptions and surveys into XML files. I never even HEARD of XML, but I figure it'll probably be similar to HTML, so I wasn't TOO scared ^_^

I started worrying again when I came in on my first day of work. I found out that instead of Windows I'll be using UNIX instead, and seeing that I never touched anything other than Windows I was thinking "How do I work this thing??? What if I did something dumb and crashed the computer????" Turns out it wasn't THAT hard..I knew how to run Netscape and send email ^_^

Okay, now onto my work. Many of you probably don't really know what I'm talking about when I mentioned XML in the second paragraph ^_^ Well, first of all, I'm sure everyone of you reading this have seen a website. Most websites are programmed by a language called HyperText Markup Language (HTML). HTML uses tags to display information or images. An example of a tag would be <img src="yourpic.jpg"> , which is used to display pictures. HTML is good for displaying data and information, but it's not too useful when it comes to data management. Most data are clustered together, and if you want to reorganize the data you need to change a LOT of stuff. Users want easy-to-manage data, and that's where XML comes in. For XML (eXtensible Markup Language), users define their own tags so it's meaningful to them. For example, if you want to write a list of names, you would define a tag <name> and put that in front of every name you listed. That way, data is more organized and users will be able to tell what's going on. Since you create your own tags, you have to define them in a DTD file, which states what each tags should contain.

For displaying the XML file you'll have to create a XSL file, which is a stylesheet that tells how each part of the XML file displays. As I said earlier, I have been converting course descriptions and surveys to XML. What I do is that I study the information and plug it into a XML template.

I managed not to do anything TOO dumb ^_^ I did crash the computer a couple of times, but I think I crash my Windows machine at home more in one day than I did here in six weeks ^_^ . Once I even locked up my Netscape program and have to get my supervisor to fix it ^_^ The Wednesday sessions with WISEST are pretty informative....I learned a lot of things in those sessions. Tuesday Bag Lunches are pretty relaxing too ^_^

I like to say a big 'THANK YOU!!!!' to my supervisors: Dr. Eleni Stroulia, Dr. Paul Sorenson and Vanessa Yaremchuk (my Netscape will probably still be locked right now without her ^_^) and also to my sponsors Dr. R.E. Peter and Dr. R.G. Goebel, and also to everyone in WISEST that organized this cool program ^_^

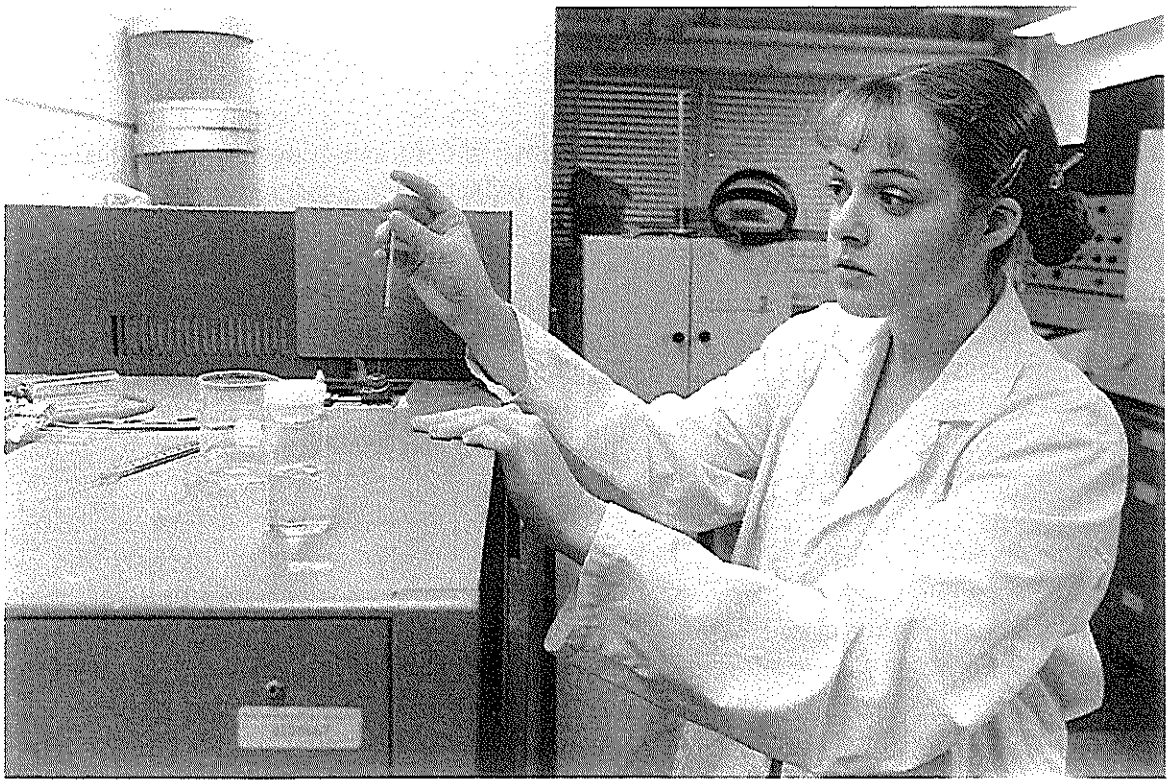
Six weeks ago, I never even heard of XML. Now, people's asking me questions about it ^_^ Six weeks ago, I got lost while trying to find my way to the LRT station. Now I can walk around campus (or part of it at least) with my eyes closed ^_^ Six weeks ago, my bank account was $1200 poorer ^_^ Was WISEST worth my time? Let me just say **"YES!!!!"**

- Cleo Espiritu

My name is Daria Kotovych and I have spent my six weeks at WISEST working with Dr. Margaret-Ann Armour's research team in the field of environmental and organic chemistry. What can I say? It has been a very memorable summer for me! Now I'll admit that getting up every morning at 7:00 AM after a late night before wasn't always easy, but the amount of knowledge and experience which I have acquired surpass by far my short sleeping hours. Six weeks is surely a long time, but more for me to write about, I guess....

I know what image comes to mind for some people when they hear the word **chemistry**: some mad scientist running around creating toxic fumes. When I first got here, I pretty much had the same cliché in mind. I've always enjoyed the field, but never before have I had any real hands-on experience. From my first day, I felt exceptionally welcome and genuinely needed, which helped me feel more at ease. One word which describes my fellow research members: wonderful! My supervisor was Dr. Margaret-Ann Armour, but I worked with Dr. William Hunter on a day-to-day basis. I was soon introduced to the last member of our research team, Pat Doran. These three individuals not only taught me an exceptional amount about organic chemistry, but also created a "homey" atmosphere rather than one of just a workplace. Special thanks to Pat for all of his paper animals, to Willy for providing me with much anticipated tea breaks, and to Dr. Armour for reminding me of the meaning of the game croquet!

I suppose I should mention what I actually did. My work involved mostly experimentation as opposed to paper work. I constantly had my hands in some chemical, and the rest of the time I worked with various machines. My first week at work was dedicated to a practice lab to get me better associated with lab equipment and technique. With more background, I began my actual project. I was given a toxic compound by the name of 2, 4 dinitrophenylhydrazine and told that I had to find a time efficient, simple, cheap, reliable method of disposal for the solid, solution, and for spills of the solution, cleaned using Spill Mix. It sounds like a handful really, but in layman's terms, I got a hazardous chemical and had to break it down into a non-toxic, harmless substance. I did find a procedure which worked. The best part about my project was getting to use two really expensive machines: the gas chromatograph and the UV spectrometer. My project was both interesting to watch and most informative.



WISEST wasn't all science, and that made this experience simply phenomenal. Wednesday afternoons were activity days, so that always gave me something to look forward to. I immensely enjoyed the trip to Comp Canada and my visit to the Space Physics lab. The best activity of all was the picnic and then the theatrical presentation of Shakespeare's "Two Men in Verona." The play was nothing short of brilliant and wildly amusing as well. These activities were beneficial, for they provided me with an opportunity to make many new friends.

First and foremost, thank you to both my research team and to all of the other members of WISEST. To the WISEST office, thank you for providing me with such a fantastic opportunity. Thanks also to my sponsors at the Winspear Fund. In a nutshell, I had a great time!

Daria Kotovych

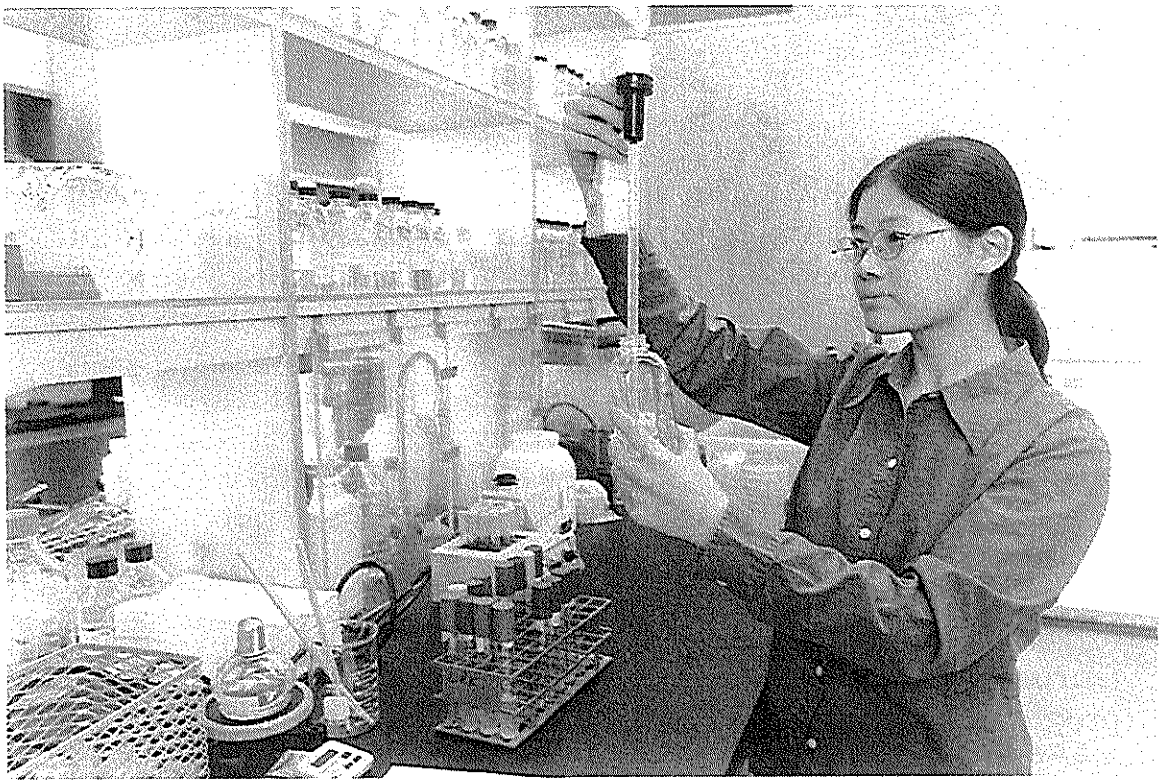
The WISEST Experience

The Summer Research Program definitely exceeded my expectations in terms of its opportunities for learning, and its profound utility in demonstrating the possibilities of what could be accomplished in six weeks. At the outset, I had expected laboratory work to be a new challenge - as it was, however there were some aspects to scientific research that I had not anticipated. Fresh from Grade 11 chemistry, physics, and biology classes, I could remember the demonstrations and experiments performed, which pale in comparison to the new experiences I've had this summer. Merely the extent of analysis and the sophistication in experimental designs I've observed, and even participated in, have impressed me beyond conception. I've truly enjoyed my six weeks in this program and shall cherish fond memories of my time with the WISEST Summer Research Program.

Within the genetics department, my project investigated an aspect of DNA replication on the model of a T4 bacteriophage. DNA polymerase, an enzyme that is responsible for the replication process in conjunction with several accessory proteins, was the focus of study. Within the viral DNA of T4, gene 43 codes the formation of this protein; however, mutations in this gene result in a mutated polymerase being formed. Incidentally, T4 DNA polymerase I bears several analogous genetic regions with human polymerase such as a stretch of amino acids called motif A. In conjecture, the exploration of the characteristics of specific DNA polymerase mutants could uncover further knowledge regarding the functions of specific amino acids in DNA polymerase. This knowledge being paramount in detecting the manner by which mutations, such as those causing cancer, occur, and since T4 DNA polymerase bears resemblance to the human polymerase, the research undertaken in our lab would have important medicinal value.

To better understand the functioning of DNA polymerase, our research group examined DNA polymerase mutants, which namely possessed genetic deviations from the wild type in the coding of gene 43. I was assigned my own mutant named L412M-rUV199oc whose first mutation occurred in the above-mentioned motif A which is common in both T4 polymerase and some human polymerases. To determine the characteristics of specific mutations and the roles of specific amino acids in DNA polymerase, one studies mutated polymerase. Regular polymerase is responsible for the replication of DNA by two means: first in the incorporation of new nucleotides in the polymer DNA and secondly in the proofreading of the newly replicated DNA. During my investigation, I was to examine the characteristics of a mutant T4 phage, which possessed a mutated DNA polymerase.

Subjecting my mutant to a battery of assays, by growing my mutant and a control wild type phage on several non-permissive conditions, I was able to determine the number of mistakes occurring in the replication of both types of phage. Due to the restrictive nature of these non-permissive conditions, those phage that grew were those which had made mutations in their replication enabling resistance. In addition, I had the opportunity to work with a chemical called phosphonoacetic acid, which is an effective anti-viral drug that is presently used to combat such viruses as the herpes simplex. In this case, growing phage in the presence of phosphonoacetic acid, demonstrated that the



mutator polymerase was developing a greater sensitivity to the drug while the wild type phage possessed natural resistance . Laboratory procedures, such as titering, plating, characterisation of phage, and phage purification were all part of the regular affairs at the lab.

In closing, I must add that my work at the lab was only accomplished with the substantial aid and support of the entire lab. Fortunately for me, I had the great help of Dr. Linda Reha-Krantz, Dongling Zhao, Hannah Lee, Taeed Quddusi, Zerrin Ozum, Dr. Mandal and Laura Tsujikawa. They were a wonderful research group with which to work, and the time passed by so quickly in their company. It is indubitable that those marvelously sunny afternoons when the weather was perfect could not have been endured inside if it were not for their good humour and lively conversation. I thank them profusely for welcoming me into their lab so warmly. I have learned much and it has been a wonderful six weeks.

Denise Ng
WISEST Summer Research Participant
Biological Sciences

My WISEST Summer Experience

By Erin Brennand

My position with the WISEST Program this summer was truly a great learning opportunity and experience. I worked on a variety of activities for Dr. Karen Farris at the Faculty of Pharmacy. Her office deals with qualitative research about the Alberta Health Care System and the role of the pharmacist in the community. I coded surveys and entered data into the SPSS program, helped pilot a survey that determined which questions and wording needed changing, retrieved and photocopied journals at the library, and even attended a focus group meeting.

Much of what I did for Dr. Farris relied on computers. During my six weeks in her office, I learned to use the SPSS program which allows survey data to be entered and then statistically analyzed. I also gained more in depth knowledge of Microsoft Word by setting margins, footnotes and headers when creating cover letters, making flow charts and creating my massive WISEST poster which was later printed on the University's "plotter".

From working in this sort of social science research setting, I learned that projects move along at their own pace. Data could only be collected after people agreed to take part, and even then we had to wait for surveys to be sent back - even if the return date had already passed. These experiences improved my patience skills and taught me to be clear on my instructions for things such as deadlines. The experience of pilot testing a survey pushed me to be more outgoing and friendly because approaching strangers to ask for some of their spare time is a difficult thing to do. When administering the survey, some individuals required it to be read out loud which helped to develop my communication skills and occasionally allowed me to gain insight into the senior population when they chose to share their viewpoints, experiences and stories with me.

Involvement with WISEST and being given to opportunity to work in a mature setting and contribute to research has only strengthened my ambition to pursue a career in science. Although I had originally thought only of medicine as a career path, my enjoyable experiences in the department of pharmacy have made me realize that there are many other scientific careers worth thinking about.

Outside of my office, WISEST provided experiences such as numerous picnics and the trip to "Shakespeare in the Park" which allowed all the participants to get to know each other. At these outings we all discussed our labs and compared our supervisors, so when WISEST held their poster showing session, it was really interesting to finally be able to see other people's projects. Having other read my poster and ask questions gave me a feeling of pride in what I had been doing for the last few weeks, and I will always have the poster as a keepsake of this program.

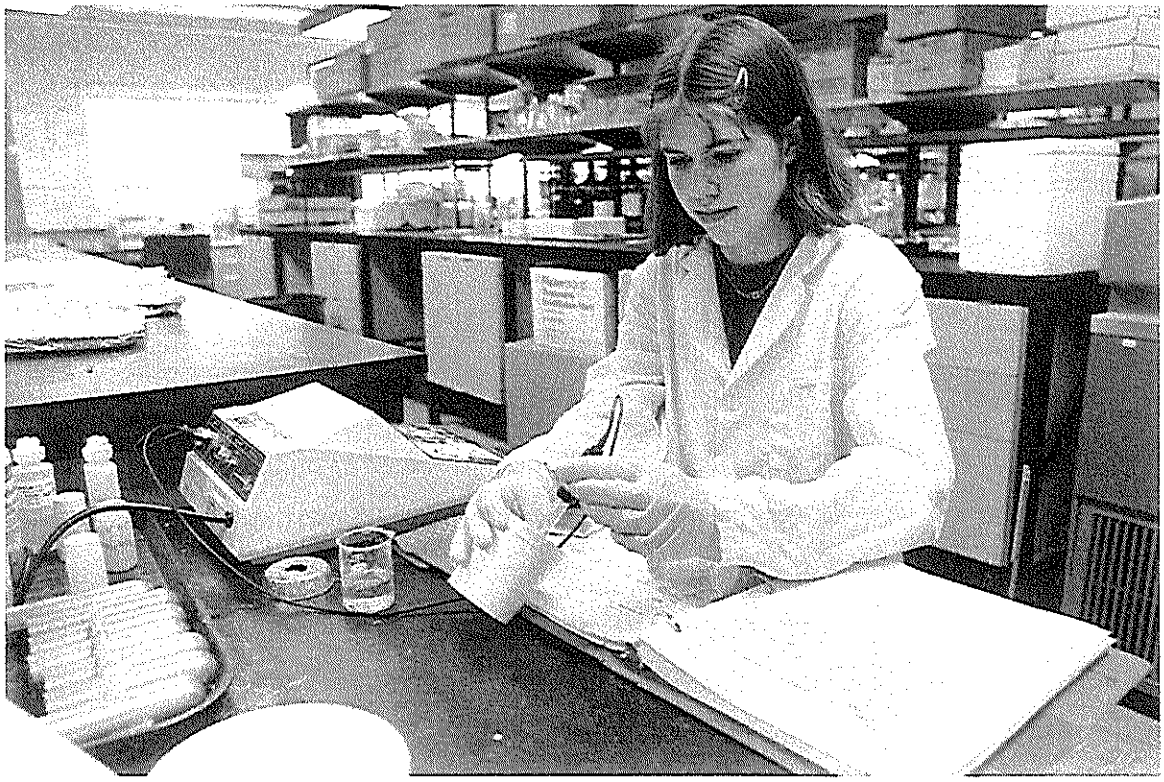
My Summer Research Project

By Erin Cameron

This summer I worked in the department of Agricultural Food and Nutritional Sciences under the supervision of Dr. Leonard and Yi Liang. Before I started my job, I was told that I would be helping to develop a protocol for measuring the pH level of compost. I spent the next few weeks trying to imagine exactly what I would be doing. When I arrived on the first day, I learned that the type of compost I would be working with was composed of dairy manure and barley straw. Fortunately, I only worked with small samples at a time, so the smell was not too bad. However, I did have to put up with manure jokes (made by my family and friends) for the rest of the summer.

About a week after I started my job, I was good enough at using the pH meter to do it by myself. I tested a lot of compost samples for Yi, my supervisor, and Jason, another grad student. One day, I went to the farm to help mix the straw and manure and put it in the composters. There were eight vessels full of compost, so every time I tested the pH I had to use at least two samples from each vessel. A short time later, I started my own project. I tested the effect of standing time after mixing and dilution ratio on pH level and found both to be important factors affecting the pH measurements.

Although testing pH was my main job, I also did a few other interesting things. For instance, I did an olfactometer test with a group of people. It was a project of some graduate students with whom I shared an office. Out of three possible samples, we had to detect which sample was not fresh air. If we did not detect it, the concentration of the chemical was increased, and we tried again. I soon discovered that my nose was not very



sensitive because I was always the last one to detect the sample. I also started to make a turning/aeration index of the factors involved in the decision to turn compost. I read a book about fuzzy logic, which would be used to make a computer program to tell when to turn the compost. I learned just enough to know that I couldn't do it myself unless I was a computer engineer or computing expert. As well, I worked on building a miniature composter to demonstrate how quickly compost warms up. Unfortunately, the initial design did not work. The grass and food scraps inside did not warm up at all, and eventually they began to smell too. However, I tried a different design and it appeared to be more successful.

Thanks to WISEST, Grace, Renate, and my supervisors, Yi Liang and Dr. Leonard, I have had a great time and learnt a lot. I really enjoyed the Wednesday afternoon sessions, particularly the small group discussions with people in non-traditional fields. I also liked meeting all the other WISEST students.

I would like to begin by saying that I really enjoyed participating in this program as well as meeting and spending time with all of you.

I was part of two projects this summer in the biological sciences building within the ecology department. My main supervisor was Dr. Bill Tonn, but I worked directly with Andy Danylchuk and Kim Howland.

During the first half of the week and every second Wednesday I worked with Andy. He is currently doing his Ph.D. on the effects of deforestation around lakes on the fish that inhabit them. My first job was to measure young-of-the-year fathead minnow (the species he is studying) that were collected from four lakes (SCL, short for South Calling Lake, 20,100,200, and 800. The number refers to the number or meters of trees left as a buffer between the lake and the deforestation) during 1996 and 1997. I measured both the total length and standard length (head to beginning of tail incase the tail had been damaged).

When that was finished I worked on the computer compiling the measurements that had been done by others for 1995-1997 and made charts and graphs that could be used to compare the populations in different lakes and those in the same lake but in different years.

For the rest of the Wednesdays and the last part of the week I worked with Kim, who is also working on her Ph.D. She is looking at the "hypoosmoregulatory abilities" (the ways in which the fish controls osmosis in and out of its body) of freshwater and anadromous (migrates between salt and freshwater) inconnu (an arctic whitefish).

I was working on a small part of her project, looking at the chloride cells (one way a fish controls the solutes inside its body). The chloride cells are found in the gills, therefore I had to dissect the gills she had already collected. This involved removing one of the arches of cartilage, removing the cartilage so you are left with only the filaments, cutting the filaments into single units that look like bunny ears, and putting those bunny ears into small jars with 70% ethanol. For the SEM (scanning electron microscope) eight to ten bunny ears were needed. For the TEM (transmission electron microscope) three bunny ears were needed and three more were cut into singles.

the next step was to dry out the samples without damaging the cells (when they dry normally the surface tension crushes the cells). For TEM the samples were given to someone else to be dried, cut further, and looked at. For SEM I had to put the samples into stronger and stronger concentrations of ethanol and then stronger and stronger concentrations of amyl acetate (within

the ethanol). After doing this they had to be dried in the critical point dryer. The critical point dryer uses carbon dioxide to flush the amyl acetate out and then the chamber is heated to the point that the gas and liquid have the same density and therefore no surface tension. The samples are then taken out, mounted on stubs, and viewed.

I enjoyed working with both Andy and Kim and sincerely thank them for letting me into and teaching me about their projects. They both made me feel appreciated and were very patient.

As expected there was some monotony and some fun times. This experience will help me to decide on my career and even if I don't go into science it will have been worth it. I would like to thank WISEST for everything.

To end this I would like to answer the question I have been asked the most –I haven't had any problem eating fish after these projects. Well, not yet!

Erin Tremblay

Six Weeks of Westerns.....

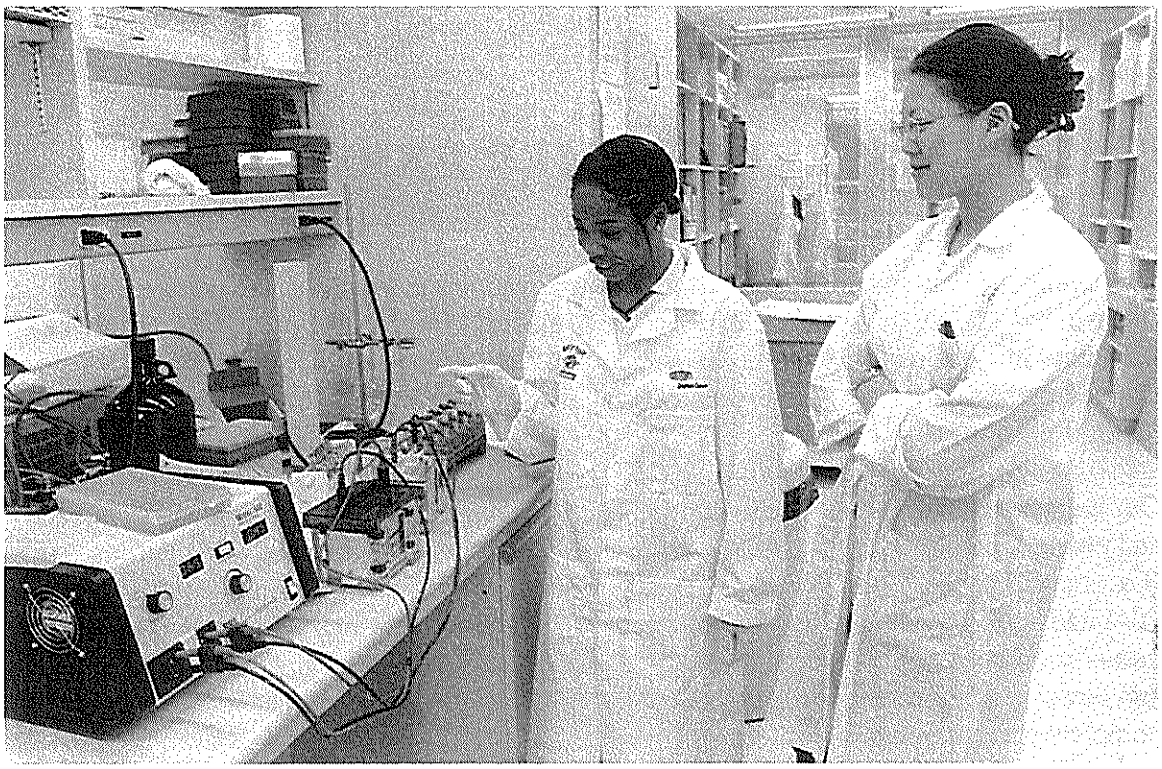
By Felicia Owokalu

My WISEST experience is one I will never forget. It all began when my Science teacher showed me the application form and he told me to apply for the job. I was a bit skeptical because I didn't want to waste six weeks of my summer working in a lab. I had already had enough of school and I couldn't wait for the summer. Anyway, I applied for the job and forgot all about it until the day Grace called me and said I had been accepted. I was so excited that I accepted it right away. I talked it over with my family and they told me to go for it.

At the WISEST orientation, I was scared because I didn't know anyone and I didn't know what to expect when I started. As the day progressed, I realized that there was nothing to be scared about. I couldn't wait until I started at the lab. I was introduced to my supervisor and was then taken to the lab where I was introduced to everyone. The first week and a half were a bit slow and I wasn't given any major project. I was told so many things that when I was asked the next day what my project was about, I couldn't tell my supervisor.

I had the privilege of working as a member of Dr. Olson's research team at the Perinatal Research Centre. The laboratory studies the regulation of birth and the consequences of preterm birth. One thing that might be associated with preterm labor is Nitric Oxide (NO) which causes smooth muscle relaxation. NO is made from enzymes called nitric oxide synthases. My project was to study eNOS, which is produced by endothelial cells and is also known as endothelial nitric oxide synthase. eNOS is involved in making the uterus relax and prevents contractions.

Many of you are probably wondering what a western is. (No, it has nothing to do with the Wild Wild West). Western Immunoblot analysis is a method we used to measure uterine eNOS protein levels. The whole process involved treating female mice with alcohol and leaving some untreated for the control. The mice were then sacrificed and uterine tissue was collected at different sampling timepoints.



Felicia Owakalu, Wynne Leung (Alumi 1995)

My laboratory experience consisted of me making several different types of solutions which were used in the Western Immunoblot analysis. I was also able to grind tissue from our mice samples by using liquid nitrogen. I did protein assays which was to determine the protein concentration in different kinds of mice samples. I also did RNA extractions; a process where we wanted to find the RNA levels in different samples.

It was an exciting time and a great learning experience. This was definitely not a waste of six weeks. The whole experience was worthwhile, I had a lot of fun, and I would love to do it again.

I would like to thank all the people on my research team. Special thanks to Jocelynn, Dean, and Wynne who helped me immensely during my time in the lab. I also shouldn't forget Kristen, Lisa, Debbie, Gayle, Maria, and Julie. Thank you to Dr. Olson for letting me work on his team and thank you to everyone at the WISEST office; Renate, Grace, and Sandra for letting me hang out in your office. Lastly, thank you to Dr. Lorne Tyrrell, Dean of the Faculty of Medicine and Oral Health Sciences and Dr. Joel Weiner, Associate Dean of the Faculty of Medicine and Dentistry for sponsoring me.

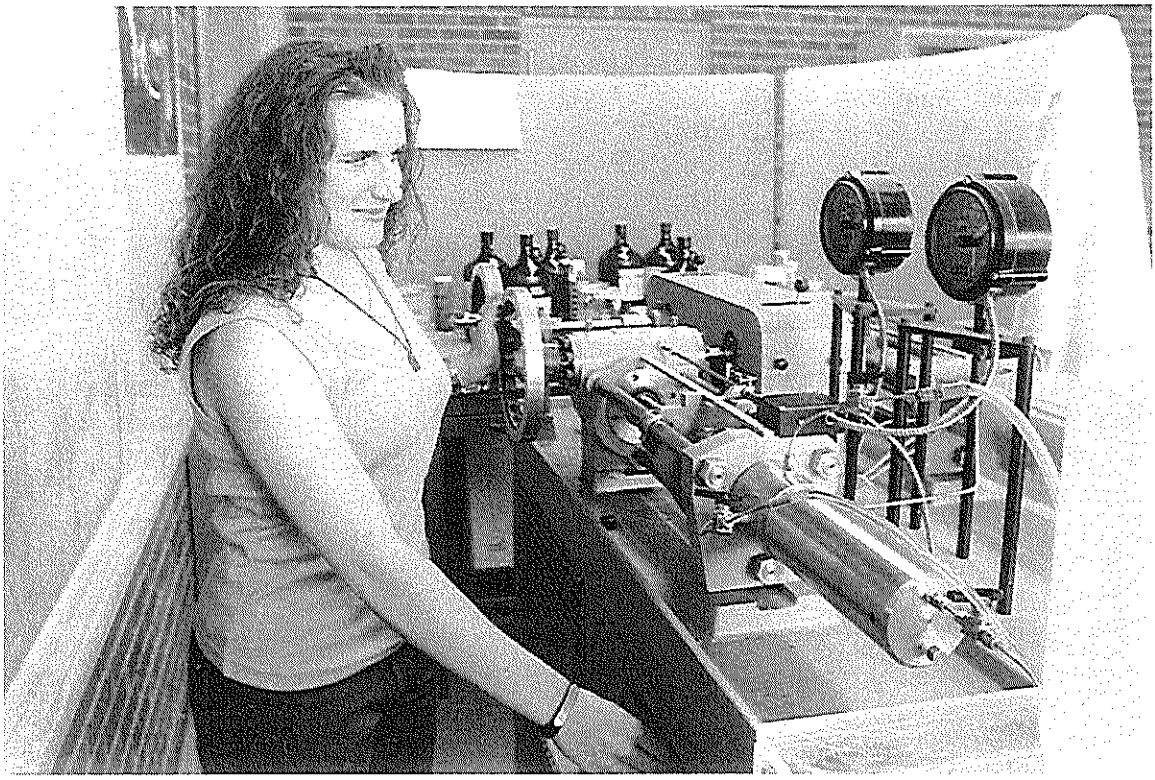
MY WISEST SUMMER EXPERIENCE

This summer I was fortunate enough to be employed in the Mechanical Engineering Department at the University of Alberta. My selected research project was the study of fluid flow mechanics through microchannels and the related interfacial phenomena. I enjoyed myself immensely and over the six weeks I learned more about fluid flow than I thought possible.

Our experimental apparatus was set up in such a way that we could control the flow rate and change the direction of flow (through the microchannel). We used three liquids (Deionized Ultra Filtered Water and two potassium chloride solutions of 10-2 M/L and 10-4 M/L concentrations). We pumped these three liquids through our apparatus using numerous flow rates. Generally, I worked on flow rates which commenced at 10 ml/min and increased in 5 ml/min increments until we reached the 40 ml/min flow rate. We did complete measurements to determine characteristics of liquid flow through microchannels at flow rates lower than
10 ml/min and higher than 40 ml/min but I did not work with these measurements very much.

To study the flow characteristics of our three liquids we measured the liquid's temperature, electrical conductivity, flow rate, streaming potential, and the pressure drop across the microchannel. The electrical conductivity was measured by a conductivity sensor (InPro 7001/120) which was connected to a conductivity resistance transmitter (Mettler-Toledo). This not only provided us with the liquid's conductivity but also proved very useful in checking the cleanliness of the liquid and system. Although we programmed the pump to a specific flow rate we wanted to guarantee that our flow rate value was very accurate. To this end we collected the system's dispelled liquid for a measured time interval. The weight of this quantity was then determined and its volume found by dividing the liquid's density into its weight. This combined with the time required to fill the beaker produced a very definite flow rate. Streaming potential was determined through the use of two Ag/AgCl electrodes which were connected to the microchannel and a high accuracy electrometer. The DAQ (Data Acquisition System - computer technology) was then used to convert the readings into a streaming potential value. A diaphragm type differential pressure transducer was used to measure the pressure drop across the microchannel. The pressure drop was converted into an electrical signal (voltage) which was received by the DAQ and converted into Psi (1 Psi = 6 894.76 Pa). These measurements were taken for six points at numerous flow rates for each liquid and the results were compared.

Through this procedure we determined that the concentration of a liquid and the Electrical Double Layer (EDL) affects liquid flow through microchannels. Most solid surfaces have electrical charge. When in contact with a liquid the electrostatic charges on the solid surface will establish an electrical field by affecting the distribution of ions. The EDL is the name given to the arrangement of the electrostatic charges on the solid surface and the



balancing charges in the liquid. It is the EDL which causes the creation of a streaming potential. This potential will produce a back flow of fluid due to the downstream accumulation of excess charges. The EDL's increased effect on liquid flow through microchannels is assumed to be due to the relativity of its size when compared to the size of the microchannel itself. Understanding fluid flow characteristics in microchannnels is very important for many fields in science and engineering. Experimentation has shown that characteristics of microchannel fluid flow deviate excessively from the predictions of conventional fluid mechanics theories. Currently the understanding of these special flow behaviors is far from sufficient. However, the fundamental research being carried out by Dr. Dongquing Li and his group will be of tremendous use in increasing our understanding of fluid flow through microchannels.

The summer has flown by and my time in the WISEST program has concluded but I will never forget the experiences and knowledge this wonderful program has allowed me to garnish. Always will I remember Dr. Dongquing Li, Weighlin, Byron, Sarah, Yu Lu, Peter, Dr. Margaret-Ann Armour, Dr. Sandra Zohar, Grace, Renate, and all of the many others whose kindness and assistance greatly enhanced my summer and desire to pursue a career within a scientific field.

- Jamie Relland

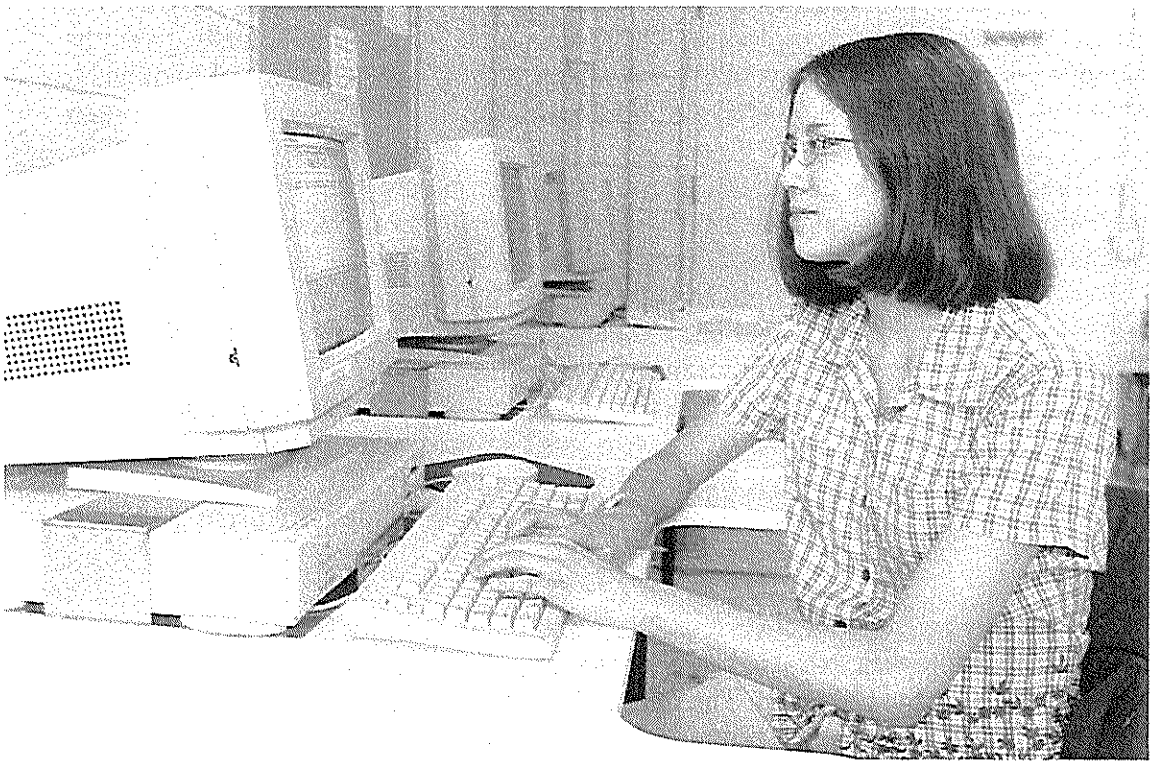
WISEST Student Report
Gillian Lee

This summer I worked in the Department of Physics, University of Alberta under the supervision of Dr. Jack Tuszynski. I was involved in a project on pharmacokinetics, which is the study of drug action over a period of time in an organism, or in my case, an isolated liver. There were three main goals. First, a pharmacokinetic model (a differential equation describing a drug's fate) would be developed. This model described the binding of the drug to both plasma protein and tissue protein. Second, the consequences of both types of binding were to be deduced. Finally, the model was to be applied to experimental data.

I spent the first week of the program learning how to do basic calculus operations, focusing on differential equations. This was important since pharmacokinetic models contain differential equations. During the second week, I had the opportunity to learn how to use 'Mathematica,' a computer program capable of numerical and symbolic calculations as well as the graphical simulation of pharmacokinetic models. It was interesting to factor, expand, and solve equations I could not have expected to be soluble using a computer. I concentrated mostly on solving differential equations and creating drug concentration vs. time graphs, as this was pertinent to the project.

My role has been to assess the parameters of a few pharmacokinetic models using Mathematica. I created graphs, analyzed them, and made generalizations concerning the various parameters. For example, after scaling the amount of tissue protein binding, I realized that an increased amount of this type of binding increases the time it takes for drug concentration to reach steady state in the liver. This greater amount of time resulted in sigmoidal graphs, as a certain "lag time" was apparent.

Aside from working in the department, the WISEST Summer Research Program also gave me the opportunity to meet other grade 11 students who have a genuine interest in science. Every Wednesday, it was great getting together with everyone in the program to participate in planned activities, such as small group



discussions with men and women in non-traditional fields, a fieldtrip to CompCanada, and tours of the University and of another research lab. These sessions were also good opportunities to see what
other students were doing in their own research projects. Therefore, I had the chance to have a glimpse of many different research endeavours at the University.

It has been an incredible experience working in the Physics Department this summer. Not only has it enabled me to become more familiar with the campus, but it has also allowed me to see how research is done. The program has helped confirm my plans to enter into a science-related field in University and I hope in the future other students like myself will have the opportunity to become involved in the WISEST Program.

My name is Janelle Albrecht, and I have spent the last six weeks working in a DNA lab within the University Hospital. I must say that it took Grace a lot of convincing in order for me to agree to come here. I originally applied to the WISEST program with the idea that I wouldn't be accepted, so when I was accepted I hadn't actually given the whole idea a lot of thought. It wouldn't have been such a hard decision had I not had to leave home, but I am extremely glad that I did make the decision to come to Edmonton.

The past six weeks have been extremely interesting and probably the most enlightening six weeks of my life. I have learned more during my stay here than I can ever remember learning. My project involved the process of extracting DNA from tissue and blood samples. I never thought I would actually have to cut up pieces of placenta and umbilical cord. (it wasn't that bad) The main purpose of my project was to experiment with, and evaluate two kit methods of extracting DNA. The DNA lab is interested in finding a new way of extracting DNA because the current method involves the use of two very toxic chemicals. The two kits I worked with, Qiagen and Puregene, were very straight forward to follow and yet involved two very different methods. It was interesting to be able to extract the DNA in an hour or two, while the current method takes a full day to complete.

It was my role to collect various blood and tissue samples to be used in my project. Each sample was extracted by both the Qiagen kit and the Puregene kit. The first step in each kit was the lysis step. The Qiagen lysis step involved the addition of Proteinase K and a buffer to the sample. The Puregene kit involved the addition of red blood cell lysis solution, and a cell lysis solution. The blood lysis stage was finished after a ten minute incubation at sixty degrees, and the tissues lysis stage was finished after incubation at fifty six degrees overnight.

Ethanol is then added to the Qiagen samples, and the DNA strands become visible first as little white strands and then as a white ball. The Qiagen samples are then added to a spin column which contains a filter and collection tube. The samples are then spun down, and the DNA stays on the filter while the filtrate is spun through and discarded. Two buffers are then added to the spin column, the samples are spun down and the filtrate is discarded. The last buffer is added, which dissolves the DNA. The Qiagen samples are then spun, and the filtrate containing the DNA is kept.

After the lysis stage of the Puregene samples a protein precipitation solution is added. The samples are then spun and the proteins form a dark pellet at the bottom of the tubes. The next step is to pipet the supernatant containing the DNA (leaving behind the precipitated protein pellet) into a tube containing 100% isporanol. After the tubes are inverted the DNA becomes visible. The tubes are then spun, and the DNA forms a small white pellet. The isporanol is then poured off into the waste container. (being careful not to lose the pellet of DNA) Ethanol is then added to the DNA, which washes the DNA, the samples are then spun down and the ethanol is poured off. A DNA hydration solution is then added to the samples and they are ready to be analyzed.

After I extracted the DNA from all the samples I ran the tests on the DNA that are usually ran in the DNA lab. The purpose of running these tests was to determine whether the DNA extracted using the two kits was sufficient enough to be able to obtain results from the usual tests run. The results are looking good at this moment, and as we experiment more with the tests the results are looking better.

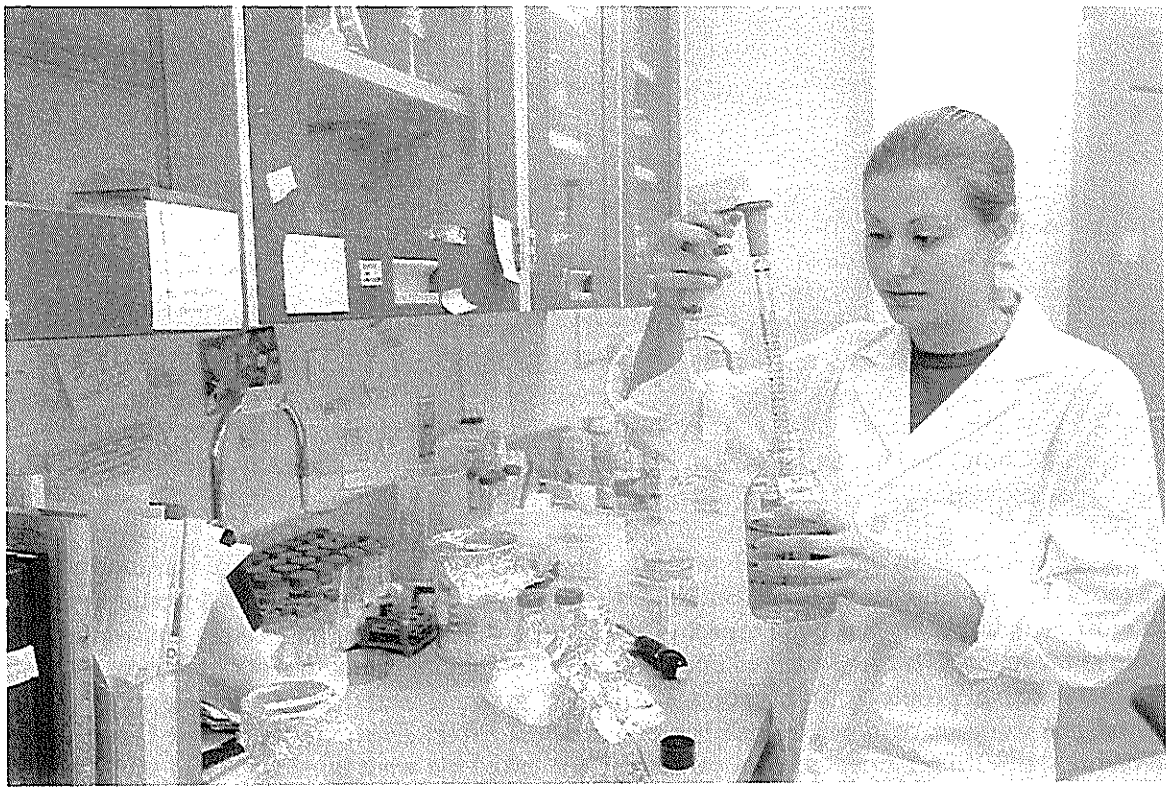
The past six weeks have been great. I have had the opportunity to experience university life as well as meet many new people. This is a wonderful program, that I would recommend to any grade eleven student. I wish everyone good luck in the future and I hope to see you all again.

Janelle Albrecht

The WISEST Experience

This summer was very exciting for me. I had the opportunity to learn what it was like to work in a lab, and what kind of a process research requires. I was also able to explore the U of A campus which was a definite benefit because I plan on going there for university. The summer was also slightly frightening with such a great deal of expensive equipment and me with virtually no knowledge of how to use it. Nevertheless, with help from my supervisor, Heike Petrul, and my co-worker, Ranjani Somayaji, I soon learned many skills and was able to begin my project.

The goal of my project was to express recombinant antibody molecules in bacteria, which in this case was the E. Coli strain JM83. Initially, the total RNA was extracted from the hybridoma cell line DEC 205, although only the mRNA was required for my project. The mRNA was then used as a template for the cDNA in a process known as reverse transcription which produces a DNA copy of the RNA. An amplification PCR (polymerase chain recation) was run in which the V_H and V_L genes (genes which code for the variable domains of an antibody) were isolated from the cDNA and amplified. The V-genes were then combined in an assembly PCR to form a single chain Fv. This antibody fragment was digested with sfi-1 restriction enzyme and was then ligated into plasmid pAK 400, which had been previously digested with the same restriction enzyme. The resulting construct (JK-1) was used for transformation of JM83 bacteria. A PCR screening was then done to identify truly positive transformants that had incorporated the complete Fv. Small-scale cultures of two positive transformants (JK-1 #3 and JK-1 #8) were grown up and protein expression was induced with IPTG. After checking to see if the protein was expressed using a SDS-PAGE gel, a large-scale culture of (positive) transformant #8 was grown up. The recombinant ScFv protein was then purified using affinity chromatography. The purified antibody molecule will be used for further testing in different assays.



The time that I spent working in the lab this summer was an incredible learning experience for me. It allowed me to have a clearer picture of my aspirations for the future which will in turn allow me to better plan my career. I would like to say thank you to WISEST for giving me the opportunity to explore an area of research that interests me greatly, and I would like to extend my congratulations for 15 years of success. I would also like to thank those who sponsored the program, Beatrice Leveugle, and Heike Petrul for their continuing support of the WISEST program.

Jasmine Krysak

Filtering the Web: Autism Linkages
Jeeshan Chowdhury – Faculty of Nursing

Autism, if I asked you about it how much could you say you know about it, could you say anything? If you couldn't say much, you need not worry because many doctors, nurses, psychologists, and other professionals know little on autism themselves. It would be hard to believe that educated professionals would know so little on autism, but the fact is that autism is such a confusing and enigmatic disorder that what is known about autism is limited and mainly theoretical. The problem with autism is that it is unlike most disorders because it is difficult to diagnose and when diagnosed it is even more difficult in finding information, resources, and expertise on the treatment for autism. Parents who eventually discover that their child has been diagnosed with autism after years of testing by doctors, psychologists and pediatricians are forced to become experts on the disorder as the information and support resources simply do not exist for them. It is this situation that was the motive for the work I have done in the past six weeks.

As the sole male in the WISEST program this year, I was, of course, placed in the Faculty of Nursing located in the Clinical Sciences Building. From my experiences in WISEST I would have to say that the most memorable and valuable aspect of the project would have to be meeting and working with the people in the research teams. I worked under Dr. Jane Drummond, perhaps one of the most interesting and definitely active people I have ever met. Active, meaning that I doubt I have ever seen Dr. Drummond not working or doing something else for more than five minutes. When I first met Dr. Drummond at the WISEST orientation in early July, she asked me what project she had said I would be doing because she lost track in the midst of all the projects she was working on at the time. I discovered that Dr. Drummond had earned a Research Scholar award and since had taken on more projects than the rest of the team could keep track of. Dr. Drummond worked with a number of people but I mainly worked with two of her associates, Darcy Fleming, a Ph.D. student, and Susan Neufled, a clinical nurse specialist in pediatric neuro-surgery. Darcy and I worked most closely and his help and guidance in my work was invaluable. As well, Darcy enlightened me to the wonders of authentic ethnic foods like sushi and Korean delicacies, not to mention the not so well understood workings and beliefs of socialism. Susan was my guide to the world of writing and publishing a paper. From her I learned the workings of an article and of cranial-facial surgery. After a few days in the program I fully understood the meaning of, "nontraditional roles". After walking around the building for a couple of days, I realized that there were very few men in the building and I have yet to see another male in the male washrooms. The one male I had a great deal of contact to, Darcy, he and I joked that we had our own private washrooms. The team seems to be brought together under their passion for child and family development, and I learned much from them.

The project I began working on was entitled, "Autism Linkages", a joint project between Dr. Drummond and her associate Dr. Gerry Kysela. The project, as the name indicates, was about Autism and a part of the project was about the resources available to parents with children with autistic characteristics. The first task in the six weeks working on the project was learning about autism and what is autism. In attempting to learn about autism myself, I found it one of the more difficult tasks I had to perform with the varying information and limited resources on autism. I found myself like most parents with autistic children turning to the Internet to find information on autism. What I found on the Internet was a mass amount of information tangled among advertising and inaccurate sources, usually finding information that went completely contrary to my earlier research. After trudging through this tangled web of information, my task was to perform a content analysis of online resources on autism. After researching and literature reviews, I formed a criteria based on the needs and concerns of parents looking for information on autism, a guideline for evaluating and rating autism related web sites. My initial search for autism produced 30 381 sites, a sample far to big to process in my six weeks let alone six years. As such I produced a methods for producing a more manageable sample, 145 sites, and for the next couple of weeks I surfed the net judging autism related web sites. After hours and hours on the internet I realized

the immense situation that parents faced. With such a confusing and puzzling disorder and child combined with insufficient resources and support for these parents, they can be become desperate for answers. With the mass of unregulated and uncertain information on the Internet, parents are in great potential danger in using false and improper information from the Internet in their search for answers. The problem is magnified since parents are such an important factor in the treatment of autism for their child, that the potential danger of such inaccurate information is intensified. As such, I formed the idea of a searchable web page that would provide parents with the data I had collected over the past couple of weeks. With a search engine dedicated to autism, they could find information on a specific topic or issue on autism and then have an annotated review of the page based on critical analysis of the content, validity, and accuracy of the information. This web page is currently under construction being programmed to provide the data from the research project. The next phase of this project is to publish an article on the, "Content Analysis of Online Autism Resources for Parents and Families", which I am currently writing. Future expansions of this project could include surveys of parents and families on their uses of the Internet and customizing the site to their needs and expanding the sites index and databases to include even more sites.

When you ask most sixteen year olds about their summers, they will usually tell you the usually; vacation, work, sports, hanging out. Not many can say they did research at the age of sixteen with a real research team. The past six weeks in WISEST have been exceptional and have gone to by too fast. Working with the research team, meeting and talking with 34 girls from all over the region, as well as seeing campus and university life has been an invaluable experience and opportunity to learn. Over the past six weeks I and the rest of the WISEST students have learned so much not only from the work with my research team but from the weekly meetings and presentations from WISEST about university life to information technologies. The past six weeks have been an invaluable experience thanks to WISEST, the supervisors and sponsors who have all given the opportunity to learn about research, university, careers, and ourselves.

My WISEST Experience

By Jenn White

When my chemistry teacher told me about the program, I wasn't really interested in applying. Why would I want to give up my entire summer to work in a lab 500km from home? Eventually, though, I decided to try it. When I first arrived I didn't know what to expect. I had never worked in a real lab before and I had never lived on my own. Having four other girls there who were going through the same thing that I was made it easier to handle being away from my family and going to work everyday. My first day of work was overwhelming. Everything seemed very complicated but after a while I began to understand what I was doing.

My work deals with treating multiple myeloma with shiga-like toxin. Often, myloma is treated by giving the patient high dose chemotherapy, then rescuing the white blood system with a transplant that contains the patients own white blood cell precursors. Since the transplant is harvested before chemotherapy it is often contaminated with malignant cells and nearly all patients relapse. The purpose of the research is to determine if shiga-like toxin-1 prevents the growth of malignant B-cell colonies. Shiga like toxin is a bacterial toxin, which kills by inhibiting protein synthesis. It is also the toxin that causes the symptoms of hamburger disease. NIH 3T3 fibroblast cells transfected with human CD40 ligand are used as a monolayer for the B-cell to grow on. With this system we can determine if the binding/internalization of SLT-1 compromises the ability of the malignant B-cells to form colonies.

To carry out he experiment I took NIH 3T3 fibroblast cells and created a monolayer in 96 well plates. I then irradiated the cells with 96 Gy on the gamma cell to prevent any further growth of the monolayer cells. Patient samples were then taken and counted. I separated the cells into 3 tubes marked Untreated, Treated and Mock treated. The untreated cells were plated right away at 12 500 cells per well. The treated and mock treated cells were then taken through the treatment process. SLT was added to the treated tube and both were incubated for 1 hour. The tubes were then spun down in the centrifuge and washed with PBS three times. The supernate was kept after each wash and plated. After the washes the two tubes were placed in the incubator for twenty hours. The second day, the tubes were taken out and plated. The mocks were plated at 12 500 cells per well and the treated were plated at 1:1, 1:2 and 1:5 concentrations. After each set of cells were plated the wells from 4-6 and 10-12 were supplemented with IL4. The wells were checked everyday and at seven days and ten days the number of foci (colonies) were counted and recorded.

The lab was usually an interesting place to work and often had a lot to do but the job could also be very monotonous. I sometimes found myself with nothing to do and had to resort to doing tedious chores such as filling micropipette tip boxes or reorganizing the fridges and cupboards into alphabetical order. Occasionally I would leave early since I knew I would make up the time another day.

Although the six weeks was long and sometimes difficult and I occasionally found myself a bit homesick, I must admit that overall I had a good summer and the knowledge and experience that I've gained I will use for many years.

An Unforgettable Summer with Frogs, Fish, Tadpoles, and Toads

Joanne Montpetit

The past six weeks have been absolutely incredible and have made this a summer to remember forever. I will never forget Sarah and Joy, I will never forget the dozens of other fascinating people I have met over the summer, I will never forget the hundreds of tiny toads and frogs, and I will never forget the Meanook Biological Research Station.

My first day there was like a door opening a new world for me and I finally tasted what independence and scientific discovery was like! Everyone at Meanook was so welcoming and helpful that it blew my mind away, yet they gave me enough space and credibility for me to understand that they believed in me and respected my work too. Each person was so interested in what I was doing that I became really fluent with the scientific terms in no time! I was amazed and delighted that these older and more experience university students cared so much about where I was from, where I was going, and what I was doing in the meantime.

So what exactly *was* I doing? I helped Tracy Gartner with three experimental ponds that studied the effects of a population of brook stickleback or fathead minnows (both are small fishes native to Alberta) on the number and size at metamorphosis of Wood frog tadpoles compared to a pond without any fish. We had data that had to be collected daily to ensure the health and validity of the experiment, and in the end it paid off because we started to get some results! The metamorphed Wood frogs that emerged from the ponds with fish were much larger than the ones from the control pond because of natural selection, but they were in much smaller numbers. By the end of my time there, we had gotten four 20 mm-long frogs from a minnow pond while we were up to about 235 14-mm ones from a control pond! After weighing and measuring each frog, we clipped a specific toe for identification next year.

It was great because I had the privilege of making some of the discoveries myself. I really liked working with Tracy who is a sweet and energetic woman but I also liked the time I spent working alone down at the ponds because I had a sense of responsibility and self-direction I had never felt before.

My other project was with the RANA (Researching Amphibian Numbers in Alberta) project. I was in charge of a pond completely surrounded by a drift fence and pitfall traps and I weighed, measured and released any Wood frogs, Boreal Chorus frogs, or Boreal toads caught there. I also took data such as air and water temperature, pH,

Joy Wang, Sarah Taylor, JOANNE MONTPETIT

and cloud cover each day. I had only one problem...a skunk would steal some of the frogs from the traps during the night!

Something else I really liked was going out for a couple days with Brian Eaton and his assistant into the field camp at South Calling Lake (SCL.) I slept in a tent at a camp surrounded by an electric bear fence, worked long hours in the woods by a lake, and had a blast! We stayed up late playing cards and cooked donairs and squid for supper one night. Thanks so much Brian!

My experience this summer passed so quickly, and I'm sad to see it's over. I already have plans to keep in touch with other Meanookies and I know that some of the friendships will last throughout the years. I can't thank Sarah and Joy enough for being such great friends, and Terra who was a WISEST student last year who even welcomed us to her home in Athabasca! If ever anyone who reads this wants to go and check out the research station (with marked turnoffs right from Highway 2) I encourage them to ASAP! It's a great place, full of great (and extremely smart) people who *love* to be friendly, and it's home to some of my cherished memories.

My Summer at the Meanook Lab

Joy Wang

Let's say this . . . I absolutely LOVED my summer. Working at the Meanook Biological Research Station sure beat summer school. I especially loved the fact that I got to stay away from my little brother.

I workeed with Rachel and Trevor in the lab, which was great fun. There was also Angela, but she left our cold winters for the sun and fun of teaching in Mexico. My first full day working at Meanook started off with acid baths. You could think of it as an initiation kind of thing. We put all our used equipment in the baths over night to get rid of any dirty stuff. Everything has to be taken out (with gloves of course) and rinsed 7 whole times! I don't think anybody likes doing it. That's why we're always trying to lure people into our lab to do acid baths for us.

People send us water samples and request various tests to be done. The most requested tests are usually for phosphorus and silica. We also test for pH with a computer that makes a lot of rude sounds. Most of our tests rely on the spectrophotometer, which we lovingly call the spec. The spec measures light absorbency which is then put into the computer. The computer spits out numbers telling us the amount of phosphorus or silica or chlorophyll in the sample.

Tip: You really really want to be careful when doing silica. Why? You ask. My first time doing silica, I got lots of holes in my pants. And I do mean LOTS! They're now patched and have been upgraded to the status of fishing pants. But holes or no holes, silica is a fun test to do because it's time sensitive. That means you have to work really fast.

Testing for chlorophyll is also a real fun test. You get to work with ethanol and cut up filter paper. The downside of cutting the filter paper is having to use right handed scissors. I'm left handed and had to cut everything with my right hand. Not something I especially like. Another downside is having to use "Vortex". The vortex is this vibrating

JOY WANG, Sarah Taylor, Joanne Montpetit

thing that mixes the ethanol and filter paper. It makes your hand go numb within a minute. It's simply horrible! But the whole thing is fun nonetheless. And not just because of the ethanol fumes. Hehehehe!

You may be wondering whether this is all we do in the lab. Basically . . . yes, but we also listen to a lot of music. I've grown to love the 'Pulp Fiction' soundtrack and I'm now a big fan of 'Great Big Sea'. It's kinda like a sing-a-long session every day.

Tip: When filling carbuoys or changing the soap bath at least *try* to remember the water is on before you get a huge flood.

I got to spend some time with Joanne on her frog project. Frogs and toads are so neat. Whenever we go swimming, you can be sure to find toads around the boardwalk. The males chirp when they're held. And they're so huge too. Who da thunk it?

I've had such a great summer. I worked but had so much fun doing it and I met the greatest people who are the greatest friends. This has probably been the best summer ever and one that I'll never forget!

PINING FOR DNA

My Quest for Eastern White Pine DNA

When I walked into Room E3-25 on July 5th I had no idea what to expect. The next six weeks lay out blank before me. Well, they filled up pretty quickly. In fact, these last six weeks flew by quickly.

I had no idea where I would work or whom I would be doing my work with. All that changed over the next few hours. I found out at lunch that I would be working with Allison Stedford (another WISEST student), which helped my anxiety about work to calm down a little. I found out where I would be working and met my supervisor, Sarah. Things were rolling smoothly!

"Plant molecular genetics and biotechnology" became clear to me. This was the job description given to me by Grace and Renate. I was so confused about what it meant, but then Sarah very (VERY) patiently explained what we would be doing: DNA extractions. Whoa! That was totally different from what I had expected. But it was really pretty neat! I was not sure that I would be able to get the procedure down, but I did and I was pretty proud of myself!

The DNA extractions weren't too hard. To get an idea of the procedure, we (Allison and I) followed two people from our research team around. When we felt moderately comfortable with the procedure, we were left to do the extractions on our own. (It took us a week to become that comfortable with it, so you can imagine how many questions we still asked after this.) Our project required us to extract DNA from 165 trees. The checklist for the trees looked very empty at first. But after three weeks, it was filled up. From then on, we were "Santa's little helpers". We poured gels for Sarah, loaded gels with Michelle, (a summer student), and bugged Matthew (another summer student). Our favorite pastimes were stuffing tip boxes and going for our daily ice run to the Chemistry Building.

I was not totally sure of what the project was until about halfway through he program. My project involved examining DNA of Eastern white pine trees, harvesting those trees and comparing the DNA of the new trees that grew to the old ones. I cannot believe that I took part in such a project! I mean, I am still in high school and I worked with university students and researchers in a highly technical university research lab! (But I guess that is the whole purpose of the WISEST program!)

Seeing some of the results of our project was neat. Being able to see DNA and some of its specific sequences was really mind blowing. It seems so weird that those sequences define what we all are, be it a tree or a person. The silver staining was also cool, I liked seeing the DNA bands appear suddenly.

The summer was a lot of fun. I do not know if it would have been half as fun if Allison had not been there. We had some good laughs, hey! And we made it through.

The Wednesday sessions were also tons of fun. My personal favorite was the lab visit, but Shakespeare in the Park topped the list (yeah, yeah, I know it was not a Wednesday session). But I still can't believe it's over.

I would just like to thank a couple of people: Allison, thanks for being such a great person to work with! I hope your life turns out as you have planned it. Sarah and the rest of the research team, I would not have done anything right without your help. And to Doug McNally and the Winspear Fund Thanks for making this experience possible! (I hope that is the seventh thank you to the Winspear Fund!) And of course to Renate, Grace, and Sandra thank you a million times over!! The bag lunches were great to!! I will miss everyone in the program, all of you guys (or should I say girls and one guy) were great!

Karen Diepeveen

What it's Like to Spend Your Summer With a Bunch of Chickens...

By Katie Martin

Before this summer, I had NO idea there was so much to learn about the poultry industry. I ate chicken all the time, and I never even thought about how much work and research is involved in producing top quality meat for my dinner table. Until now, I couldn't have told anyone what a leghorn, a broiler, and a broiler breeder were. Or what cellulitis is, and how it affects poultry. I didn't even know that a hen has only one functioning ovary! But now, after six weeks of learning more than I ever thought I could in such a short time, I am definitely able to tell everyone more than they want to know about chickens and the poultry industry.

I worked with many helpful and friendly people these past weeks. The three people I worked with most are Dr. John Feddes; my supervisor, Erin O'Dea; a former WISEST student hired on for the summer, and Jerry Emmanuel; the Grad student in charge of the main project as well as mine.

The purpose of Jerry's project is to examine broiler chick performance and occurrences of cellulitis at different levels of ventilation and bird disturbance. For example, some of the chicks are hand fed, and others are fed using an auger system to automatically give them feed.

A common problem with housing many chicks together in a small amount of space is the number of body scratches they obtain. Cellulitis is a bacterial skin infection caused by Escheria coli (e-coli) bacteria entering these scratches. Birds with this disease are condemned at the plant, which results in a loss for the producer.

That is why Jerry's project is focusing on different ventilation rates and air velocities in the area that the birds are housed in order to find out if there is a correlation between different ventilation rates and the incidence of cellulitis. These findings will be of great importance to producers.

One of the first things I learned on the farm was the difference between a broiler, a broiler breeder and a leghorn. A broiler is a chicken that is raised for its meat, a broiler breeder is a chicken that is raised to produce eggs which hatch into broilers, and a leghorn is a chicken that is raised for egg production. I worked with approximately 7000 broiler chicks this summer! And it takes a lot of effort to take care of that many chickens.

Erin, Jerry, and I did most of the "grunt work" that was necessary to maintain all of the chickens. Our day consisted of dumping feed into the hand-fed pens, filling the auger-fed pens (every second day or so), filling extra drinkers (but only for the first week), collecting and weighing the few dead chickens (some of them die from dehydration, starvation, heat stress, etc.), weighing out feed, delivering full cans to pens, marking down how much water the chickens were drinking, recording temperatures, and various other jobs that needed to be done.

Sometimes we would help other professors and students on the farm with their projects or tasks that needed to be done as well. On Mondays a lot of people pitched in to help Dr. Feddes, Jerry, Erin, and I weigh all of the feed (so we could calculate how much they were eating) and a sample number of chickens from each pen (so that we could determine if they were under or over the ideal weight).

One of the most interesting things that I did this summer was dissecting chickens. I also helped take blood samples from chickens and Erin and I had to candle rare-breed chicken eggs to determine if they were fertilized. We did this two days before the eggs were supposed to hatch, so we were shocked when we opened the incubator and discovered two early arrivals! Two days later, Erin and I vaccinated the 1800 chicks that had hatched. That took us quite a while!

And then there was my research project. The purpose of my project was to determine if the temperature of soiled chicken litter contributes to heat stress in broiler chicks. In order to find this out, I had to take different kinds of temperature readings for eight different pens. The readings I took to determine if there was a temperature difference between the air temperature and the litter temperature involved using a probe thermometer.

The other type of reading I took involved using an infrared thermometer and my famous "Styrofoam chicken." I took the initial temperature of the Styrofoam, and then I placed it in the litter for about 10 minutes. Then I took it's temperature again. This allowed me to determine if the litter was heating up the Styrofoam, and therefore adding to heat stress, or cooling it down, and therefore relieving heat stress.

At this time, I do not have any solid conclusions for my project, because the temperature of the litter increases with each week as it gets dirtier and dirtier. We are currently on our fifth week of the experiment, and there won't be any conclusions until the birds are processed at six weeks of age.

Well, I can't believe that this summer is actually coming to an end! It doesn't seem that long ago that my fellow WISEST Summer Research Students and I were gathered together for the first time. And soon, we will be gathering for our last!

I will never be able to name the many things my summer at the Poultry Research Centre has taught me. It has been a summer I will remember for the rest of my life! Thank-you Grace, Renate, and Sandra for allowing me to experience this once-in-a-lifetime opportunity!

My Summer With WISEST

I can hardly believe that these past 6 weeks have gone by so quickly. Coming into the WISEST Program I didn't quite know what to expect. I just knew that I was ecstatic to have been accepted . . . and nervous! I was placed out at Devonian Botanic Gardens, which was an incredible place to spend my summer, and the time flew by.

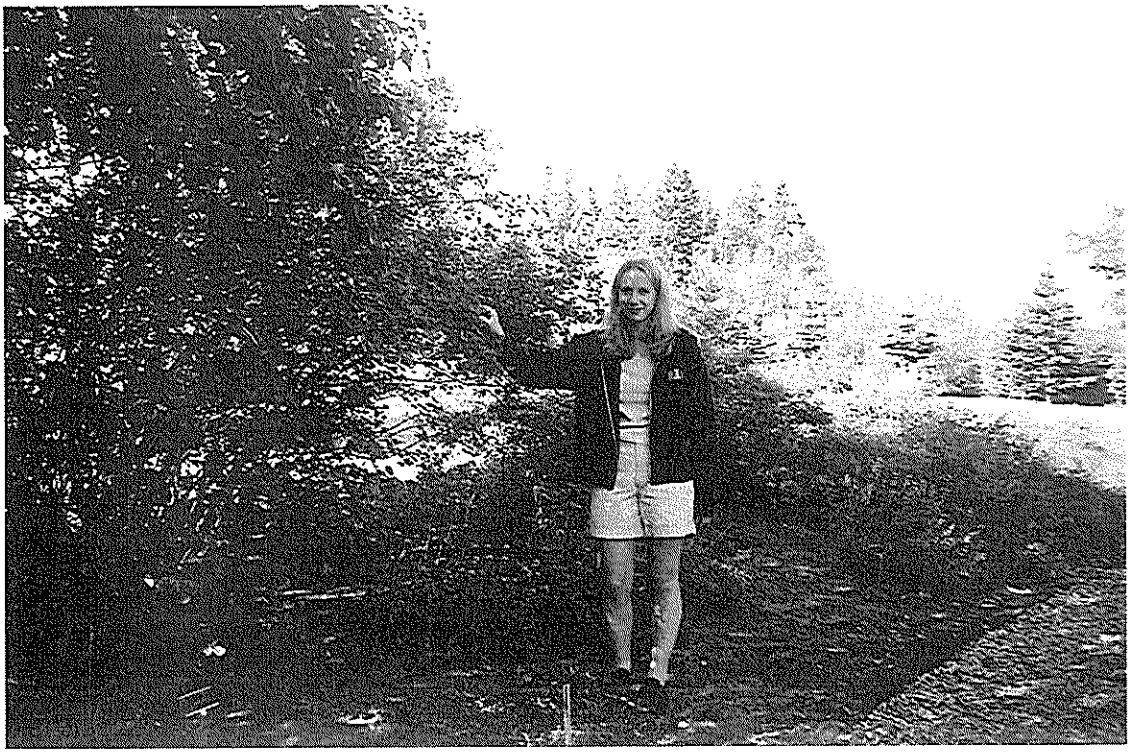
I was exposed to many different tasks working out there. It was such a pleasure to work for my supervisor, Dr. Elisabeth Beaubien. Also, on Friday's I worked with Melissa Meachem, another WISEST student, under her supervisor Dr. Rene Belland, helping her out with whatever project she happened to be working on. I also worked in the Microfungal Lab and out in the greenhouses.

A multitude of tasks were assigned to me by Dr. Beaubien. My main project was to map the gardens and the trails, and record and map where 21 native Albertan plants grew. This was a fun project, except when the mosquitos were out! I also learned how to collect different seeds, and gathered seeds for the same 21 plants.

One of my smaller projects was to spend time on the computer entering journal and book references into a database. This was definitely good on the rainy days, and I'd have to say that my typing has improved. I'm also now an expert at photocopying.

For the first two Wednesdays I spent the entire days at the University. I researched two Alberta plant species in the library and wrote reports on them. This was very helpful to me, because now I know how to use the University libraries (Thanks Renate!).

I'd have to say it's true that you learn something new every day, because I'm sure that I have. Not only have I gained knowledge about flowers and plants, I have learned more about



the faculties of Science and Engineering. Also, things such as being able to find my way around the U of A, will be very useful in the future. I had tentative plans to go into the Science program, but this summer helped to reinforce those ideas, by showing me all of the unique research opportunities available.

Participating in the WISEST program was a valuable experience, and it has been a memorable summer. I learned many new things, and met lots of new people. Thanks, WISEST, for the terrific opportunity to experience new things.

Kristin Gallagher

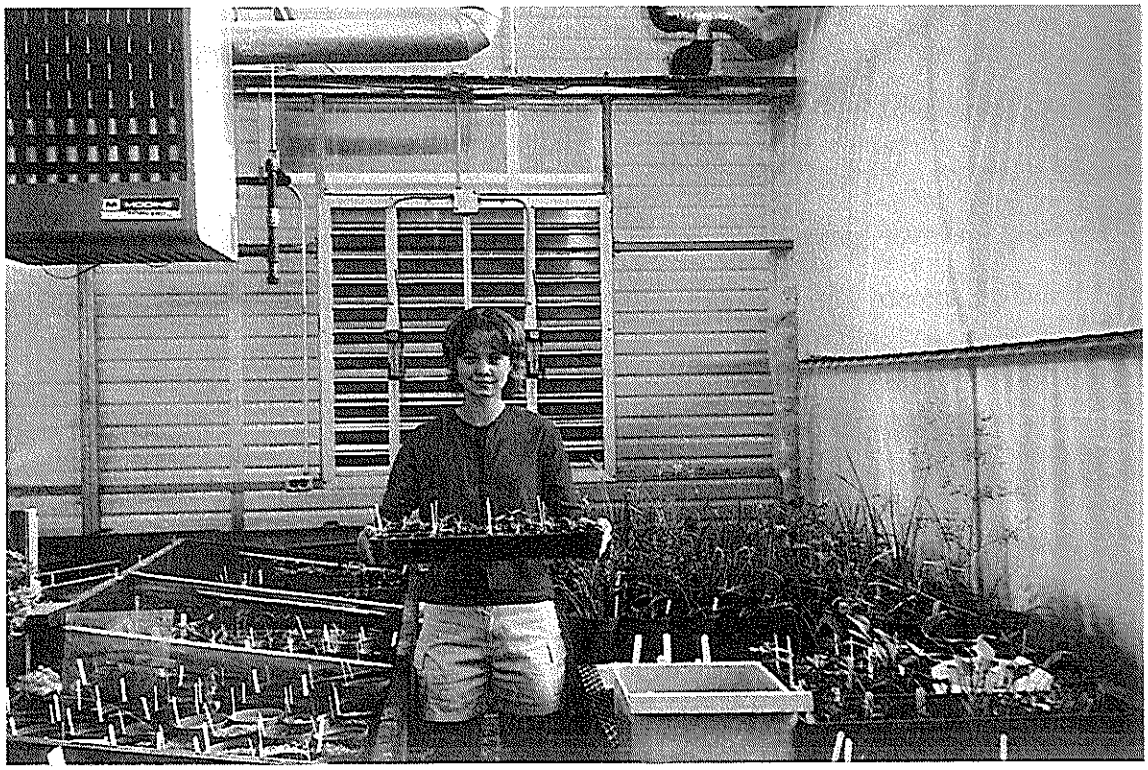
Creating a Seed Bank at the Devonian Botanic Garden

Melissa Meachem

When I learned that I was being offered a job with WISEST at the Devonian Botanic Garden I was excited; when I discovered that the job would be seed collecting I was thrilled. Tinkering with seeds might not sound like a great way to spend the summer, but seed collecting has always been a hobby of mine. My task was to create a protocol for starting a seed bank and to experiment with preserving techniques.

To preserve seeds, it is important to reduce moisture content to minimal amounts. There are various ways to do this, from drying in an oven (at different temperatures) to drying with a desiccant (for different lengths of time) to a combination of both. The seeds are then stored in a freezer at -20°C, and have a theoretical storage life of hundreds of years. This incredible longevity can be attributed to the reduction of seed metabolism by sub-zero temperatures, allowing seeds to be kept in suspended animation.

And what is the importance of keeping a few little seeds in a freezer? Simple. The strain of having to support a rapidly expanding human population (90 million each year) is taking its toll on the environment. Some experts argue that within fifty years, one quarter of all the plants in the world will be extinct. Should



this come true, those tiny seeds can be used to reproduce a plant that has been wiped out.

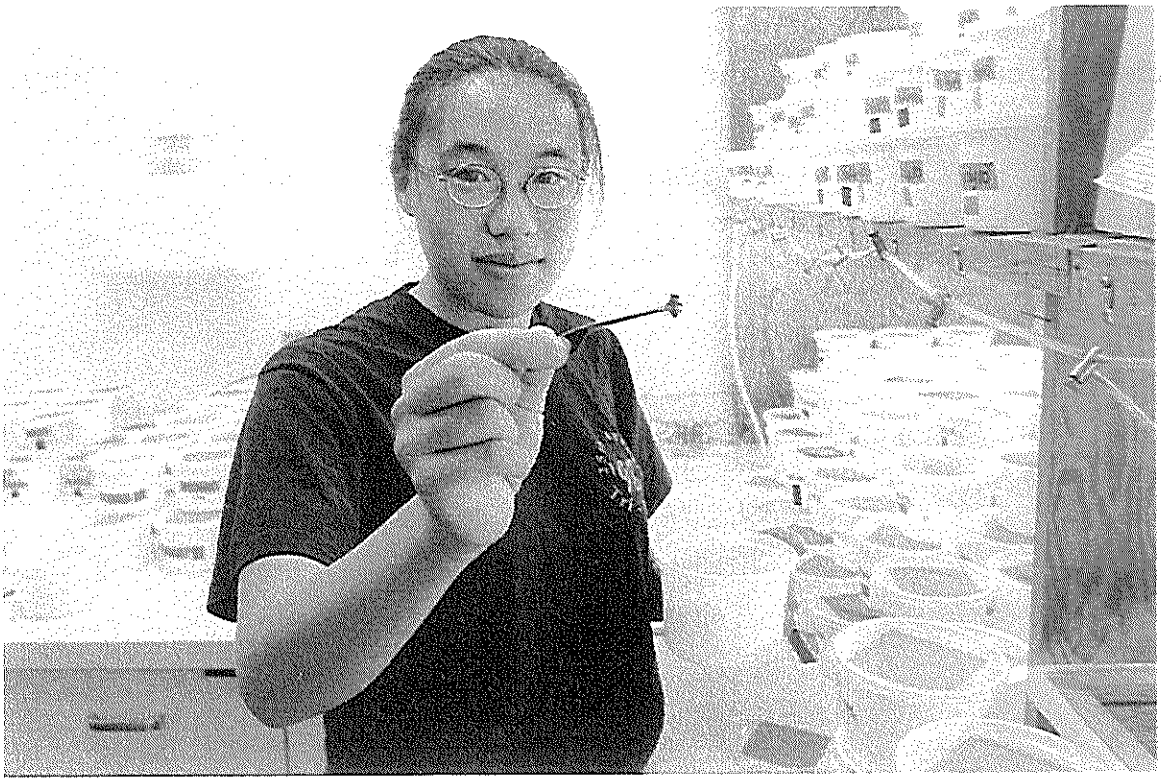
I am thankful to WISEST for providing me with the opportunity to participate in such a worthwhile research project. Every week spent at my job has reaffirmed my decision to pursue science in the future.

Bugged Out

This summer I had the opportunity to work with organisms that previously had done nothing but "bug" me. When I first was told about my placement in entomology, my imagination immediately conjured up images of giant tarantulas and cockroaches. However, once I arrived in the lab, I realized that there was nothing to be afraid of, except the dreaded fly culture room (from which I stayed away).

I was pleasantly surprised that the graduate student with whom I working had already set up an experiment that would be for me to carry out in the six upcoming weeks. The purpose of the experiment was to see if different feeding regimes would affect the development time and the adult body size of the water strider species *Limnoporus notabilis*. The first thing we did was set up twenty breeding pairs, separating each pair of male and female striders into separate tubs, containing water, two flies for food, and a styrofoam strip on which to lay eggs. Everyday we checked the strips for eggs, and if some were found, we transferred the egg strip into a separate smaller container, and replaced a new strip inside the breeding tubs. The tubs were labeled and given a treatment group. The offspring from treatment one parents would receive one fly every 24 hours. Whereas the offspring from treatment two parents would receive one fly every 48 hours, which would be removed after 24 hours in the tub.

After about a week, the eggs began to hatch, and give way to tiny nymphs, called instars. There are five instars, stages of development, between the egg and the adult water strider. When an instar outgrows its exoskeleton, it sheds the hardened layers of the exoskeleton. This is why water striders only grow in discrete stages. In other words, they do not develop gradually, but in five distinct leaps of growth. Each time the instar molted, we took the molt case that was left in the tub, and the date of the molting was recorded. Feeding the instars and checking for new molts continued throughout the project.



After the experiment was finished, we ran all the data through statistical analysis. The findings showed that the striders that were fed everyday, on average, developed faster, and had longer body lengths. These findings are very important, especially in the area of habitat comparisons. In many studies, water striders in different habitats are compared, but do they do not take into account the differences in food availability that greatly affects the size of the water strider.

Overall, I had a great time in the lab. Not only did I get to work on my own experiment, but every Tuesday I went to the U of A field site at George lake. There, I helped out with the bug count, in which you go into a pond in hip waders and collect and mark water striders. I also helped in emptying many pitfall traps.

Thanks to all the people in the lab, who were always helpful, fun and full of knowledge. To the WISEST staff, thanks for letting me be a part of this awesome program.

Michelle Po

Michelle Trommelen, Earth and Atmospheric Sciences, University of Alberta

I was very excited when I first got the call from WISEST, saying that I had been accepted into this program. And the fact that I would be working on a project in petroleum geology was even more exciting. I have always been interested in rocks, but it seems that most people I know don't seem to share the same interests. After all, all a rock does is sit there. But I was soon to find out that seemingly dull rocks have very interesting stories to tell.

Our project was to analyze rocks from the Devonian period (360-408 million years ago), in our study area of the Southesk Cairn complex (near Jasper). From completing various tests, the hope is that we will be able to determine the paleo-fluid flow in the basin, which should tell us where there are reservoirs of oil to be found. Also, we are trying to locate former reefs, where, because of high porosity, there should be oil. But of course, it's not as easy as it sounds.

We get our rock samples from oil and gas companies. The companies drill deep down into the earth, and the resulting rock that the company takes out is called the core rock. We then take this core rock, and examine it very carefully, noting the different types of rocks present, fossils present, evidence of hydrocarbons, etc. This data is carefully recorded on a computer in the Applecore program.

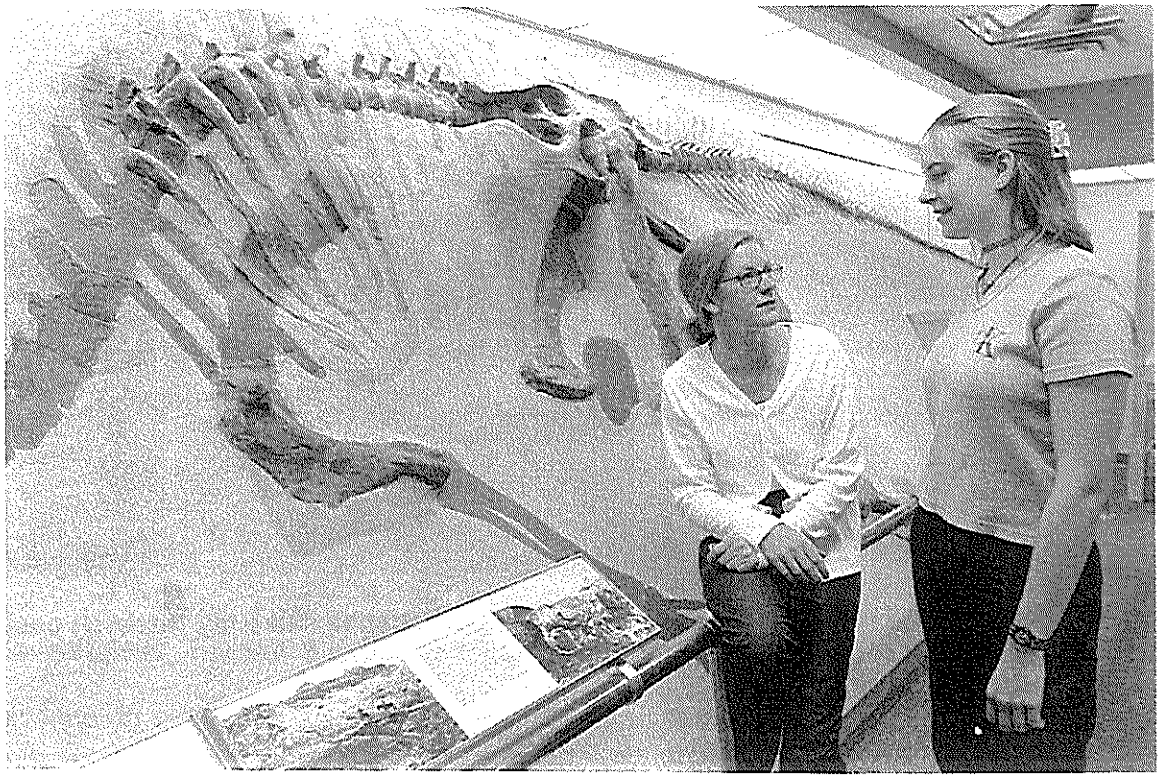
Slices of the rock core samples are taken, and then glued to a glass slide. The slide is then ground down very thin, so you get a very thin slice of the rock. Hence, this is called a thin section. These thin sections are then examined through a microscope, where fine details are recorded, and pictures are taken.

The oil and gas companies also perform numerous tests on the core rock. The one that we are concerned with is the gamma ray. They send gamma rays through the core, and then record the results on microfiches, which we then print out on the microfiche machine. The gamma ray is able to tell us where the different formations of rock begin (ex. Leduc, Nisku, Wabamun, Ireton, etc.) This information is then put on a cross section, which gives us a picture of what the rock formations look like thousands of feet beneath the surface. This helps us to decide where fluids may have flown and where reefs, basins and lagoons are located.

Then we ourselves have to perform many tests on the rock samples. One of these tests is called column chromatography. This, essentially, is geochemistry, and involves a lot of hydrochloric acid. With the help of the mass spectrometer, we use this procedure to determine the amount of strontium in the rock samples, which can help to tell us how old the rock is.

Another of the tests performed on the rock samples is to determine the amount of carbon and oxygen in the rocks. This is done in the stable isotopes lab, and also involves reacting rock powder with an acid. Liquid nitrogen and dry ice are also used in this procedure (and are fun to play with).

Besides doing all this, during the first week I also attended a university class; Earth and Atmospheric Sciences 101. I learned an awful lot (though I was quite thankful to leave the class the day before their midterm).



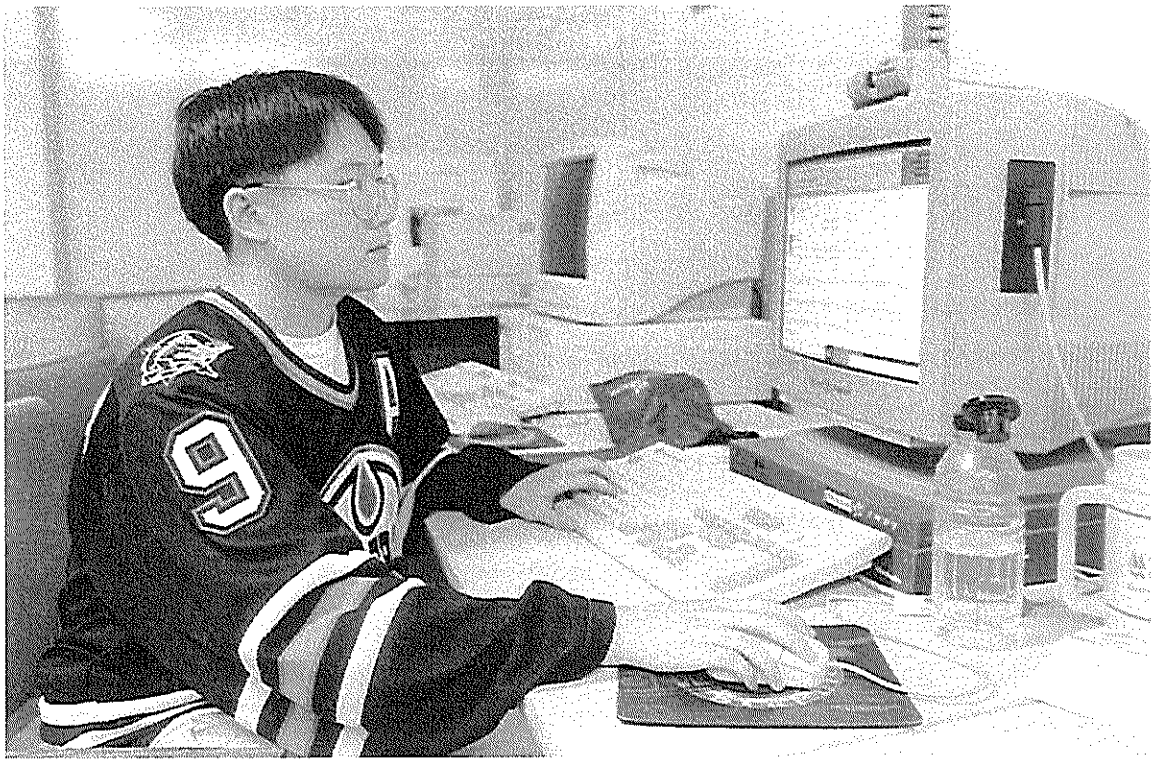
I was also really lucky because I was able to go with the research team into the field for a week. The person leading the trip was a famous geologist, Eric Mountjoy, from McGill University. The main thing I learned was that geologists don't know what trails are. If you see an outcrop or a formation high up on a mountain, you go. Hence, we did a lot of bushwhacking, and climbing up creek beds. I learned a lot about the stratigraphy of the mountains, and near the end was able to identify different formations and structures. We went up the Miette creek (day hike), Roche a Perdrix, Disaster Point, Mount Grenich, to the cold sulfur springs, up Nigel creek, and went to a magnetite ($MgCO_3$) mine near Radium BC. At nearly all these places we saw stromatoporoids, amphipora, thamnipora, crinoids and brachiopods (all fossils between 360-408 million years old). We also saw pyrite in a number of locations, and sometimes copper and galena as well.

This summer has given me no doubt that geology is what I was born to do. And I have learned so much before I even entered first year university. Also, I have connections with the geology department now, and will probably be able to get a job there next summer as well. Thank you very much to Grace and Renate for all their hard work they have put into this program. And to all the other students, maybe I'll see you at University sometime in the future.

Paid to Learn

My six weeks at the Department of Computing Science were a jumble of experiences and emotions. My first few days were taken up with reading manuals and experimenting with the various things I learnt from them. As the days progressed, I was assigned some more challenging work. My various tasks included the creation of various sites for the Department of Computing Science as well as the replacement of an out-of-date map on the University of Alberta home page. Through the completion of these and other tasks, I learnt the intricate functions of a program called UNIX. Using the various tools in this program, I was able to manipulate text and images on the Internet, send e-mail, and create, edit, and delete files, among many other tasks. I was also able to use the UNIX program to make my research poster and then send it to the plotter.

When the jobs were first assigned to me, I had the enjoyable (though slightly frustrating) task of having to figure out how to do them. Of course, the computer would periodically refuse to cooperate. ("Periodically" may not be the best term to use, as the computer was adamant about being troublesome at least once a day.) At such times, I could very happily have used the keyboard as a bat to knock some sense into it. However, after enough experimentation and accidentally erased files, I eventually was able to begin the job. I found working with web sites very interesting and perhaps easier than other types of work. The advantage of working on the Internet is the ability to see the web page develop, grow, and evolve as more, and different commands are punched into the computer. I used many different computer programs and pieces of equipment, that I would not normally have had the opportunity to work with. All of my projects were enjoyable, especially during the early stages when I had to figure out which commands and programs to use and how to get the desired result. When this had been done, the work slowly became repetitious and tedious, as the same programs and commands were run over and over again.



Nevertheless, I learnt a great deal during my six weeks at the Department of Computing Science. In addition, I was able to speak with students working in other areas to learn more about their experiences and what their fields entailed. The poster session and weekly group meetings were very helpful for this. As part of the WISEST program, I was also given the chance to visit other research labs and to speak with individuals currently working in science and engineering. One of the most memorable activities I participated in was the tour of the Visual Reality Room. Here, I was given a virtual tour of the University and of a cancer cell.

Overall, I feel that the time was very well spent. Not only did I gain insight into various fields, which will be very helpful in choosing my future career, but I also met many intelligent people, who offered me many, invaluable bits of advice. On top of this, I made many new friends, and enjoyed myself thoroughly.

I would like to take this opportunity to thank all the people, especially those associated with WISEST, who made this experience possible for me. I would also like to extend a special thank-you to the Department of Computing Science for the use of their facilities and to Mr. Rob Lake, who was a very understanding and patient mentor.

Pam See-Too

Meanook Madness (or What I Learned This Summer)

By Sarah Taylor

Occasionally it occurs to me that I am getting paid for having this much fun and I'm surprised that there isn't some sort of rule against it. I, of course, am living and working at summer camp, otherwise known as the Meanook Biological Research Station. I could probably spend this entire report telling all of the awesome stuff I've done here, but let's start with the basics, work.

I am an assistant to St9phanie Nicopolus, a researcher who's come all the way from Montreal to study the lakes we have out here, the weeds that grow in them and the microscopic organisms that live on those weeds. I get to help her in all the tasks required to attain enormous amounts of data, which she will spend the next four years analyzing. This is no easy task, let me tell you. We do half fieldwork and half lab work, with a unique twist. We leave Meanook and travel out to the lakes we have to sample, which just happen to be a convenient three hour drive from Meanook. We stay at a base camp and quad out to where we need to sample from. Our lab work is also done there.

The actual fieldwork is very simple, though time consuming. Every morning we head out on out quads, all loaded down with gear, for a fifteen-minute to one hour drive. This is one of my favorite parts of the day. To date I have seen two white tailed deer, ruffed grouse, five black bears and about a thousand butterflies, not to mention the odd rabbit, squirrel and unusual bird. We arrive, unpack the quad, and load the boat. Then St9phanie and Josh (another assistant) change into their diving gear, and I study the complex intricacies of a creepy crawly bug, a patch of wild strawberries, or that noise in the bushes (this is the boring part). Before long we head out and while St9phanie and Josh dive I sit in the boat, soaking up sun (or rain) and bottling samples of lake weeds they collect. TA DA! Twenty-seven bottles later we leave and my fieldwork is done (with the exception of getting back to camp, which can be the most difficult part of the day). Now the fun part, lab work.

Now if you've never worked in green light before to preserve chlorophyll, or had three people crammed into a space the size of a gas station bathroom, you probably won't appreciate the difficulty of what we are doing. We shake each bottle for twelve minutes, exactly, to remove the microscopic algae from the plants. Next the plants are taken out of the bottle and the remaining water is filtered through six filters, two for chlorophyll, two for ash free dry weight and two for benthos (think water bugs, leeches and freshwater shrimp). Next comes the task of rinsing the bottles and packing them in their carrying coolers, to start all over again the next day. With that all finished, we finally have time to eat and maybe play a few games of gin.

Joy Wang, SARAH TAYLOR, Joanne Montpetit

That's what I'm doing, it may sound boring, but I love it to death and I couldn't have had a better time this summer. I didn't realize that it would all be over this soon, six weeks flies by. So back to the title, what I learned this summer. I learned; there are not enough card games in this world, you can survive five days without a shower, St9f's law: one cookie in your stomach is never enough, serendipitous events are especially important, mosquitos will bite you especially when your sleeping, being clumsy is not necessarily a bad thing, fieldwork will go wrong, and finally, the life of a Meanookie is one I'd love to lead.

Meanook has offered me challenges and amazing people to work with. The atmosphere hanging around this place isn't deceiving, everyone actually is friendly and helpful! I couldn't have asked for a place that better combines work, play, nature and happiness. It was a wonderful summer and I hate to see it end, but it does, like all good things. Meanook and the people here are phenomenal, but I can't just keep saying that, I'll run out of room. So thank you to all the people that made this incredible summer possible, and good luck to the other WISEST students in their future endeavors.

I had a blast!!

Sarah Taylor

Ophthalmology – an ExcEYEting Experience

Sarah Lai

The past six weeks in the Department of Ophthalmology at the Royal Alexandra Hospital have truly been one of the most interesting and exciting experiences of my life. Not only did I have the chance to learn all about ophthalmology, I was also able to work alongside knowledgeable and friendly doctors and residents. Everyday, there were new people to meet and new challenges to face. With the help of my supervisors, Dr. Matt Tennant and Dr. Ken Shutt, and Sonia Kang, another WISEST participant, I discovered the importance of ophthalmology and eye care.

Everyone I met at the hospital were very friendly, educational, helpful, generous, and knowledgeable. They helped me to learn all about ophthalmology and guided me in the making of my research poster. They treated me like a friend, and educated me with optimism. At the end, they were kind enough to give Sonia and I some special souvenirs to remember them by.

One of my first experiences at the hospital was shadowing residents during appointments in the Eye Clinic. I learned a lot from watching the residents and doctors interacting with patients, analyzing their symptoms for a diagnosis. I also learned to operate basic ophthalmic tools, such as the ophthalmoscope, the single slit lamp, as well as the tonometer. By the end of the program, I knew how to diagnose and treat common eye problems, such as glaucoma, retinal detachments, strabismus, corneal abrasions, diplopia and blepharitis. On my first day at the clinic, I had even learned something of extreme importance: always eat a large breakfast. Who knew that waking up early and standing for over three hours would spell out fainting? Well, I didn't, at first. But for me, passing out was actually a very neat experience.

Other than following residents and doctors in appointments, I also had the chance to watch over other specialists and technologists. The retinal specialist at the Royal Alex introduced me to common retinal problems and if and how they could be treated using lasers. After watching him perform laser surgery on diabetic patients, I tested out the lasers myself.

A visit to the University's Ocular Genetics lab proved to be quite interesting as well. The technologists there showed me around the lab where they researched eye-related genetic disorders, such as choroideremia. They taught me how to set up agarose for gel electrophoresis used to separate strands of DNA to determine if a patient has inherited a certain disorder.

One of the most interesting experiences at the hospital took place in the Operating Room. Up close or on a screen, I watched doctors and residents perform real live surgeries on patients suffering from a variety of problems. They demonstrated all types of surgeries from correcting strabismus, to replacing lenses in cataracts patients, to lifting baggy eye lids. In the Operating Room, it was interesting for me to watch the doctors, seemingly tense and stressful, as they worked under the clock. But for the doctors, residents and nurses, it was just a regular day at work.

To say the least, my experience at the Royal Alex was very enjoyable. But, it wasn't only fun and games; there was work to be done. Sonia and I were to conduct our own little research project. Unlike the projects of the other WISEST participants, the research we conducted did not involve basic science. Rather, it dealt with issues pertaining to gender in ophthalmology and medicine. After discussing possible gender problems encountered by females in ophthalmology, Sonia and I performed an in-depth study of gender issues using a variety of sources. We then developed a comprehensive online survey at http://www.ualberta.ca/~ophthalm/WISEST/ that was emailed to all the residents of ophthalmology at the University of Alberta. Its purpose was to assess the role of gender in ophthalmology, determining the issues and problems, their causes and effects, in an

attempt to provide solutions. The results of the survey were not very surprising in that the females perceived a definite gender problem while the males did not. All the female participants agreed that they had experienced discrimination, intimidation or harassment from their male counterparts at some point during their education. There were also many issues among which residents of the opposite gender disagreed. Issues, such as wage gaps, unequal opportunities, discrimination and segregation, showed that men and women felt very differently about gender problems.

Many think that the results of this survey would deter me from entering the field of ophthalmology, or even medicine in general. But on the contrary, rather than discourage me, my experience in WISEST has heightened my interest in this career. Although gender issues in ophthalmology still remain unresolved, our study shows that there has, in fact, been improvement in the past few decades. Compared to studies in the past, women today are more readily accepted among doctors, residents and patients. In addition, opportunities are slowly beginning to be based on competency, rather than on gender. As growing numbers of women arise in the field of ophthalmology, fewer women of the future will be exposed to the gender bias and discrimination that conflict women today.

My time at the Royal Alexandra Hospital has been unforgettable. I have gained invaluable experience and have built lasting friendships with many WISEST participants, as well as with my supervisors. This experience has definitely influenced my future career decisions as I now have a growing admiration for ophthalmologists. With that, I know that the memories from this program will last a lifetime.

A Summer to Remember

When I received the phone call that I was accepted to the WISEST program, I ran outside to tell my family. I was nervous and not sure if I wanted to go, but once I thought about it I was ready for the challenge. When I walked into room E3-25, I was wondering what this summer had in store for me. I was nervous and excited at the same time. When the day was finally over and I met my supervisors (Dr. Faye Hicks and Jane Eaket), I was on my way to check out my room at Lister Hall. I finally moved everything in and my summer was about to begin. The first day at work I was so nervous, but everyone tried to make me feel at home and welcome. My project was on dam breaking. My assistant supervisor, Jane Eaket, had a tank already set up for the experiment. The experiment consisted of us filling half of the tank with water and when the water settled we would open up the gate that was in the middle of the tank. When the water rushed through we would tape it on a camera that we mounted over top of the tank. We did this a couple of times before we actually received good footage. Once we had our footage, I digitized the frames, there was one hundred frames but only thirty were to be digitized. I put the information into a database, then into a graph. This information is so that we can see if the computer models of dam breaking have the correct data. At work I spent a lot of time on my project but I also read books about it. In the picture above Jane is showing me the tank and telling me what the roles are of the instruments inside.

The Wednesday afternoon sessions were a lot more fun than I had anticipated. They were filled with fun activities, but yet they were also learning activities. The small group discussions and the visit to the lab were very helpful and informative. The social gatherings were fun too, like the picnic in the park. The visit to Comp Canada was a lot of fun, being able to actually use the technology instead of listening about it was a great idea.

When I first read about the poster project I thought that I was going to have a hard time with it, but my assistant supervisor was very beneficial and enlightening. The poster was actually kind of fun once I started.

I also would have to say that living at Lister is one of the experiences I will always carry with me. It taught me a lot about friends, life and about moving away from home. At first everyone was a little homesick but once we got past that, which did not take very long, we became good friends and had a lot of entertaining times. When I first met the girls I was a little shy not sure what to say, but when I got to know them I realized that they were the same as me, making the same decisions. Sometimes we would have deep discussions about life or sometimes we would just fool around and enjoy our time together. I will always remember the girls at Lister

and cherish the times we spent together. Our big sister was Sarah, she was fun to be around and she helped us a few times finding our way around Edmonton. She did a wonderful job of being a big sister.

I feel more confident now that I can do what ever I want and that I will be able to move away from home. This summer was one of the best summers I have ever had and I will always remember the experiences I had at work and at Lister. This summer will always be with me and I hope that I never forget what an awesome summer it really was. I would encourage everyone to attend this program, it is very informative but it is also very fun, I would also encourage them to live at Lister, because a lot of good memories and fun times were had there. I am sad to see my summer with WISEST come to an end, but I will always treasure the memories at work and at Lister.

SHANNON LUCHKA

My WISEST Experience

Sonia Kang

Ophthalmology is an extremely busy field. After six weeks of working at the Royal Alexandra Hospital in the department of ophthalmology, I know just how hectic it can be. Our average day was filled with visits to different clinics, hours of poring over research material in the library, and seemingly endless touchups to the web site. However, my time in the WISEST summer research program has not been all work, I have had a lot of fun as well.

My favorite experience during this program was the day I spent with Dr. Phillip's in her clinic. I learned a great deal about the eye that day, but more importantly I learned about interacting with patients and showing genuine interest in their health. Some other activities that I enjoyed were the visit to the ocular genetics lab, the day Sarah and I spent in the operating room, and the day we played with lasers. My visit to the space physics lab was also quite informative.

Our research project was to discover the role of gender in ophthalmology. I felt that this was a worthwhile project in that it allowed us to develop an insight into all of the different obstacles which women must face when trying to enter into the field of ophthalmology and into medicine in general. We were able to create a survey that was sent to current residents and graduates of the University of Alberta Department of Ophthalmology, and gained many distinct perspectives on the issue. Hopefully we will be able to send a copy of the survey to all ophthalmology residents across Canada.

The WISEST summer research program has enabled me to experience many things that I may never would have had the opportunity to experience on my own. I have seen and tried things that I will never forget. I have also realized that with a little work, you can accomplish anything.

WISEST, the MAD Lab, and Cantilevered Micropumps

By Stefanie Lee

The WISEST Summer Research Program has been a truly enriching experience for me, stemming from a wonderfully multifaceted program centering around the research lab but also consisting of opportunities extending beyond into university life, careers, and science in general.

First, about my research. For the last six weeks I have been working in the Department of Mechanical Engineering under the guidance of Dr. Bhattacharyya and Sandra Esteves, and physically in Electrical Engineering's MAD Lab, a perfect example of the interconnectedness of things it has been my chance to observe during my time here. For those who understandably may be a bit curious about the acronym, MAD Lab stands for Micromachining Applications and Development Lab, thus making this a place where we study, test, and develop tiny devices small enough to reside on computer chips.

The proper term for this is MEMS, or MicroElectroMechanical Systems (hence the interconnectedness thing), and they are used in a variety in sensing and actuating applications in the aerospace, automotive and biomedical areas. Implantable micropumps which are currently being developed will be able to deliver analgesics (pain killers) as part of a drug delivery system, eliminating the need for continuous insertion of needles, the pain of intravenous configurations, or the discomfort of external pumps. Currently used implantable pumps are a cumbersome 6 ounces (170g), measure one inch thick and three inches in diameter, and are surgically implanted in the abdomen.

This is where MEMS designs come in. These micropumps are thousands of times smaller and are intended to be located underneath the skin near a vein. One particular design uses cantilevers, minuscule platforms which behave like diving boards, to pump fluid down a channel. My project was to study their mechanical response and quantify their deflections, it first being necessary to know how these things behave under certain conditions. In a nutshell, what I did was focus a laser beam on the cantilever, pass current through the cantilever to make it bend, and then calculate the angle of deflection from the movement of the reflection of the laser beam. This is challenging and precise work that has

left me with a sense of accomplishment and much newly acquired knowledge of mechanics and electronics. I also had the chance to take part in academic meetings, give presentations, and experience firsthand collaborative problem solving in research.

This summer, despite no small reluctance on my part, is drawing to a close, and I reflect on all the things - including and extending beyond the research lab - that I have gained. I am now completely comfortable and familiar with the university setting, thanks to the tours, lab visits, and the sheer fact of being able to spend so much time on campus. I have gained much insight into careers in research in particular, and science and engineering in general. This has been a rare opportunity I am grateful for - a multitude of thanks goes out to WISEST, Dr. Bhattacharyya, Sandra Esteves, everyone at the MAD Lab for innumerable hours of help, and the Summer Career Placement Program for sponsoring this position.

My Job That Paid Me to Learn

I first found out about this program at school when my Chemistry teacher announced it to my class. All I remember was that it was summer job and you were going to get paid. (Money: the incentive). So I decided to try and of course, being able to learn about Engineering and working with a professor is great for my future. After getting everything filled and sent out, I never really though much of it.

Until one day, I received a call from Grace telling me I had been chosen to take part in WISEST. I was ecstatic. My first summer job!!!! After learning about how many other people applied, I felt honored and privileged to be part of this program. It was surely going to be one of those once in a lifetime opportunity.

Throughout the weeks before July 5, I wasn't sure what to expect. I just hoped that I wouldn't screw up whatever they told me to do.

Finally the day came and I was so nervous. Slowly as the day went by, I began to have a better understanding of what I would have to do. Of course, the poster that they briefed us on seemed somewhat difficult to do. I must admit, it wasn't as bad as I though it would be.

Near the end of that day, I got introduced to my head supervisor, Dr. Jingli Luo and her assistant Dr. Cui. Both Thulasy and I had the same head supervisor so we both got a brief tour of the lab that dealt with corrosion of metallic alloys. Thulasy wanted to do the research on fuel cells so Dr. Luo took her to a different lab. When Dr. Cui was first explaining to me all the uses of the different equipment and the purpose of different experiments, everything went straight over my head. I thought '*How will ever be able to understand this and be able to explain it to everyone else. I'm so dead.*'

For the first few days, I basically read textbooks that dealt with corrosion. I never knew there was so much to learn about corrosion and how in depth you can take this subject.

During my six weeks of work, I basically tested the corrosion of the metallic alloy, Al-Ni-Ti. By changing different factors of the experiment, it changed the amount of corrosion resistance the alloy had. First I changed the amount of Molybdenum in the alloy. I added 5%, 10% or 18% Mo. Next I changed the crystal structure of the alloy by heating it at different temperatures for a certain amount of time. The last thing I changed was the solution that corrodes the alloy. One solution had 0.2 moles of sodium chloride while the other one had 0.5 moles of sodium chloride.

The corrosion resistance of the alloy is tested by a machine where you connect three different electrodes to the machine. One is the alloy. Another is a piece of platinum wire because a current needs to run in a complete cycle. So the current goes through the alloy, through to solution, through the platinum wire and back into the machine. The last electrode is the reference electrode. It's something you can compare the alloy to.

The software that was used gives you data that can be plot on a graph. Some of my time was spent transferring the data from one computer to the next and graphing this information through Microsoft Excel.

That was basically my full six weeks. Most of time when different experiments were running, I got a chance to talk to different people about the faculty of engineering and the kinds of things they do in different areas of engineering. They gave be a much better idea of what engineering is really about.

For that, I would like to thank Grace, Renate, and Sandra for running such an awesome program and allowing me to be part of it. I will never forget this experience. Thank-you very much!!

Tania Tam

FUEL CELLS: ENERGY FOR THE FUTURE

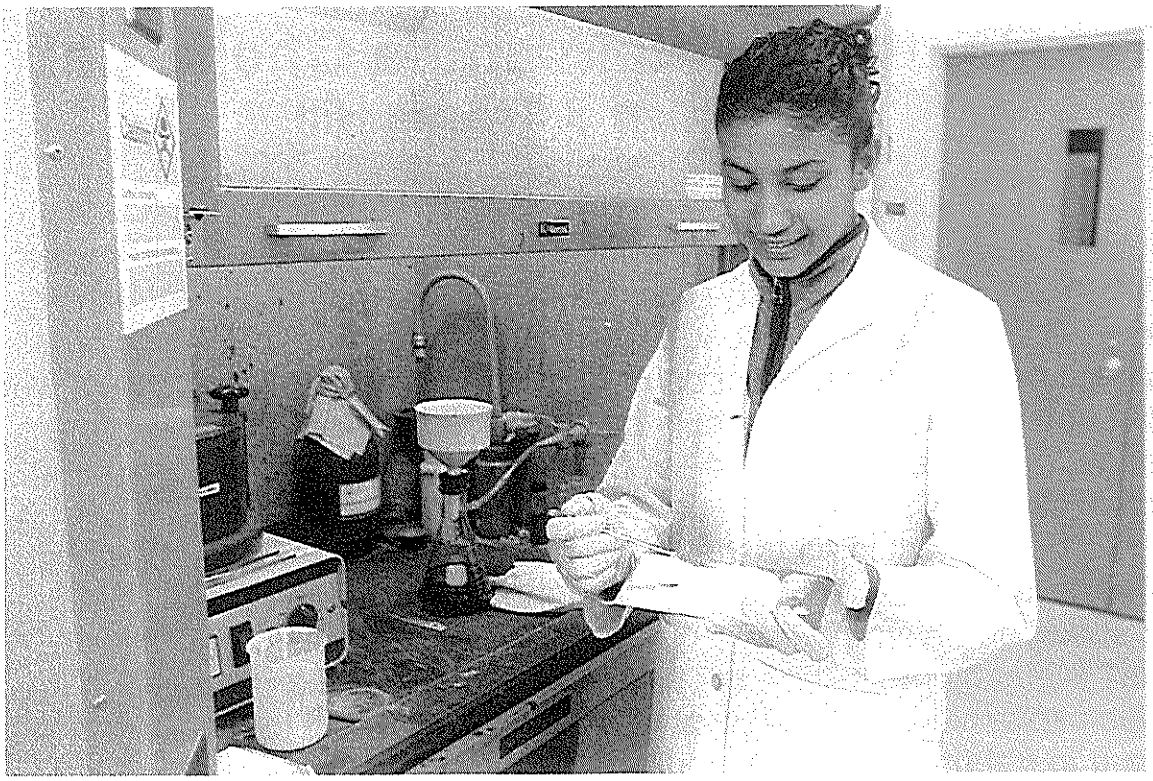
Thulasy Balasubramaniam

When I first began this program I had absolutely no idea what a fuel cell was and why they were important. When asked why I chose this project by my supervisor, I said I thought it would be interesting, and I was right. After reading some literature about fuel cells, I was in awe of the great benefits they will provide. In the future, fuel cells will run cars and won't produce harmful emissions, they will take toxic gases and use them to make more energy, and they will be able to use hydrogen as a fuel, just to name a few applications. Fuel cells will solve almost all the energy and pollution problems facing our world. After learning all of this, I was eager to begin my project. The following is an account of what I did this summer.

My research team was focussing on the development of solid oxide fuel cells. Fuel cells are similar to batteries except they don't need to be recharged. When supplied with a fuel, in our case H_2S gas, and an oxidant, usually oxygen or just air, the cell produces high-grade energy. An important component of the fuel cell is the electrolyte. In solid oxide fuel cells, the electrolyte is a solid, ceramic, proton conductor. My job was to find such electrolytes, make them, and investigate their structures.

During the first week of the program I read a lot of scientific literature. I researched various proton conductors and chose a few to make. I would mix two oxides together and add acetone, and then I would let the mixture dry on a heat plate under a fume hood. When it was almost dry, I placed the beaker in a drying oven, heated to approximately 120°C, for about 30 minutes. After that I put the powder in a crucible and heated it in a very hot oven (temperatures ranged from 550 °C to 1400 °C) for about 10 hours. After firing, the powder was ready to be pressed into thin pellets. These pellets were fired once again and electrodes were applied to its surfaces by my supervisor. The electrolyte was then ready to be tested in the fuel cell.

After making all the electrolytes, I was able to view them under a powerful microscope. It is important for the pellets to be smooth because coarse pellets are poor conductors. Using the microscope, I was able to see which pellets were smooth and which were not. Unfortunately, the pellets I had made using the press were brittle and coarse. After being tested these electrolytes also proved to be mediocre conductors. We came to the conclusion that pressing wasn't the best method for making pellets, so we tried a simple tape casting method. This process involves a gel



to be spread on a substrate layer by layer, so instead of making a powder, I made a thick paste. This process had not been perfected so soon it became tedious and frustrating; we decided to abandon the technique.

My supervisor came to the conclusion that the structure of the electrolytes may have also caused them to perform poorly. In theory, the electrolytes should have had a perovskite structure, so to test this, we used x-ray diffraction. The machine scanned a sample of powder and plotted a graph on the computer screen. We compared this graph to a standard to see whether we were successful in making a perovskite structure.

So that is what I did this summer. The research was really interesting and the people great to work with. Working in the labs and observing others gave me a taste of what chemical engineering has to offer. I was also able to visit Syncrude's research facilities here in Edmonton and tour their labs; it was interesting to see industry's take on engineering. The whole experience has left me well informed of careers, both within engineering and beyond, that I may decide to pursue in the future. I'm very grateful to have been involved in such a great program; it has been a memorable experience.

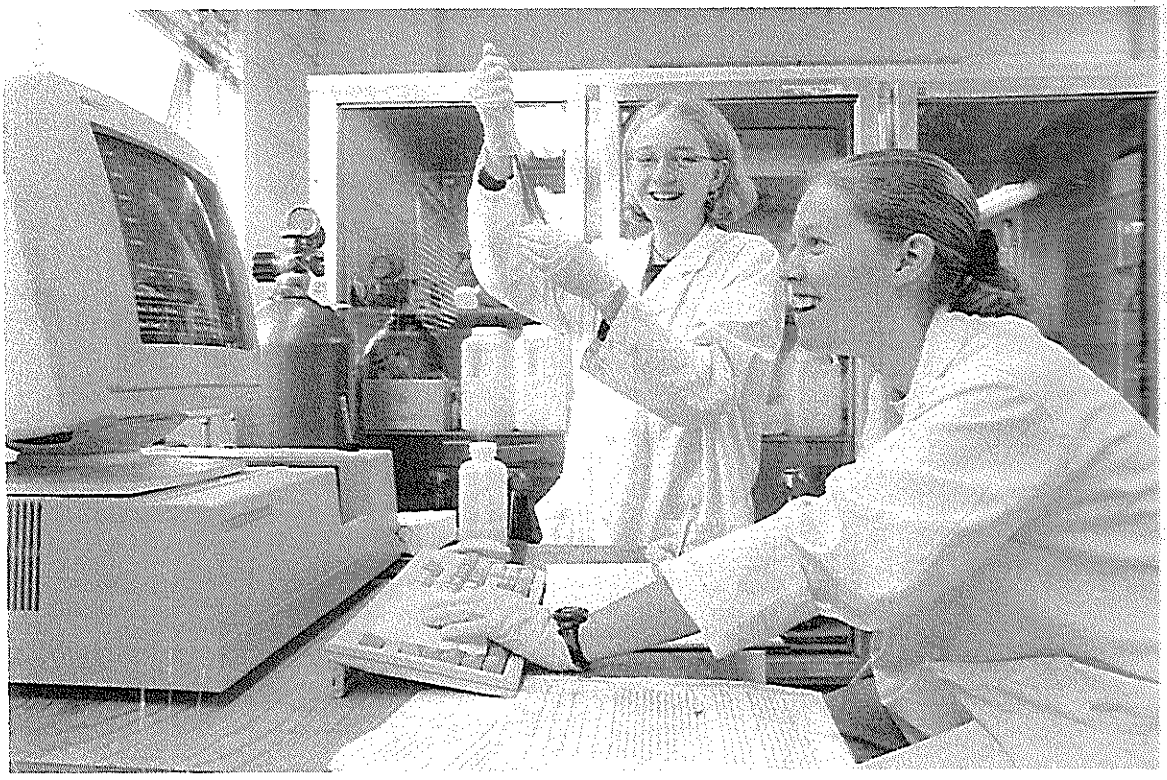
Two Girls, a Protein and a Chem. Lab

Kendra Marr & Treena Hill

When we first arrived at the lab, neither of us knew what was going on. As the project was being explained, we were so nervous that we went with the trusty "smile and nod" technique. Eventually, with the help of Dr. Loppnow, Ester Fraga and Adam Webb, we caught on to what was happening and the summer flew by. When we had nothing to do the others in the lab let us do their dirty work and made the lab really fun. We even got to play with liquid nitrogen and make slushy with dry ice.

Our project in a nutshell was extracting and purifying proteins: plastocyanin to be exact. First we started with poplar leaves. We got to spend some time outside picking leaves. Then came the messy part: blending and filtering. The blender leaked, which resulted in much splashing of green plant goo all over. We had to centrifuge the soup to get rid of the pulp, and cleaning the green plaster out of the centrifuge bottles was even messier than the blender. We added lots of acetone to our green "Kool-Aid", and watched as this yellow cloudy precipitate fell and stuck to the bottom. We took the precipitate and dissolved it in our previously made buffers and put that into dialysis bags. Tying the knots was a bit tricky. After a few days of long waiting, we centrifuged the brown mess and once again had to clean out the bottles. Next, we loaded it into the column, which we had prepared before, and waited and waited and waited. After a couple days of adding stronger buffers, we could finally see our protein by using the spectrophotometer (spec for those of us who don't like long words) and by adding potassium ferricyanide, which made it turn blue-green. We had to wait some more for it to concentrate and then we put it into the next column and you guessed it, waited! To pass the time, we distilled our used acetone and a couple of times had to sprint through the building because we had forgotten about it. Our protein was finally isolated after that column and it was a beautiful blue colour. We concentrated it again and stored our minuscule amount of plastocyanin in liquid nitrogen. It was kind of depressing only getting 3 ml of protein from 3.8 kg of leaves.

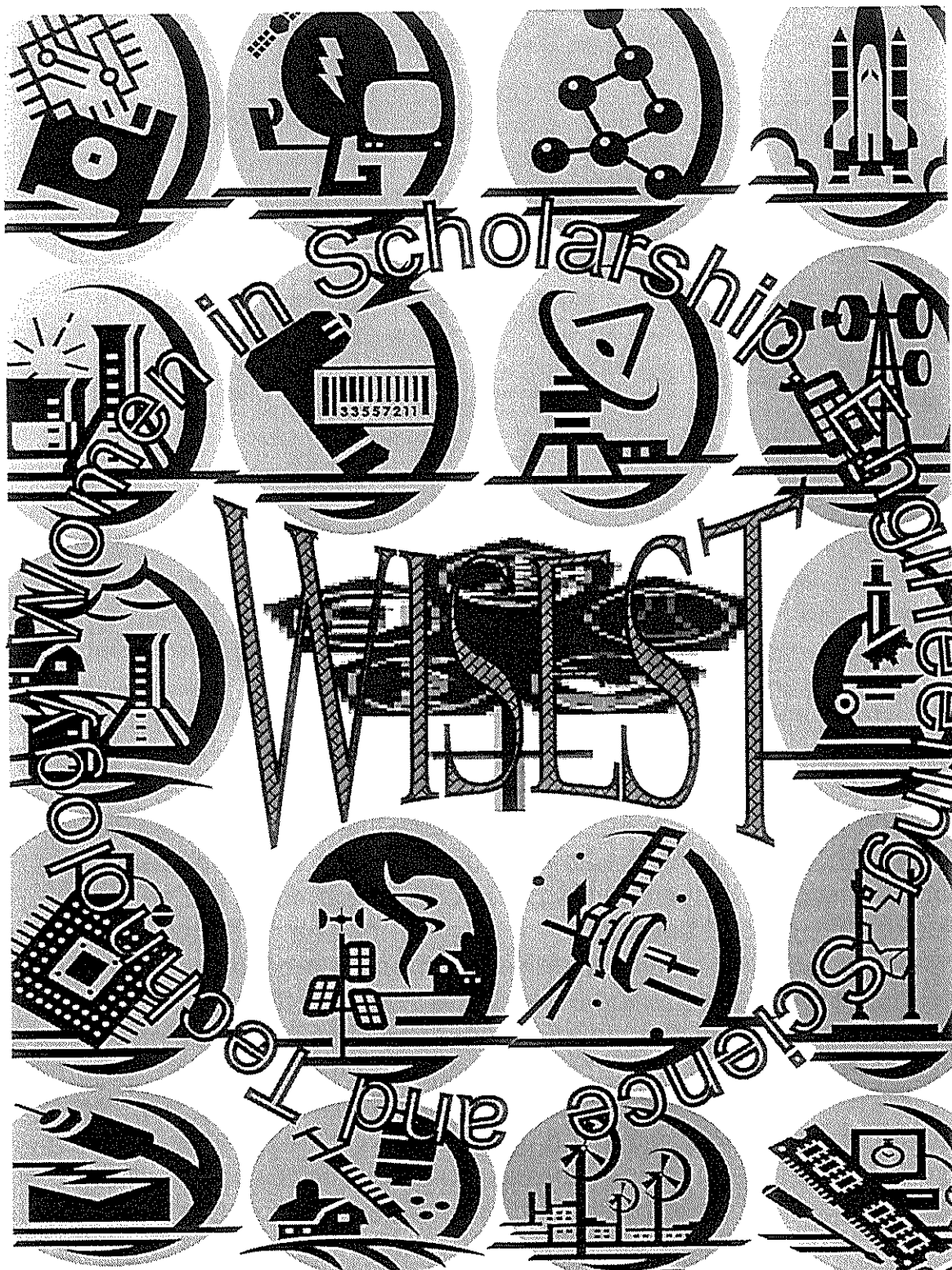
When we were close to being done the poplar leaves, we split up and one of us (Treena) did bean leaves and the other (Kendra) did



Kendra Marr, Treena Hill

bacteria and isolated azurin instead of plastocyanin. We still did a lot of work together whenever we weren't busy with our own projects. The bean leaves were almost exactly like the poplar leaves, with the only differences being the amount of leaves we used and the colour of the mixture. When cleaning the centrifuge bottles, the pellet looked like peanut butter instead of green plaster. The azurin project was much smellier. It involved killing the frozen bacteria (smelly), blending it up (smelly) and other steps similar to the poplar leaves until it finally didn't stink anymore. Treena's favourite saying was "It's not smelly, just don't breathe". Easier said than done!

The two of us had a really great time this summer, learning all about proteins. We had lots of good laughs; dropping glass rods and splashing distilled water everywhere. But we really had a great experience and we know that this was a summer that we will never forget. Thanks again to the fantastic people in our lab and the helpful WISEST co-ordinators.



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