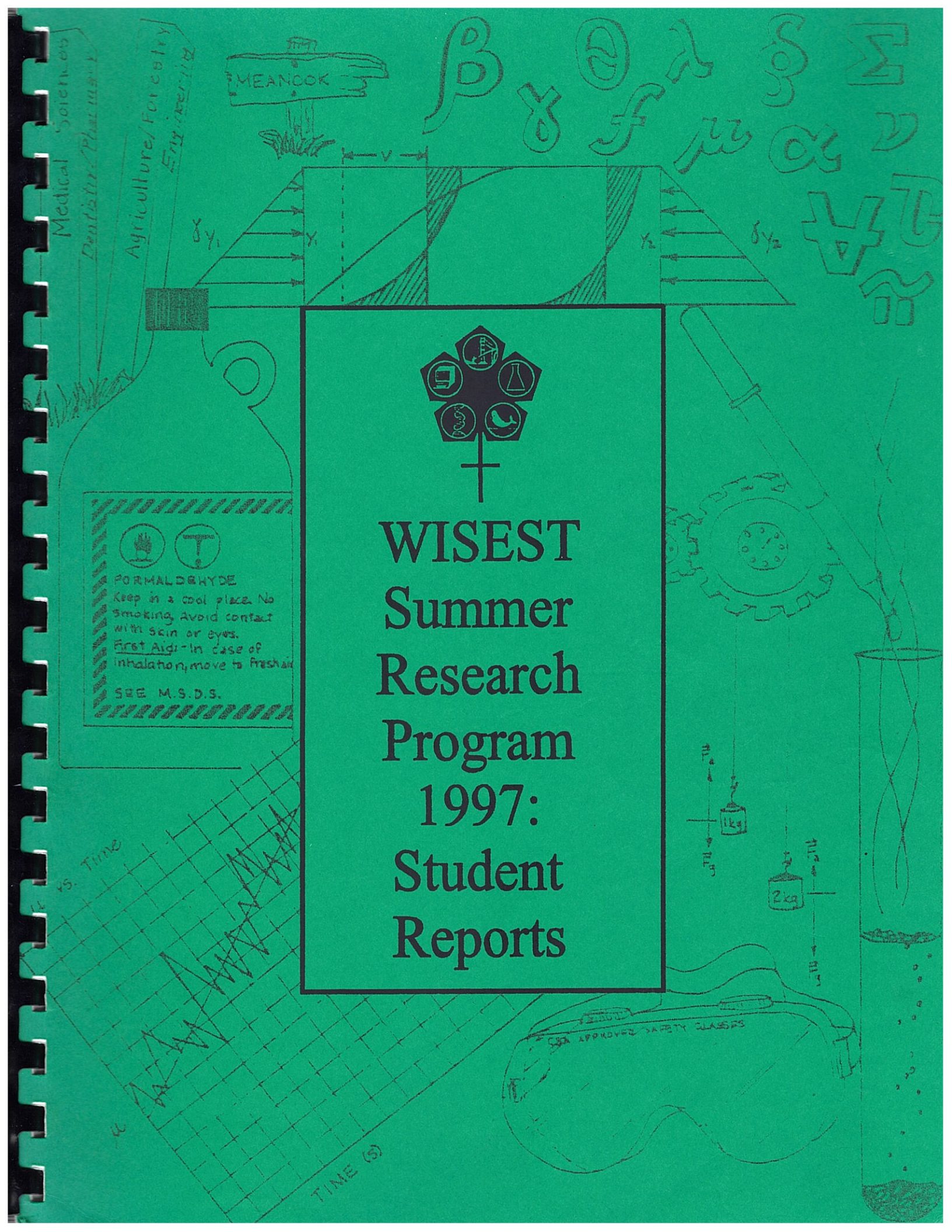
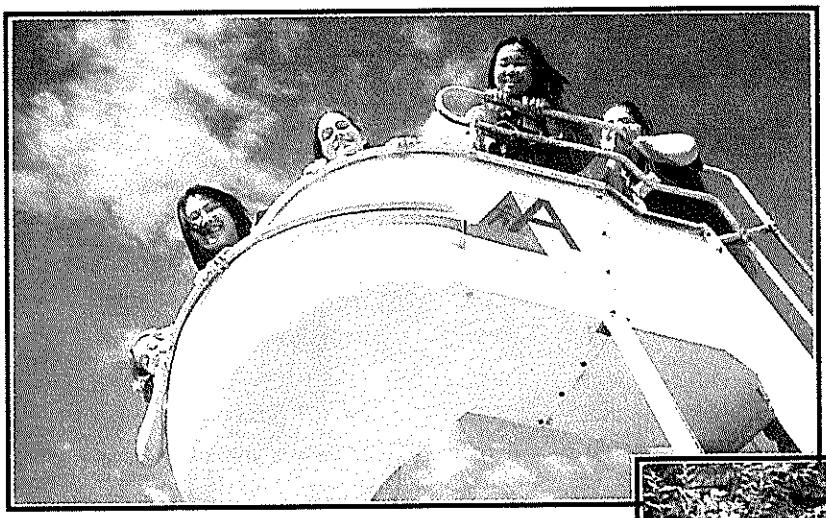


WISEST Summer Research Program 1997: Student Reports

WISEST

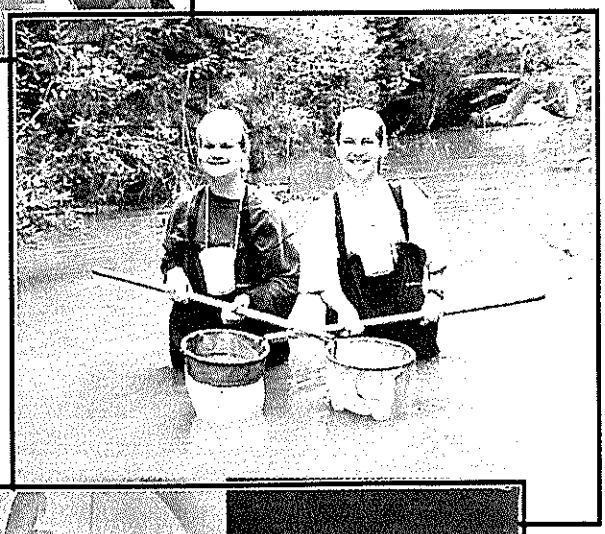
Women in Scholarship Engineering, Science and Technology

Summer Research Program
1997 Student Reports

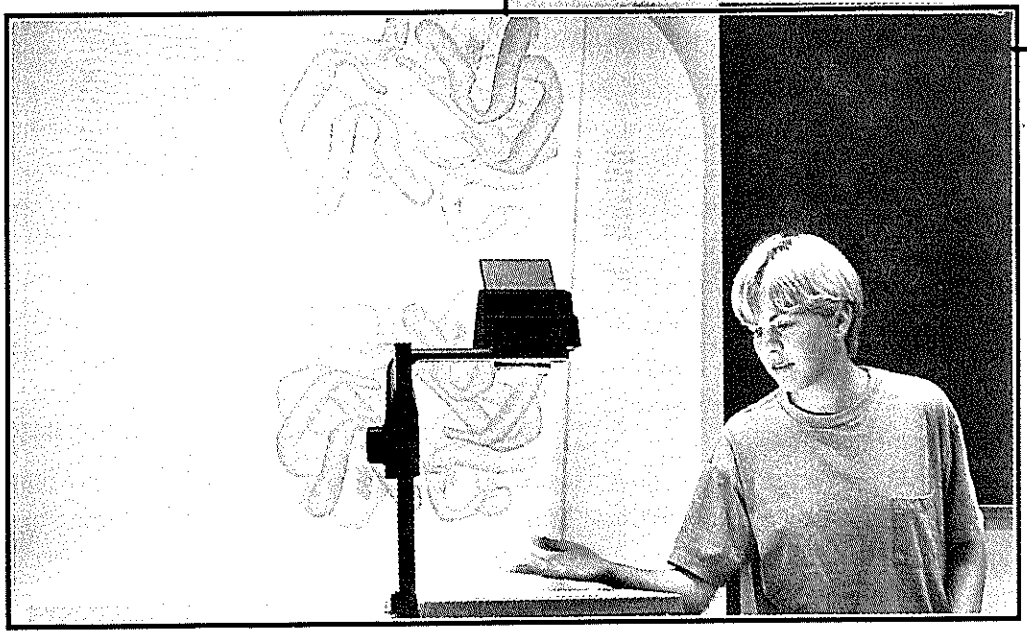


"I am very pleased I got the opportunity to be a part of this program. It has helped reconfirm my idea of a career in science. I learnt a lot about the different University degrees and I feel a lot closer to making a decision."

"This was one of the most beneficial programs that I have ever been a part of. It was a privilege."



"This was an amazing experience. I'm taking a lot away with me from this program. Thank you."



Front cover design by Katherine Leicht

Grace Ennis, Dr. Dorothy Tovell, Renate Pfiefer, Dr. Margaret-Ann Armour

The Summer Research Program is one of the initiatives of WISEST: Women in Scholarship, Engineering, Science and Technology. WISEST was the brainchild of the late J. Gordin Kaplan, the first Vice-President (Research) at the University of Alberta. The group was formed as a Task Force in 1982 and is now a standing committee of the Vice-President (Research).

It has a mandate to investigate the reasons why few young women are choosing careers in the sciences and engineering, to take action to change the situation, and to work to increase the percentage of women in decision making roles in all fields of scholarship. The current membership is thirty scientists, engineers, scholars, educators, and students from the University of Alberta, the Alberta Government, the school boards and the private sector.

In the summer program, which began in 1984, students from grade 11 spend six weeks during July and August working as members of research groups at the University of Alberta. The girls work in Science, Engineering, Agriculture, Forestry, Pharmacy and Pharmaceutical Sciences, Medicine and Oral Health Sciences, with boys working in Nursing, Agriculture, Forestry and Home Economics. From their responses to questionnaires at the end of the program, we know that the young people who participate find the experience broadens their knowledge of fields of research about which they had little awareness. Thus, it influences the choice of courses, which they will take at the university and of careers that they may pursue.

The teachers and school counselors are very supportive of the WISEST Summer Research Program: in making information available to their students, encouraging them to apply for positions, and in completing many teacher reference forms. We at WISEST recognize that the success of the program is very much dependent on the teachers' help in publicizing the program. We encourage all teachers to share this booklet with grade 11 students in their schools to help ensure continued participation.

This program would not be possible without the supervisors and their technicians, undergraduates and graduate students, and research associates. Their commitment of time in training, supervising and encouraging the students is invaluable. We are very pleased to add our thanks to those expressed by the students in their reports.

The program would also not be possible without financial contributions of our many supporters. In 1997, funding was received from: the Alberta Heritage Foundation for Medical Research, the Edmonton Glenora Rotary Club, the

Margaret-Ann Armour Fund for Rural WISEST Students, two anonymous donors, the Summer Career Placements Program of Human Resources Development Canada, the STEP (Summer Temporary Employment Program) of Alberta Advanced Education and Career Development, Syncrude Canada (Fort McMurray), Syncrude Canada (Edmonton Research Centre), Dow Chemical, Weyerhaeuser Canada Ltd., the Vice-President of Research at the University of Alberta, and the Faculties of Science, Engineering, Pharmacy and Pharmaceutical Sciences, and Medicine and Oral Health Sciences.

It was a busy six weeks for the students as they worked in their labs and took part in the Wednesday afternoon sessions and various optional social activities. This year's Wednesday afternoon sessions included a campus tour, an informal discussion with people who have chosen non-traditional careers, a tour of Celanese Canada Inc., a visit to another research lab at the University of Alberta, and presentations by the students of their work. For the final afternoon session, the students attended a luncheon with their supervisors as a way of acknowledging their supervisors' time and efforts. We would like to thank the numerous people whose participation made these sessions such good opportunities for learning.

A special effort was made to include students from outside the city in the WISEST program. Not only did the students work at the university, but they also experienced city life by living in Edmonton. Jennie Young, the "Big Sister" for these out of town students living at Lister Hall, was there to offer support, direction and at times, entertainment. Those out of town students who had alternate living arrangements were also included by the "Big Sister".

In addition, several social events were planned to give the students an opportunity to get to know one another better. These included: dinner at "Earl's" before attending a Shakespeare play in the Hawrelak Park Amphitheatre, an evening at the Edmonton Space Science Centre, an Open House tea for parents, friends and corporate sponsors, and a picnic after the tour of Celanese Canada Inc. Every Tuesday at noon, students were encouraged to bring their bag lunches for an informal gathering at the Students' Union Building. To help the students prepare for the presentations of their reports, sessions were given in "How to present a scientific report".

The WISEST team for the 1997 program was composed of four members: Dr. Margaret-Ann Armour, Dr. Dorothy Tovell, Grace Ennis and Renate Pfeifer. Margaret-Ann Armour (Vice-Chair WISEST) and Dorothy Tovell (WISEST Co-ordinator) were available to provide wisdom, insight and advice, when needed, to Grace and Renate as they administered the program.

Each year a booklet, such as this, about the WISEST Summer Research Program is made available to students, teachers, supervisors, sponsors and other people who express an interest in learning about the Summer Research Program. To this booklet the students have submitted their final reports which describe their work in the research labs and have contributed pictures and summaries of the various activities which were sponsored by WISEST during the program. 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. Katherine Leicht's artistic submission for the booklet cover was chosen from many creative entries to the "Cover Design Contest".

We have been fortunate also over the years to have the services of Paul Dolphin, who has helped record with photographs the people and activities of the program. His competent assistance in the production of this booklet is greatly appreciated.

We have very much enjoyed getting to know all of the young women and men who spent the summer exploring non-traditional fields such as science, engineering and nursing. We were happy to have all of you in the program, and strongly encourage you to tell your friends and schoolmates about your experiences. We wish you the very best as you pursue your education and work towards fulfilling careers.

Grace Ennis and Renate Pfeifer
(WISEST Program Administrators)

Many thanks
to the following supporters
for their financial contributions to the
WISEST Summer Research Program 1997

Alberta Heritage Foundation for Medical Research

Edmonton Glenora Rotary Club

Margaret-Ann Armour Fund for Rural WISEST Students

Syncrude Canada (Edmonton Research Centre)

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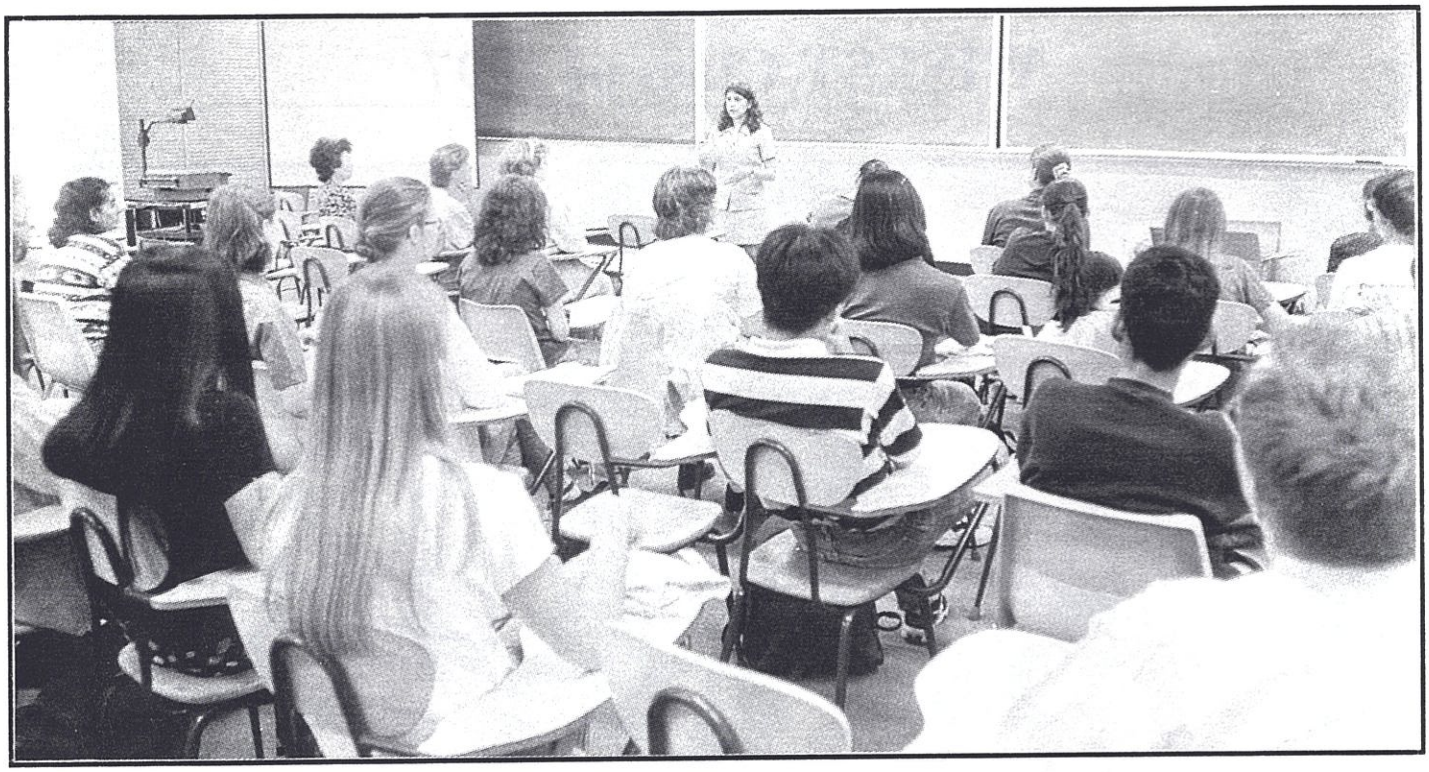
Two Anonymous Donors

WISEST Class of 1997



"July 3: The Beginning of A Meaningful Summer"

"The Opening Session – Who Are All These People?"

"July 3rd was a very important day for me and for at least forty-nine other people, because it was the first day of six weeks that would bear heavily upon my summer, and possibly, upon my more distant future.

We settled into Chemistry E3-25, some more nervous than others, glancing at each other's name tags and asking each other what we knew about our projects so far. As for me, I fortunately found someone that I knew among the unfamiliar faces, which boosted my spirits considerably. Speaking of faces, I was also finally able to put faces to Renate Pfeifer and Grace Ennis, who I'd only known through the phone and the mail....." (Andrea Macyk)

"....Among the fifty WISEST participants present on Thursday, forty-eight of them were females and only two were males. This was certainly not a tremendously surprising scene; the two guys and the forty-eight girls probably would have expected this type of setup. But anyway, the fifty youths, presumably were strangers to each other, did not appear to be strangers to each other at all; in the conference room where the youths met, there was definitely talking going on. It would undoubtedly be the case that socialization among the youths was to be a huge factor in giving the students a meaningful summer....." (William Chan)

"....What followed was a morning of inspirational talks given by Drs. Armour and Tovell, and a discussion of the program and its requirements given by Grace and Renate. I think there was moment of panic when we found out about the oral presentations we would have to give in August, but otherwise, everything went smoothly.

As Renate and Grace took us through our folder of sheets, I underwent a subtle rite of passage—filling out my first tax form. Welcome to the world of work. After some more paperwork, we adjourned for lunch in HUB, our heads spinning with information...." (Andrea Macyk)

"....Lunchtime came before we knew it, and most of us had our first taco salads. By this time, some of the unfamiliar faces were no longer strangers. Talk and conversations filled the room as we anticipated going to our separate working stations. Two hours were later dedicated to a safety course, reminding us of our responsibilities for the following weeks. At the end of the day, we met the people we were working with and we were whisked off to our labs. We had survived the first day and it was not as terrifying as we thought it would be. Phew!!" (Sheryl Fajayan)

"University of Alberta Campus Tour"

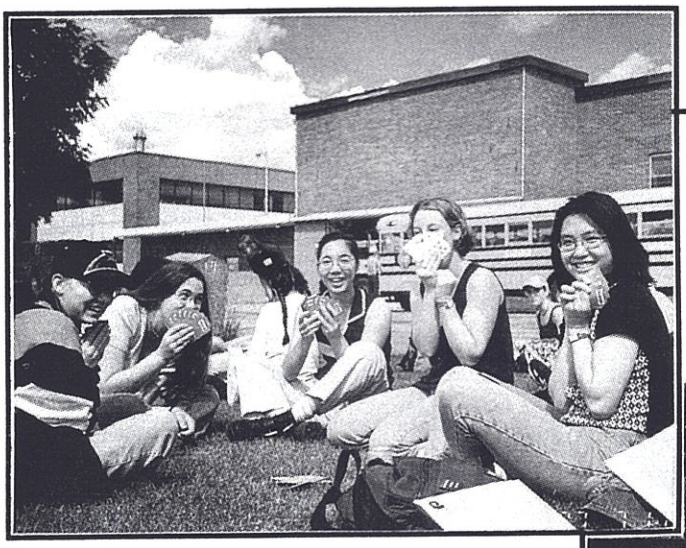
"Before the campus tour, how many places around the campus was I familiar with? Let's see, I knew the Central Academic Building (CAB) because that was where we had to meet on our first day. I knew the HUB Mall because that's where we would eat (very important to know where to get the best snacks), and I knew the building where I worked (also very important)...." (Sheryl Fajayan)

"As I walk down the path on the quad heading towards SUB, I am somewhat distressed as to whether or not I will be able to find the Peace Dove statue, the designated meeting place, which is located by the Administration Building. Luckily, I find it without too much trouble; although, it is hard for me to see how it can be called a dove. I am greeted by the WISEST coordinators and the other WISEST students. After putting on our name tags (a Wednesday ritual), we split up into smaller groups and begin the campus tour...." (Alanna Ward)

"....So I didn't know too many places around the university, so it was a very good thing that we had that campus tour. Besides looking at all the different buildings, we saw the scary lecture theatres where I will be sitting with about a hundred other students one day, the Van Vliet Physical Education & Recreational Centre and the incredibly stuffy Greenhouse. We also learned about a lost python that may still be calling the university his comfortable home and why the Butterdome is yellow...." (Sheryl Fajayan)

"....The tour guide takes us out the back door of the lecture hall and we come across the spectacular Earth Sciences Building and learn something very interesting: the building walls are not like mirrors in a bathroom, but like one-way mirrors! (Some of the girls' mouths hang open in disbelief as they recall using it as a mirror to primp their hair or to touch up lipstick; the rest of us have a friendly laugh at their expense). Our tour guide tells us that psychology students use the building to study human nature towards the 'mirrors'! "Every move you make, every breath you take, I'll be watching you", to quote an old eighties song, sounds like a good catch phrase for that building. I think I'll try to avoid walking past it as much as possible!....

....Coming from one of the smallest high schools in Edmonton, J.H. Picard, the U of A campus is quite overwhelming at first. After completing the campus tour, and beginning to familiarize myself with the U of A, I feel much more comfortable with the campus now." (Alanna Ward)



"Mission Possible: Celanese Canada"

"On Wednesday, July 16, 1997, at 12:30 p.m., a group of unidentified teenagers (about 17 years of age) gathered outside the Stadium Car Park at the University of Alberta with an unknown purpose. This group of fully prepared individuals carried an enthusiastic and confident look on their faces. Despite the sunny and warm weather, they stood patiently under the blinding rays of the sun, occasionally talking among themselves. By their appearances, this group of youths was definitely on a mission: a mission possible.

Approximately 46 minutes and 28.259 seconds past the noon hour(I am guessing!), Two large yellow school buses arrived on the scene. The teenagers got on the buses in two groups, and departed. Their destination was Celanese Canada Inc., a German-based chemical company located in north Edmonton. Their mission was to learn.

Upon arrival, the youths were taken inside a facility where they received information on the various chemicals produced by this chemical company with a name not usually recognized by the ordinary person. They were told of the processes and the required raw materials of which the chemicals were made. They were also given video presentations on the facts about Celanese Canada, and basic information about chemistry. Numerous names of chemical compounds were mentioned in the presentation: acetic acid, cellulose acetate tow, methanol, vinyl acetate, formaldehyde, etc. The types of products that could be derived from such compounds include dyes, fibres, and even explosives (from pentaerythritol).

In addition to the presentation, they were taken on an expedition to examine the different plants where production occurred , one of them being the methanol unit. They were also told how raw materials were made into their repective products and how the waste and/or excess materials were disposed of (e.g.effluent) or recovered for later use (e.g. hydrogen). They were taken to one of the control centres where the monitoring of the production was fdone with the help of computers.

Part one of their mission was completed successfully at approximately 3:30 p.m.

Between 3:30 p.m. and 4:00 p.m., the teenagers departed Celanese Canada and headed south, their destination being Rundle park. The mission was to eat, as a picnic was held for this group of teenagers. The youths found themselves a perfect spot for picnicking after a brief search and began enjoying this part of their mission. In the absence of hesitation, they ingested the delicious food that was laid on the picnic tables in abundance. This part of the mission proceeded not as smoothly for food and plastic cups were lifted into the air by strong wind that blew continuously during the late afternoon. Nonetheless, smiles appeared across people's faces as they ate with pleasure and talked happily among themselves. The picnic lasted for more than one hour; when it was over, the youths collected themselves, ready to return to the university.

At approximately 6:00 p.m., the two large yellow school buses returned to the Stadium Car Park at the University of Alberta, carrying the 40+ teenagers. A slight sign of fatigue was shown on the faces of some youths, though a more important observation was that everyone was able to fulfill the mission: a mission possible." (William Chan)

"Visit to Medical Microbiology"

"On July 30, all the students participating in WISEST were given the opportunity to broaden their summer experience by visiting another lab of their choice on the campus. I, along with four other students, chose to visit Medical Microbiology.

While we did get to take a look around our tour guide's lab bench, most of our time was spent in a theoretical discussion, mostly about DNA: the work that had been done with it in the past, and the work that is being done now. Some of the knowledge I gained at this session has already proved useful, when some grad students I work with were discussing a course, and I understood what they were talking about!

This discussion covered all the bases, and Craig added humor by relating the knowledge gained and processes used to real situations, for example, how we know that O.J. really did it.

However, the talk was not restricted only to what goes on in the lab. We heard about the big picture, the degrees available, and the process of working on a Ph.D., and the pros and cons of a career in academia, versus private industry.

It was great to see more than just the lab I was working in, and it was an interesting afternoon in Medical Microbiology. A big thank-you to Craig for making the tour both interesting and entertaining." (Erin O'Dea)

"Hanging out in Zoology"

"....I was assigned to the zoology tour, which was guided by Dr. Paszkowski....As well, tagging along was the photographer. As if one picture of me was not enough! After a brief period of wondering "where do we go?", we finally met up with Dr. Paszkowski. Since most of the work in zoology is done outside of the lab, she decided to show us relevant areas in the zoology wing. The bulk of the tour was spent at the research museum. For most of us, we had already seen this through the campus tours. One new place was the cooler, which she allowed us to enter; it contained bones of different mammals. The smell was awful! As you left, you had this strange taste in your mouth. At the museum, she distinguished that the purpose of this museum was for research, not for display. She also showed us numerous samples of different types of specimens available. The specimens themselves can date back to the early 1900s, the majority coming from Alberta. We then continued into the fish section of the museum. She then led us to the aquarium where research was done. Currently at her lab, one of her graduate students was looking at the effect that lakes formed from pits, made by drilling of oil, affected fathead minnows because of resilient hallo-carbons that remained. Dr. Paszkowski said that more research was being done on fish because of economic reasons and that it was less cruel since fish are lower than mammals in the whole spectrum of life. We then ended our tour with Dr. Paszkowski saying some closing words about the opportunities available under Biological Sciences and how to pursue further studies after obtaining an undergraduate degree. On the whole, it was a very informative experience." (Tiffany Marr)

"Visit to the Cardiology Lab"

"I loved the lab I got to visit! Sure, I took biology, but fetal pigs differ more than slightly from the 40 kilo monsters that were squealing the morning we walked into the Surgical-Medical Research lab. Not just cute pig squeals either – these were decibels above that. I guess they don't like shots much. Half an hour later, we filed into the operating room where a pig was being laid out on the table. His belly was scrubbed and the gas mask put on. Not long after that, they started to cut him open. They don't use a knife, they use a little electric tool that has a bad habit of jabbing nerves and making the pig jump. We got to watch two such pigs be cut open to have their livers removed. It's incredible that it can be done so quickly and easily. The livers were being used to further an effort to find prolonged preservation techniques for organ transplantation. It was really exciting to realize that something we think so little of, like pigs, can be so helpful in finding new ways to save lives." (Adrienne Grove)

"A few of us visited the Cardiology Lab in the Medical Sciences building.... Dr. Kavanagh and Dr. Jones were both cardiologists, and Isabella, former WISEST student, was their summer worker. The lab was literally filled up with machines, devices and *gasp* - scissors and scalpels!! Interesting looking stuff... Dr. Jones told us about atrial fibrillation, an abnormal heart rhythm that happens before a blood clot. She showed us other neat stuff, like the new kind of pacemakers, and some clockface electrodes to fire electrical impulses to the heart. Dr. Kavanagh answered most of our multitude of questions, including how long would university take to reach her career goal, she told us about 14 years of university and training was about right...wowsers! Yet I find this career definitely worth considering, and I'd like to thank Dr. Jones, Dr. Kavanagh and Isabella for the interesting and educational tour." (Elaine Gan)

"People in Non-traditional Careers"
"Learning through Experience"

"The objective of WISEST is to broaden a student's mind, thus allowing them to see all of the opportunities available to them in the sciences. This objective was further obtained through the small group sessions held during Wednesday, July 23. The purpose of the group sessions was allowing WISEST participants to hear speakers talking about their job, their life, and basically informing us on the realities of pursuing a career in the sciences. Students and speakers were divided up into small groups. In my group, the speakers included Faye Hicks (professor –civil engineer), Janet Robertson (professor – medical microbiology and immunology), Teresa MacDonald (biologist/paleontology), and Michelle Arnot (graduate student –pharmacology). They openly talked about their life and careers. The smaller group atmosphere allowed for questions to be thoroughly discussed and the perfect opportunity to dispel any biases or probing thoughts. They all stressed the importance of scholarships and that they were there, you just have to find them. They were also women who faced many curves in their paths, but in the end, found the path they wanted. It was great to hear because I currently only have a vague idea of what I want to do. Today really helped me because it gave an opportunity to listen to other women's experiences and what they had to face to get them there." (Tiffany Marr)

"I was really looking forward to meeting the people in non-traditional careers. These women talked about what their life and career was like, which gave everyone within our small group a chance to get some ideas about different career opportunities and choices. All of the speakers in our group had started out wanting to go into Medicine but surprisingly, three quarters of them switched career goals! One speaker specialized in Chemistry and Science Education, she told us about balancing her work and having a family, that it's possible but challenging. Another speaker that specialized in Immunology and Pharmacology, still had time to play sports and have a social life. One speaker was even a former WISEST student, who was specializing in academic Medicine. They've accomplished so much in their science careers. Wow, it's like they're far high up a mountain few have dared to climb. These role modes have truly inspired me to climb that mountain." (Elaine Gan)

"My group consisted of the following speakers, Rene Plziehn, Karen McDonald, and Bill Leddy and the discussion leader was Grace Ennis. I really enjoyed this small group discussion, because it gave me a chance to learn what it will be like going to university, and having a career in science. When going to university, they recommended taking a break

between the first and second degree, not before completing a Ph.D. Rene Polziehn recommended that we do a Ph.D. and skip doing a masters degree, since most people, when doing their masters degree, put in a level of work equal to the amount to complete a Ph.D. She also said when you are finished all of your degrees, and if you are still undecided and you need work experience, to do post-doctorate degrees. One of the interesting things discussed was the topic of having children and staying home to raise them. Both the women speakers in the group felt that leaving the field even for one year would require additional training and teaching to get back up to date. According to Karen McDonald, not all attitudes have changed concerning women in the science work force, she still feels discrimination from some of the senior men. On the flip side, Bill Leddy also felt a lot of discrimination from his friends when he chose the non-traditional career as a nurse. However, in general most attitudes have changed and society is more willing to accept both sexes in all kinds of jobs...."(Michelle Vigeant)

"Shakespeare in the Park" *"Twelfth Night"*

"As I wait at the traffic lights, I am able to descry a group of WISEST girls at the on-campus Earl's. My stomach is growling: I'm hungry after a hard day's work at a U of A research lab! I arrive near the entrance of the restaurant and chat with the group while we wait for the other girls to arrive. Eight WISEST girls show up for supper at Earl's: the supper is great, but there's no time for dessert because we're running late for Shakespeare in the Park!

We have to power walk to get to Hawrelak Park in time for the play, *Twelfth Night*. On the walk over, as we near the park, it begins to sprinkle lightly, but fortunately it stops. A light, cool breeze makes the leaves in trees tremble. The conditions are perfect for the play....." (Alanna Ward)

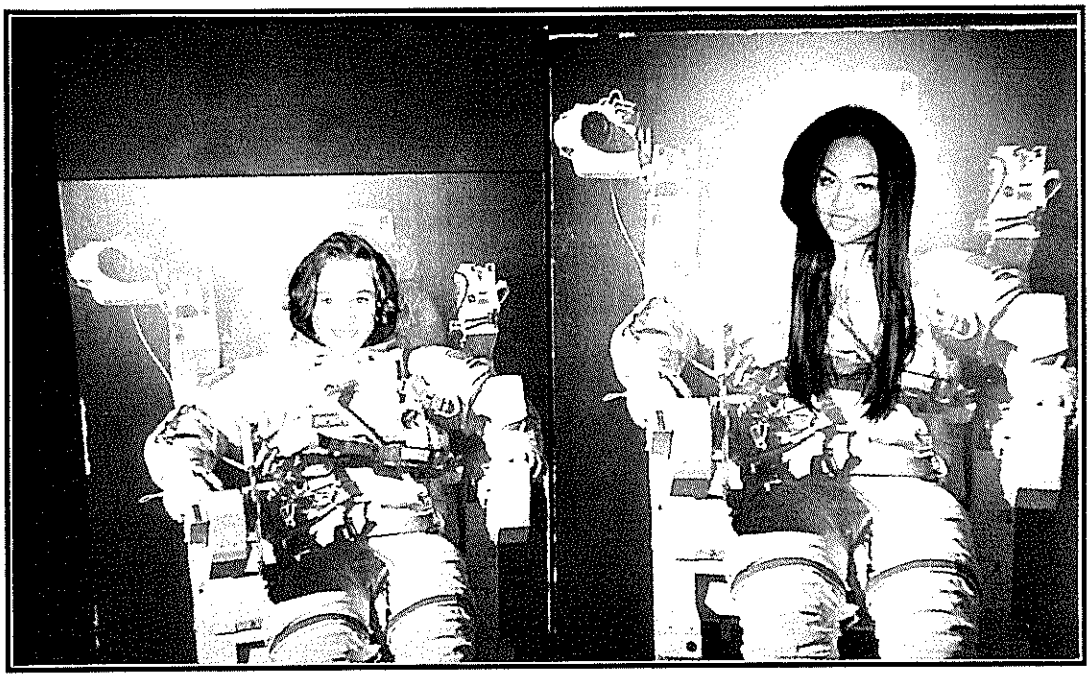
"....When we got to the Heritage Amphitheatre in Hawrelak park, we were very impressed – reserved seats, just for us! They were in the front row, and had nice little signs on each seat saying "Reserved for WISEST". We felt very special.

The Free Will Players put on " Shakespeare in the Park". Their goal is to make the works of Shakespeare accessible to a wide variety of audiences....

The play we saw was Twelfth Night, one of Shakespeare's comedies. As such, it involved a lot of switching names, costumes ... even genders! The results, of course, are hilarious. And this certainly was a crazed version of an already wacky play. It involved a lot of shouting, singing, and running up and down the aisles by cast members. A very light-hearted approach – and it worked very well...." (Anne Ferry)

".... Although the plot is somewhat complex and Shakespearean language is flowing rapidly from the actors' mouths, once I get into the mind set of the play, I greatly enjoy it. While the play is going on, a little visitor unexpectedly shows up on stage. Fortunately, the cute, tiny squirrel does not get in the way and soon scampers off, and disappears into the lush, green foliage that surrounds the Amphitheatre. The fact that the weather is perfect and that no mosquitoes are around makes the experience all the better. What makes this interpretation of *Twelfth Night* especially memorable is the deviation from the exact lines of the play, the comedic timing and the humorous quips and costumes (i.e. Malvolio in his outrageous yellow attire!). All in all, I find the Free Will Players' production of Shakespeare's *Twelfth Night* to be professional, hilarious and highly enjoyable....

....Apart from being a great play, this outing is also a good opportunity to socialize with the other WISEST girls." (Alanna Ward)



"A Hard Day's Night"

"Trip to the Space & Sciences Centre"

"Studies in science can relate to all of us. It involves everything: human beings, animals, the planet, the universe and even the places that are yet to be discovered. During our trip to the Space & Sciences Centre, we were able to get more knowledge about the universe and relationships with mirrors (their special feature during the time) from their galleries. But besides being educational, the whole experience was entertaining...." (Sheryl Fajayan)

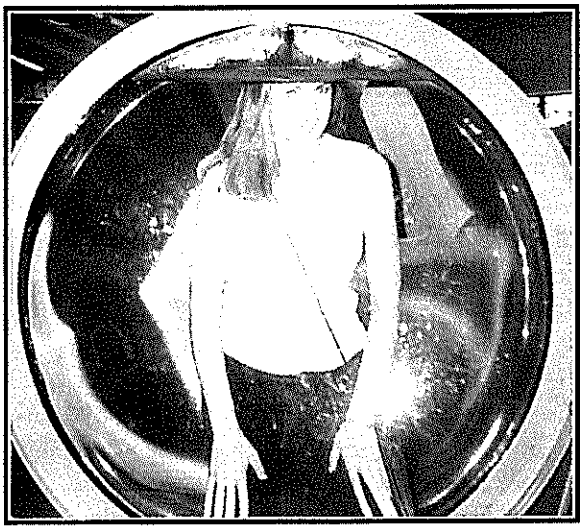
"....After we ate our hearty dinner (which consisted mainly of junk food), we proceeded to the gift shop, where there was all kinds of neat stuff, including space food, sea monkeys, and *Star Trek* action figures which had little resemblance to their human counterparts. Following that, we played around with all the try it yourself 'experiments' which were mostly things that fooled your eyes into thinking something was happening when it really was not. It was very interesting when we watched others seemingly 'float' in mid-air...." (Elena Liew)

"....A few of us tried our luck in a maze filled with mirrors. I recall several occasions where I slammed face first into a mirror, thinking it was an exit. Eventually, I made it through the house. Ahh...the things we do for science...." (Sheryl Fajayan)

"....After viewing the gallery exhibits, Renate and Jenny decided to get their singing voices ready for the Beatles Anthology laser show. What followed next was a WISEST performance featuring the best female singers in Alberta! Well....it didn't exactly rival *Lilith Fair*, but we all had fun singing along to the Beatles. As Paul, John, George and Ringo sang (loud enough to cover us up), images created by lasers danced above us on the huge dome. Later, we had an invitation to view how the laser show was created. The woman operating the laser showed us how one little dot on the domed screen can be transformed using mirrors and other gadgetry into endless unique and interesting patterns. Laser animation used during the show was not made this way, but was created in Seattle. We were all interested in what requirements were needed to operate the laser beam (a background in science and music). We all had a great time, the show was amazing, and I'm sure there'll be a surplus of laser-operators in the near future!" (Nicole Pfeifer)

"... Later I was able to view a film in the Imax Theatre, along with Mac. This film is for all of the UFO enthusiasts out there. There were seemingly valid information dealing with other people's experiences and the Roswell incident and therefore gained new insight to the very controversial topic. Frankly, until I see one with my own eyes, I do not believe in UFOs visiting our planet.

My favourite part of the field trip was the mirrors, more commonly recognized as 'funhouse' mirrors. Why was it my favourite? Well, one mirror in particular, gave the illusion that I was about six feet tall. One of my dreams is to be a little bit taller so for about 30 seconds, I had my wish – sort of." (Sheryl Fajayan)



"Life at Meanook Biological Research Station"

"The first dreaded minutes when we arrived at Meanook were stressful. Our thoughts went to friends we would not see for weeks, and even then, only for a few days. There were no shopping malls for miles, movie theaters or many vehicles (with the exception of the lovely yellow ones from the U of A). Yup, we were at Meanook.

This soon ended. The experience of Meanook came in four basic groupings. The first of terror, the second of tolerance. We went to bed early, behaved ourselves and worked hard. Next came enjoyment as we stayed up later and realized that sleeping can truly be a waste of precious time. Finally came the part when we realized that those six weeks had just whizzed by and it was time to go home, and the shock of realizing, that yes, you would miss Meanook.

Meanook was a unique experience. It is a place that people are drawn to from all over the world. From Guyana, to Hungary, to the United States, people came and went, but there were also those who stayed around. These were the people we got to know, and yes maybe even love. These are the people who prayed for summer jobs at Meanook , even if it meant leaving their friends behind, and these were the people who lived up at Meanook all year, just to get that summer camp feeling. These were researchers.

Now, before this gets too bad, I want you to realize that Meanook was not this horrid place we are trying to trick you to coming to, but it was not a utopian paradise either. It was a great experience, and although we can't place our finger quite what on, it will help us.

Now it isn't the fact that I can measure fish in 30 seconds flat, or make slides of tiny fish ear bones. I don't think in the future the skill of measuring frogs, labeling or taking chlorophyll tests will help me much. It was not the actual skills we learned here that will help us.

What we learned was how to fit in, and that even though we're 6 years younger, we can be peoples' equals. We learned what research was, through the monotonous and tedious experiments to the afternoons off at the lake because it was just too hot to work.

Meanook also gave the unique opportunity to make really good friends. Now I know that sounds corny, but it is true. I don't know if it is the ethanol in the water or the fact that we lived together, but Meanook allowed us to get to know people better than we knew most of our friends.

In general, it was a great experience. From the kitchen chores, to the barbecue, late nights plotting and talking to science students and asking why they went into their area, Meanook allowed us to see both lab work, field study, and emerged us into a science community. One last word of advice to any future WISEST Meanook students, don't let anyone boss you around and make sure they know who the WISEST one is." (Candace Rypien)

"Our Summer at Meanook (an ode)"

By Kathryn Herman, Candace Rypien,
Laura Van Veen and Thea Chibuk

Four High school students came to visit Meanook.
Brainy, shy, quiet students at the first look.
There were some common threads that were tied to them all.
They were gorgeous and brilliant, and a couple were tall.
Outstanding at basketball, cooking and bull—it.
When fogies lost to them they planned the next hit.
Thea was the target that they took out.
But the students became stronger without a doubt.
Late one night the students began to plan,
Their secret idea was to eliminate Dan.
(Ignore that last line.
Everything's really just fine!)
At two in the morning, the students crossed the field.
With millions of tape labels they had to yield.
The rest is history that Meanook knows very well.
Maybe some day our story they'll tell.
Laura enjoyed the sport of floating on logs.
Thea, she just adored those really cute frogs!
Kathryn enjoyed the barbecue too much we fear.
And Candace, well, that's all we'll say here.
Greg had a dish fetish and kept doing MY jobs.
The rest of the fish crew were a couple of knobs.
(Sorry, they're nice, but we needed a rhyme,
and it's late and we're tired and running out of time.)
the lab people, they worked really hard,
and if you don't believe that, you're a retard.
We'd like also to thank Mary, Karin, and Kathleen,
For tolerating us and not being too mean.
As for us WISEST students, they thought we'd never sleep,
We're really not students, beep beep, I'm a jeep!
As for the lessons we learned during our stay,
Egg beater, Tango and waking up early every day.
Meanook won't forget us or the things that we did.
Even though now, of us they are rid.
On a serious note, we'd just like to say,
It was really fun, and we'll be back some day!

My "Babysitting" Experience

"As the Big Sister for four hyperactive teenagers in Lister Hall this summer, I lost all my hair, lots of brain cells, and half my body weight. Requiring my constant supervision, I got no sleep whatsoever but still attended to them cheerfully. I strictly enforced their eight o'clock curfew and ensured that they watched the Learning Channel all evening. The girls in my charge were Pam (the*__tad__-bit-overly* emotional one), Cynthia (a.k.a. "__Miss__ Handford"), Kyla ("What's __tact__?"), and Stephanie (the*__observant__* one). And together, we had a great six weeks that were nothing like the nightmare described above!

I soon realized that I had found the perfect summer job. Not only did I have to go to all the summer festivals, movies, and tourist hot spots, I actually got paid for going and having fun! The girls' mad exuberance for life was contagious and I have many fun memories of their stay. Some of my favourite memories include the Disney Sing-Alongs which happened practically every night and also being a "drill-sergeant" on our daily excursions to the weight room.

I owe my thanks to the girls that stayed in Lister Hall and the out of town girls that came out with us. Without all their enthusiasm for doing things and having fun, I could not have succeeded in my job. I thoroughly enjoyed these past six weeks and already, we are planning a "reunion" sometime this fall." (Jennie Young)

"Life at Lister"

"Entering the dark tunnel of Henday we began a journey into the unknown world of Res. Little did we know that at the end of the tunnel was the elevator that beamed us to eighth Henday. As we stepped off the elevator all was quiet ... we instantly knew work was to be done.

On the lighter side ... we found four girls instantly building (what is hoped to be lifelong) friendships. The first night we shared our life stories. Then there was the second night, the moment of truth ... time to get to know Jennie_____Young.

We thought she was a prim, proper, studious, schoolgirl who would make us go to bed at 8 o'clock and never let us have any fun. We soon found out that she was QUITE the opposite. She's an adventurous, fun loving, generous, beautiful (inside and out) person. As Big Sister, she offered advice and an ear that we could talk off 'til 3 o'clock in the morning. But enough about her.

Our experience at Henday was one never to be forgotten. We learned many things including how to cook exotic meals in the microwave (such as pizza pops: our little secret, 1-½ minutes remembering to turn it). Managing our money (Cynthia!), grocery shopping without overflowing the cart, how to get up in the morning after being awake until 2 AM (Pam!), and we can't forget to mention how we introduced Disney to our floor. Boy, did we amaze them with our singing! Yeah, we watched them all: Aladdin, Beauty and the Beast, the Hunchback, Little Mermaid, you get the point!

So, how exactly was life apart from work? Where do we begin? Let's see.... We went to Whyte Ave., pool halls, movies (Hercules, of course!), arcades, and (oh!) the infamous laser tag, not to mention killer darts and weekly get togethers for the X-files and Roar. For a grand finale, an evening excursion to the Legislature building.... Wading in the pools, dancing in the fields, "purple city", and rolling down the hills. Some of us (Stephanie!) learned to appreciate the beautiful "scenery" and did someone (Kyla!) run through the fountains for a measly 4 bucks?

This summer has been a memorable one. Our eyes have been opened to "A Whole New World". (Okay, maybe we're a little hooked on Disney!). To conclude, we leave you with some final words of wisdom:"

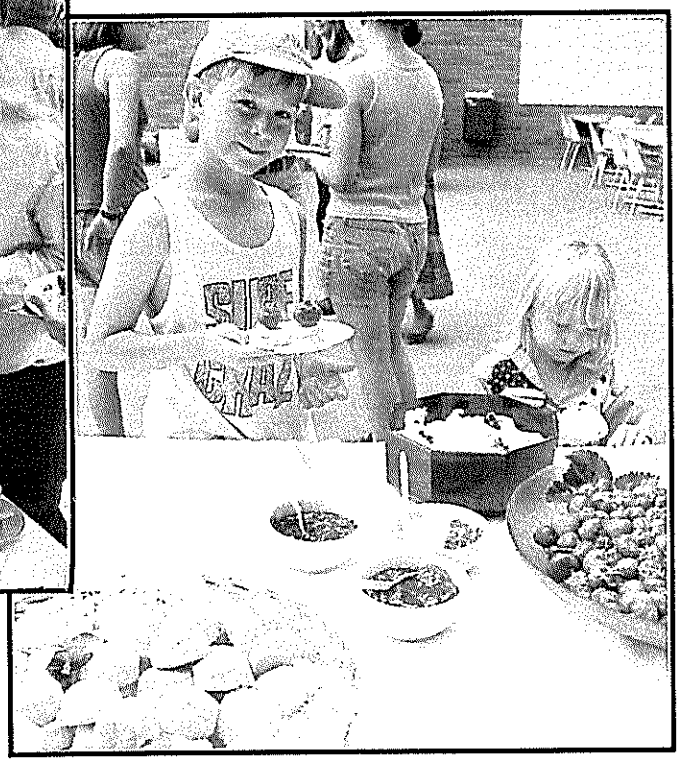
Be bold, speak your mind whenever and wherever you are (with a little TACT, of course!)
-Kyla Fowlow

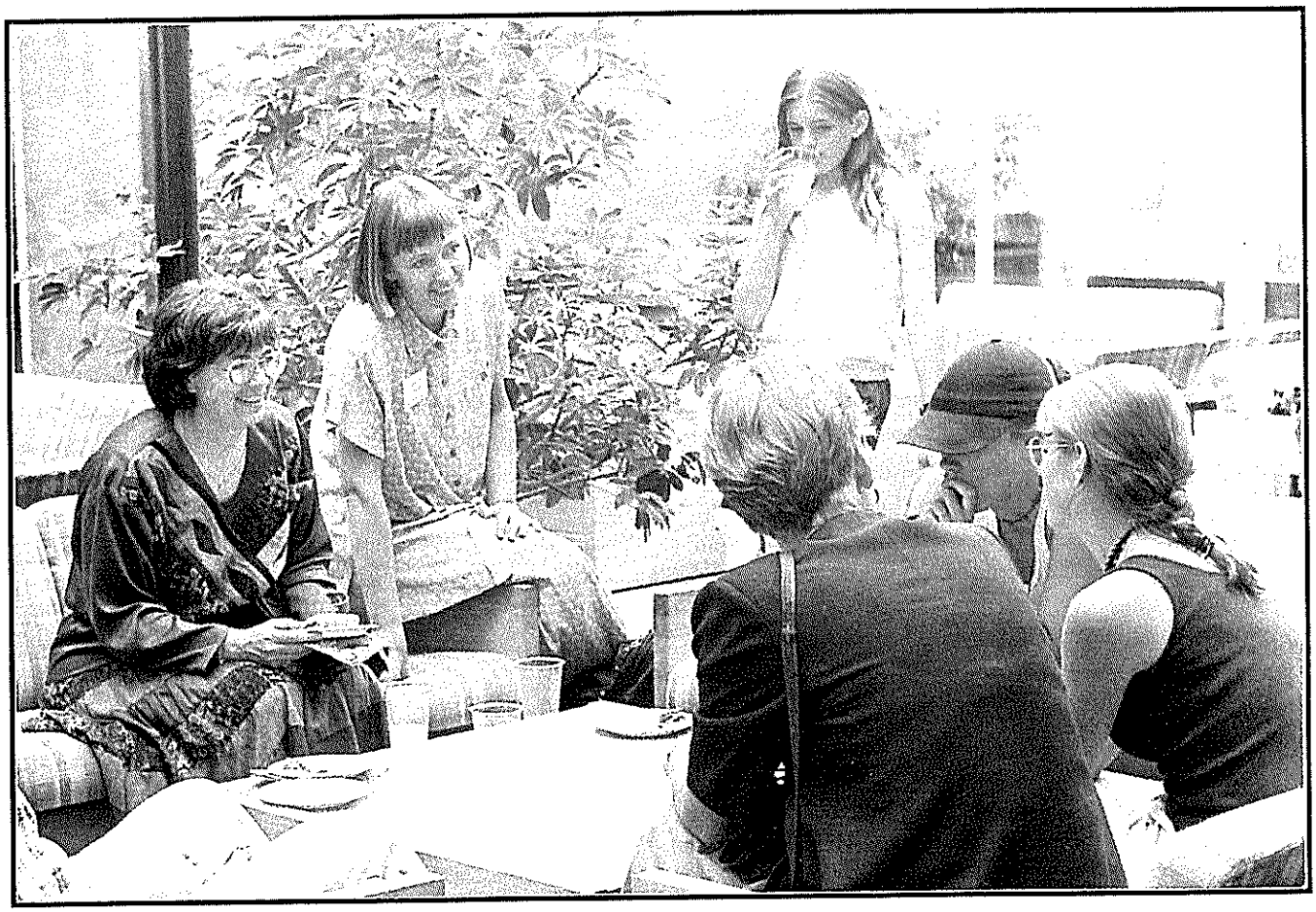
Don't forget to check out the view (ALL THE TIME!).
-Stephanie Gregorwich

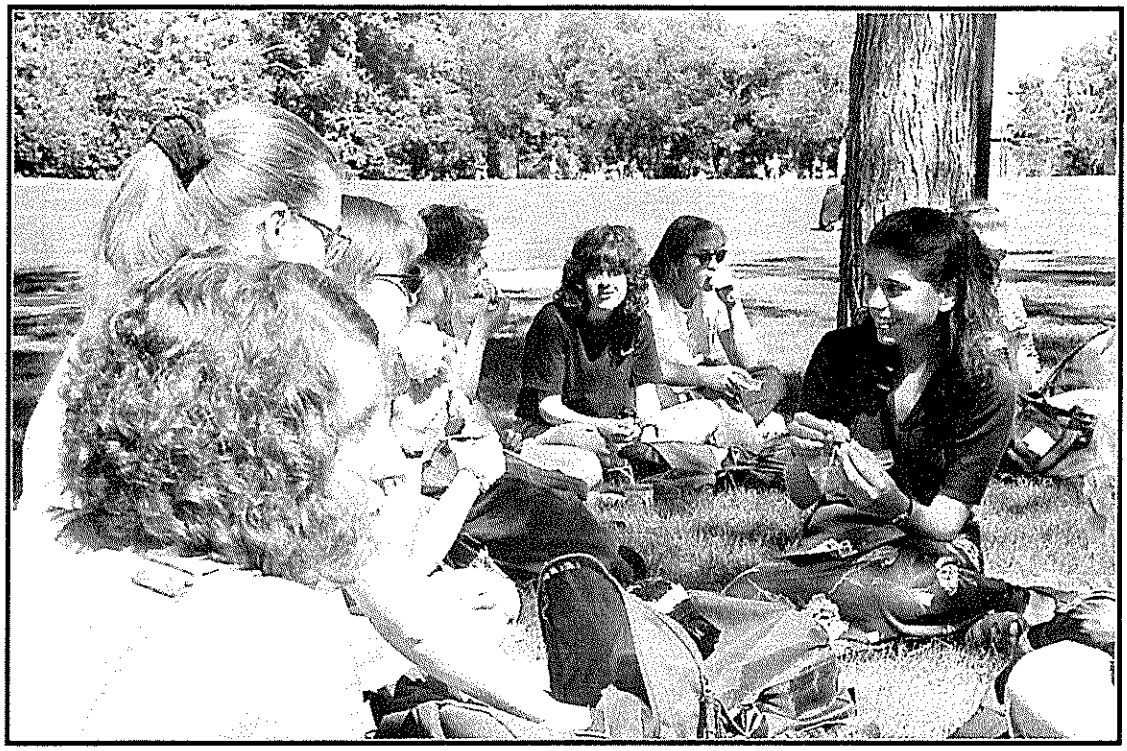
Don't be afraid to swirl (your marble cake, of course).
-Cynthia Handford

It's okay to express your feelings to extremes.
-Pamela Waayenberg

"WISEST Tea and Social"







"Tuesday Lunches with Renate" *"Potluck Lunch"*

"Each Tuesday of the six weeks of the WISEST Summer Research Program allowed all the participants to gather together at lunchtime with Renate and just talk (and eat, naturally). Every meeting was unique, as was the size of the group, which attended these lunches – the number to people, fluctuated every week. We were also blessed (although sometimes it felt like we were cursed) with extremely warm and sunny Tuesdays...." (Elena Liew)

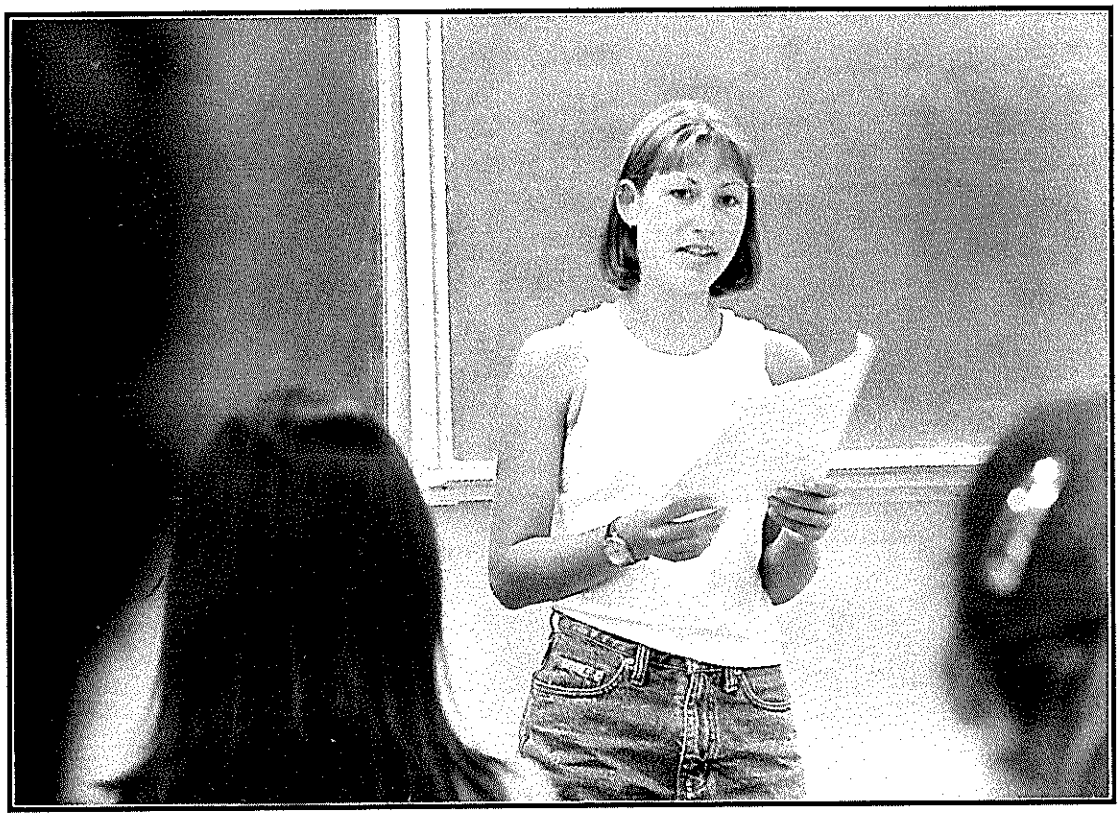
"Did anybody forget how to play the "Name Game"? Well, I did but lucky for me, I had the opportunity to play the game once more during our first Tuesday lunch together with Renate. So how did I do? I was horrible. But not to worry, I did add on some new names to my memory bank that day.

We didn't play the name game during the other Tuesdays. Instead we shared stories of some of the embarrassing things or goof-ups we had in our labs. Some of us broke small lab equipment, walked into wrong doors therefore getting lost, and etc. It sure is good to know that I am not alone goofing up during my first week.

During the Tuesday lunches, there is an opportunity to share experiences with others in the program. People usually split up into very small groups to start with but the groups never stay small. Before the lunch break is over, there will be groups of about eight or more people huddled together in a circle, babbling away about 'what happened yesterday'...." (Sheryl Fajayan)

"Because of the way my experiments worked, I couldn't attend all of the Tuesday bag lunches.... However, I did manage to get to .... the potluck lunch on August 5. As the WISEST students and Renate gathered in SUB, we watched our menu grow. It included: chips, macaroni salad, more chips, some fruit, more macaroni salad, muffins, some more chips, Caesar salad, at least three kinds of cookies, even more chips, pop, a pail of chocolate ice cream (still frozen!), and still more chips. It was great. We sat in groups around the tables and ate and talked. It was a lot of fun, and I'm glad I could make it out to SUB that Tuesday. I didn't even have to worry too much about leftovers – my lab took care of those!" (Andrea Macyk)

"....These lunches were special to me because it gave me a chance to talk to my peers, whom I don't get to see very often and to find out what they were doing. These were times to just relax, talk, laugh, and get away from the lab. They will be among the memories of this summer that I will carry with me, perhaps forever...." (Elena Liew)



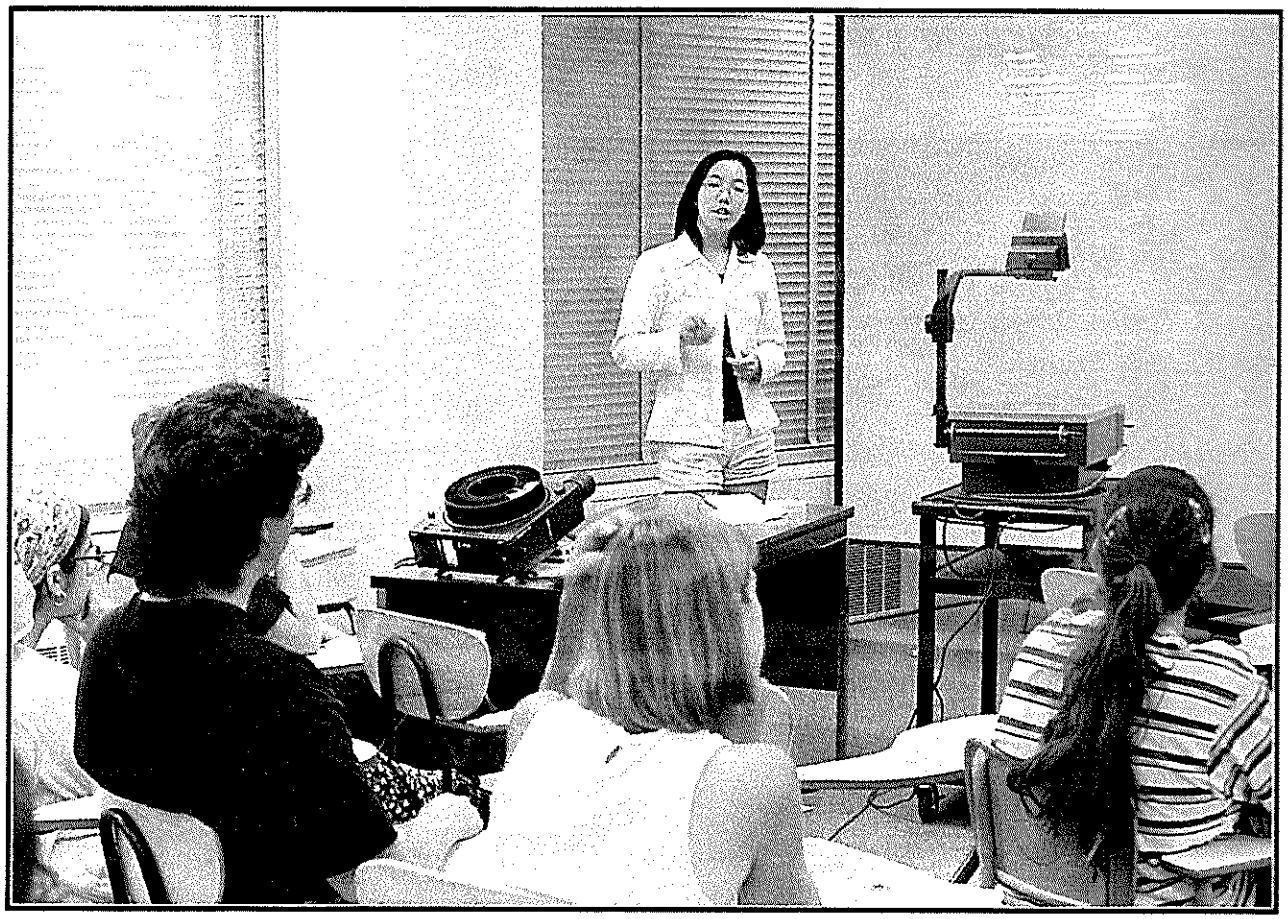
"The Dreaded Orals"

"Oral presentations....agghhhhhhh! Am I over-exaggerating? Okay, maybe a tiny bit. After all of those weeks of slaving away at your lab site, it was finally time to present your findings. The oral presentations were the perfect opportunity to do so. Not only is orals part of your university experience, but in research projects such as these, findings are often presented through this type of medium; it was also a wonderful chance to see what other WISEST students were doing for the past few weeks. They were a prime opportunity to create possible interests in fields, which you might not have considered previously. Thus, numerous days were spent working to create impressive presentations, or rather overnight in some cases. However, when Wednesday, August 6, finally came to be, the day of presenting had arrived. When entering E3-25, the room seems racked with nervous but excited energy. The atmosphere was filled with liveliness and more people than usual...." (Tiffany Marr)

"....The youths talked excitedly among themselves, perhaps trying to disguise their nervousness or making an effort to cope with the fact that their presentations would take place inevitably; or even perhaps they were simply enjoying each other's company. Of course, these could only be some hypotheses. It was certain, however, that everyone of these youths was fully prepared to tell the rest of the world what she/he had done and would be doing this summer...." (William Chan)

"....For the oral presentations, the WISEST participants were divided into smaller groups for the sake of time. Each group was mediated by a volunteer that often kept the question period from being a silence game and ensuring a graceful flow to the event....." (Tiffany Marr)

"Just What Did We Do This Summers?"

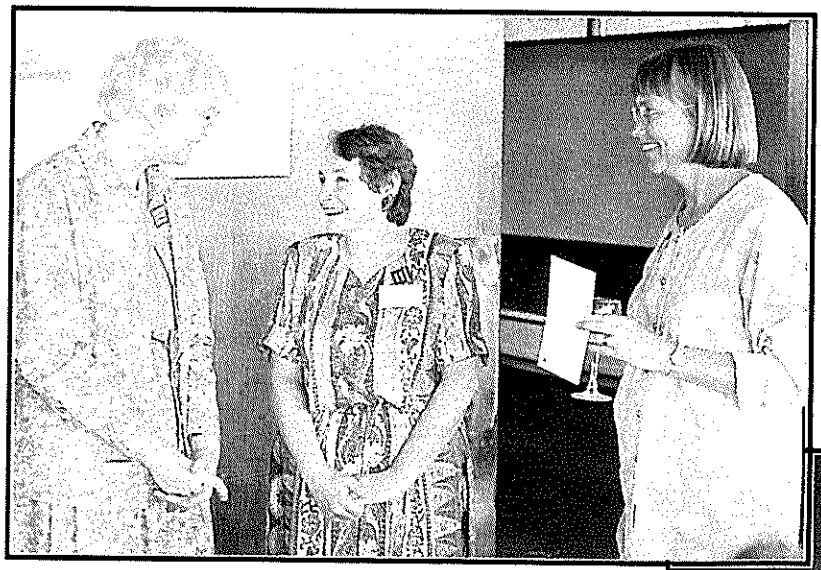


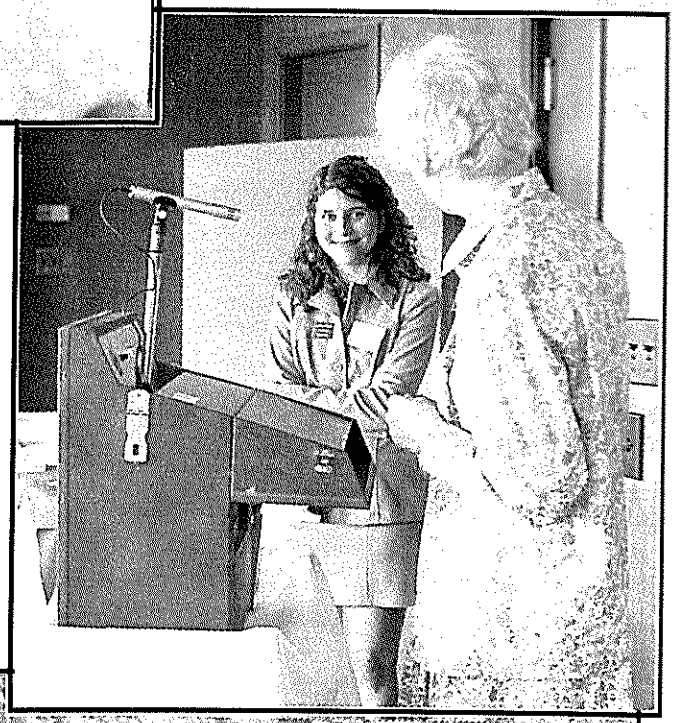
"....Regarding the presentations, they were done in a few ways. Slides, photos, transparencies(containing text, graphs, and/or diagrams), real objects (e.g. samples of plants), even drama were some of the methods used by the youths. In general, all the presentations were successful, as exemplified by the fact that the audience paid close attention to the speakers. The audience showed great interest in the materials presented and asked many questions. Patience was also displayed by the listeners in response to the presence of nervousness on the part of the speakers. A phenomenon that was observed in the presentations was that a smile or a hint of a smile would appear on the face of the speaker when she/he finished presenting her/his research project, perhaps suggesting the inner joy that the speaker felt as she/he finally got through one of the biggest days of her/his life in the WISEST program. Of course, this could only be another hypothesis...." (William Chan)

. "....People knew what they were talking about as they were able to answer questions. It is amazing what we can learn in just a few weeks....." (Sheryl Fajayan)

. ".... This Wednesday session was a great time to listen and learn since that is the entire reason why we are here...." (Tiffany Marr)

"Year End Luncheon"





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Student Reports

Grasshoppers and Transects

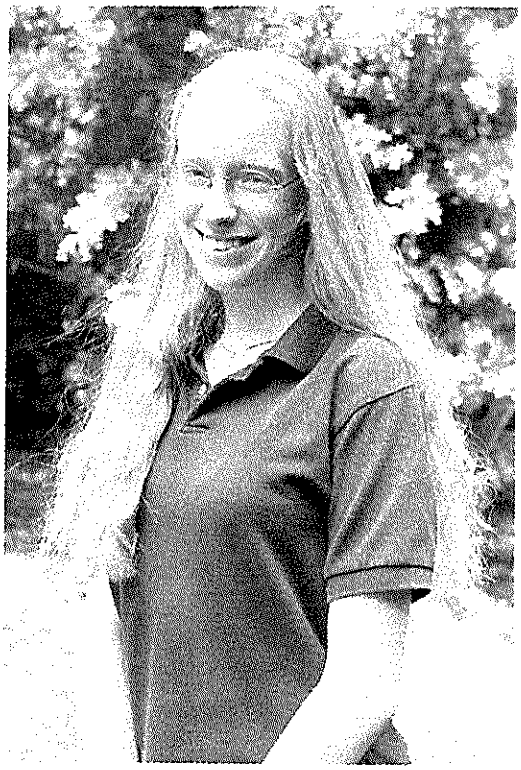
Before this summer, when I thought of the term "biological sciences", my mind was filled with images of heavy biology textbooks, of growing unimportant plants in wee little cups with cute labels, of monotonous classes and rigorous exams. Not once did I examine the somewhat more practical "real-life" applications of what I had learned, and I certainly did not picture myself crawling around in an uncomfortably warm field that was infested with Canada thistle (*Cirsium aravense*) and bugs of all shapes and sizes. That, however, was exactly what my project (in the innocent-sounding field of "biological sciences") at the Wagner Natural Area entailed, and I made it through (more or less) alive!

The research that I participated in this summer dealt with secondary succession in a hayfield at the Wagner Natural Area. It was a rather multi-faceted project with areas of study such as the comparison of the "edge effect" (species invading the field from the surrounding forest edge in, towards the center of the field, through roots or runners from older plants in the forest) to "nucleation" (species invading the field randomly, from seeds carried by wind or other influences, and establishing themselves throughout the field). The project was also designed to discover which species was the most successfully invasive.

Dr. Mark Dale is responsible for the project at the Wagner Natural Area. This research, which was initiated in 1991, will provide a basis for further study of secondary succession. The data collected would also prove useful in studies of fields or meadows in terms of successful field plants. The data collected, when analyzed, will also be appreciated by the Wagner Bog Society.

I worked with Jenifer Osborne, who is another WISEST student, and our "sub-supervisor", Debbie Mucha. We were responsible for collecting the data for 1997. The first part of the data collection involved a 30m by 30m "main" plot which, unlike the rest of the hay field, is mowed yearly. This plot is sown with a standard hay mixture of seeds; analyzed data will show trends in the success of various plants. The main plot is divided into 150 3m by 2m plots, 60 of which were randomly selected for examination. Other parts of the data collection included lines of 5 2m by 3m plots spaced 20m apart between the main plot and the forest; analyzed data from these plots will show the gradual invasion of forest species into the field. This year, data from 5 random plots and 6 in/out transects (including both mowed and unmowed areas of the field) were collected.

By the August 14, we were entering the data from this year into computer files so that they, along with the accumulated data from previous years, can be analyzed. We were also cleaning up the substantial mess made by those responsible for the data collection and entry of a certain year... The nature of this project makes it impossible for me to speculate about what trends the accumulated data will show. I can state with great confidence, however, that the analysis of the data we collected this year will show high concentrations of *Festuca pratensis* (a grass very much like that commonly used in lawns) and of *Bromus inermis* (another grass, the incredible predominance of which has been the bane of my existence!)



Through my involvement with the WISEST Summer Research Program, I got a chance to meet a lot of intelligent people who were actually being recognized for being intelligent, and I reaffirmed my great appreciation for intelligent people and how wonderful it is to work with them. More specifically, through my participation in the field research at the Wagner Natural Area, I learned to identify a few (after this summer, I know how very few!) common meadow plants such as alfalfa and varied clovers and grasses. I know a lot more about field research, I learned enough about DOS to be able to enter data by myself (after a while) and developed rather peculiar tan lines. (And, for the information of anyone who did not already know this, grasshoppers: a) will try to defecate on you if you hold them long enough, and b) are mean-tempered enough to bite for no reason at all!) Thanks very much to everyone, especially Dr. Dale, who answered my many questions, to Renate and Grace and other WISEST administrators who accommodated my absence due to illness, and to Debbie Mucha who became a sort of amazing teacher-friend-chauffeur-supervisor. Thank-you for a great experience.

Caitlin Wells

"Whatsoever that is True"
OR
Once Upon a Lab

And so, here I am at the final task of my WISEST Summer Research Program, and I think it's the most difficult task so far — to squeeze six jam-packed weeks' worth of experiences onto two small pages of type.

I'll start with the basics: my designated WISEST position landed me in the Immunology lab of Dr. Hanne Ostergaard, in the Department of Medical Microbiology and Immunology. The lab, which was full of wacky but wonderful people, was located on the eighth floor of the Medical Sciences Building (and had a great view of campus!).

At the outset of my summer, I mostly held onto the velour shirttails of grad student Chris Arendt, with whom I worked on his CD45 research. CD45 is a protein molecule found on the surface of certain white blood cells, such as lymphocytes. Although it is believed to be involved in cell activation and also cell adhesion, the role of CD45 is not clearly understood.

My project was concerned with CD45's role in cell activation — how it helps "turn on" cells of the immune system (like cytotoxic or "killer" T-cells) in response to foreign antigen. When a cytotoxic T-cell's receptor "recognizes" foreign matter, such as in a cell infected with a virus, a whole series of signals and reactions is set off as the T-cell is "turned on" for action. You can think of it as like knocking over a row of dominoes. So we can ask: How does CD45 fit into this complicated series of dominoes? What other molecules within the T-cell does CD45 react with? (Essentially, what dominoes knock over or are knocked over by CD45?)

And just how was I helping to answer these questions? One long word: immunofluorescence. Basically, I stained mouse T-cells and dendritic cells, which were on glass slides, with antibodies that would bind to proteins within the cell. These antibodies were conjugated, or attached, to fluorochromes which would make the antibodies glow under a fluorescent microscope. I stained for CD45 and for another protein, called Glucosidase II, which is believed to associate with CD45. After the slides were stained, I looked at them under the fluorescent microscope to see if and where the antibodies had attached by looking for the glow of the fluorochromes. Where was the staining located in the cell? Did CD45 and Glucosidase II stain in the same places?

To get really good results, I first had to optimize the antibodies — that is, figure out how concentrated an antibody solution to use on what kind of cell. That was basically the bulk of my project, although I was gathering results for the above questions as I went along. I also had to do controls to confirm my results. Some of the different cell lines had weird names like BW-PHA^R and YAC, and the antibodies had equally strange appellations such as I3/2^{FITC} and donkey anti-rabbit .

Although my techniques were essentially rather simple, things could — and did — go awry on several occasions. At first, I had trouble preparing the slides properly. My antibody solutions were too concentrated, too dilute, or made using the wrong antibody. I broke a slide and then Chris took a picture of it.

When things went right, however, I had a nice reward for my labours: a beautifully stained slide. Under the fluorescent microscope, the transparent slide became pitch black, with bits of red and green cells glowing against it like little stars and galaxies in the night sky.

When you think of a research lab, what comes to mind is the stuff that newspapers proclaim in headlines — amazing findings and cures and miraculous breakthroughs. But with all of the idealizing aside, I've learned this summer that all of the behind-the-scenes work, the kind of basic research that my lab was doing, is just as important. These scientists deal with things that are so tiny it boggles the mind. These molecules, these bits, aren't what we're made of, they're the bits that make up the bits that we're made of. It's truly amazing. That's how I picked the title of this report — "Whatsoever that is true" is the English translation of the University of Alberta's Latin motto, Quaecumque Vera. Whatsoever that is true, that is what science seeks.

Besides my lab work, I also had a lot of other great experiences this summer. I had a chance to meet Dr. David Ho, renowned AIDS researcher and TIMES' Man of the Year. I made several possible future contacts in the Faculty of Medicine. I found out that university (and particularly grad) students are innately attracted to meetings offering free food.

The very best thing about the summer, however, has to be the people I worked with in the lab. They were really great about answering my questions, showing me where things were, and letting me borrow their equipment. And even though Chris gave me a lot of independence in the lab, he always helped me out or gave me advice when I needed it. Among my fond memories of "the lab" are: Pizza with David Ho, Chris' photo shoot (and later, Chris' slide show), Troy and Olivia's day in the spotlight, Lawrence's amazing flying gel-catch that almost was, Dr. Ostergaard's birthday party, the Kato tapes, and the Banana Planet lunch ("Are you going to finish that?").

I'd like to thank Dr. Ostergaard for letting me loose in her lab and for all her help. Thanks also to Chris (remember: BDT!), Nancy (How RUUUDE!!!), Olivia (well-combed), "Wrong-Way" Wojtak, the "RESERVED" Lawrence of Puente, Liz ("That was you, wasn't it?"), Troy, Stuart, Gabrielle, Dong-Er, Barbara, and everybody else for making this summer so memorable.

Andrea Macyk

Andrea Macyk *(a.k.a. Andrea "Always-Having-a-FITC" Macyk)*

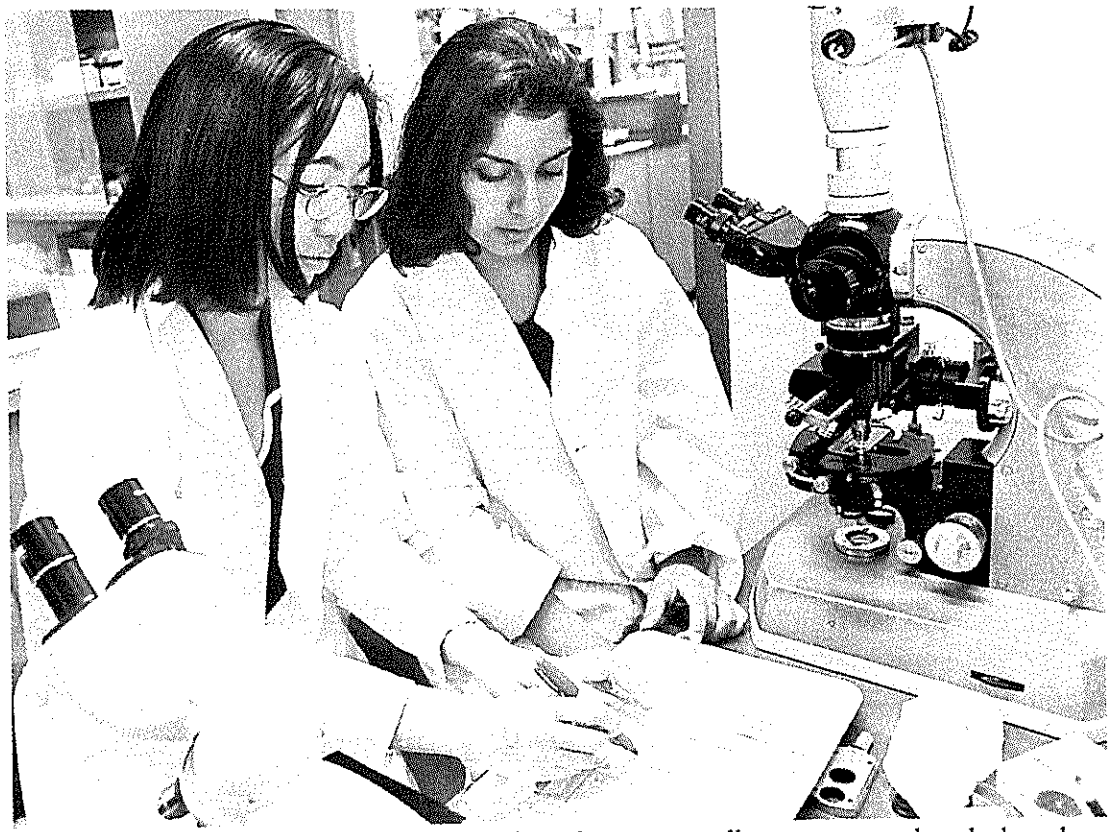
The Plant Anatomy Corner

Amazingly, the last six weeks have gone by very quickly. Yet, in these six weeks I've seen and leaned more than I had during six weeks of school. In these few weeks, I worked in the Biological Sciences building with Tiffany, Heather, Lara, Grace, Pam and Paul. During this short period of time my knowledge on corn and microscopes has been drastically increased. It all started with our tour of the greenhouse. Slowly, we watched and learned how to maintain and raise corn plants. Every Thursday(which was known as judgment day) we get rid of the weak & old corn plants and then plant new ones. Although we soon began to dread Thursdays, it wasn't that bad. But, the best of all was that Dr.Cass's students trusted us enough to give us our own project.

Working on our independent project on the anatomy of Pholx was a lot of fun. Our project involved the use of histology methods such as fixing, sectioning, staining, photo-microscopy, film development, and printing. In the first step we'd cut up the specimen and place it in a series of solutions(TBA-soln1-soln2- . . .-soln5-paraffin:oil-paraffin wax). Then we orientated the specimen and allowed it to solidify, forming a block of wax. Next we'd fix these blocks of wax on to a piece of rectangular wood and place it into the Microtome. After sectioning these we make them into slides and placed them in a couple of stains(saffron, fast green) to accent the cellular material. Finally, we took pictures of the slides and developed them.

During the last few weeks as we were working on our project, there were times when we'd make funny little mistakes. On one instance Tiffany and I had left the oven open overnight. This had caused all our specimens(that we had spent days preparing) to solidify and go to waste. For weeks Dr.Cass's students teased us about this incident. Another incident occurred during our second week, Tiffany and I had accidentally set a stack of paper towel on fire. Fortunately we were able to quickly put out the fire.

When we weren't working on our project, Tiffany and I would partake in the research activities of the various lab members such as sperm cell isolations, embryo sac isolations, DNA extraction and electrophoresis. For a sperm cell isolation, pollen is collected from the plants and placed in a solution(containing liquids of different



Tiffany Marr, Guneeta Kalia, (right)

densities). This solution is centrifuged, then the sperm cells are removed and placed in another solution. This solution is also centrifuged; therefore the sperm cells collect and form a pellet at the bottom of the test tube. In a embryo sac isolation, corn kernels are sectioned using a Vibratome. The embryo sac is removed from the kernel under a dissecting microscope. Many embryo sacs are then placed in an enzyme solution for three and a half hours, exposing the egg cells. While carrying out these tasks I've picked up a few useful skills and also learned my way around the lab. However, it was the attitude of the people I work with that had the greatest impact.

The support and encouragement from Dr. Cass's students helped me enjoy my six weeks. Most of the time, the workers at Dr. Cass's lab would go out of their ways to entertain us. I appreciated their willingness to help Tiffany and I with our oral and written report. I'd like to thank Heather for offering her phone number so I could call her if I needed help in preparing my report. Furthermore, I'd like to thank Lara for helping us prepare power point slides for our oral report and cheering us up with her positive & serious remarks. I'd like to thank Pam for preparing us for Dr. Cass's mini-quiz and I'd like to thank Grace for making Tiffany and I feel comfortable working with them in the lab. Also, I'd like to thank Paul for being there everyday to support us through our six weeks, thanks a lot Paul. Most importantly, I'd like to thank Dr. Cass and WISEST for giving me the opportunity to work in a lab. I can honestly say that I enjoyed my six weeks at this lab, but mainly due to t0he people I work with.

Guneeta Kalia

Up Close and Personal with Corn

Six weeks. For some reason, I thought the days would drag on forever. However, six weeks have past, and I cannot believe how fast time flies by when you are having fun. For the previous six weeks, I have been working at Dr. Cass' lab. It is located in the botany section of the Biological Sciences building. Currently, his research has focused on corn. The ultimate goal of his lab is to produce better corn through genetic engineering. Although I did learn two procedures involved with this research – sperm isolation and embryo sac isolation, I really had no direct participation with the work being done. I spent the majority of my time looking at the cellular structure of plants; to be more specific, I was studying histology – the study of tissue. Through various steps and procedures, I was able to look under a microscope of slides that I had made and view a certain structure of the plant, whether it was the ovaries, anthers, etc. The light microscope that I was using had a camera connected that allowed me to take pictures, which I developed in the darkroom. My work with histology allowed me to learn various methods and lab procedures. As well, I have improved my microtechnique and had the opportunity to work with fancy machinery.

Although I must admit, corn research is not the most exciting project out there, I still feel very fortunate in being placed where I was. What definitely made a memorable impression were the people involved in my lab. First, I was very lucky to have a supervisor, Dr. Cass, who was open and supporting, encouraging Guneeta and me to pursue whatever interest us. However, I must admit, one meeting with him made me feel like a little kid that had no where to hide from a teacher's inquisitive looks. During this meeting, he quizzed Guneeta and me about corn and how it pollinates and fertilizes, and pollination and fertilization in general. As well, he also asked questions about our knowledge concerning the lab. I never felt so half-witted before although I am sure he never meant to leave such an impression. As mentioned previously, the research team members definitely helped to make the past six weeks interesting. They were the greatest. They always had time for us, answering any questions that we had, and always thinking of projects to keep us both busy but learning at the same time. One amusing event was the potluck held in August. That was just a great time because we could kickback and enjoy wonderful food. As well, the research members – Lara, Heather, Pam, Grace, and Paul – were supportive and made working alongside them very comfortable.

Another lab highlight, not always good though, was the infamous Greenhouse day. When I first arrived, there were little snickers and smiles when referring to Greenhouse day. Greenhouse day is basically the removal of older plants and planting new corn plants. However, that first Thursday, Heather broke us in. Not only did we have to do the above task, but part of our time was also spent scraping algae from the pans and cleaning them. Thankfully, this was only a once a month venture. As well, I was given the little job of washing corn plants that were entering the pollen free room. For my first time, I was given a smaller load to clean compared to the numbers entering later on. However, the end result was the same; my feet were drench. For the better part of an hour, I felt as if I had just come out of a swimming pool. My work in the greenhouse has at least led to one decisive conclusion, I know definitively that I am not allergic to corn pollen.

WISEST 97 has been a wonderful opportunity. I do not know how it can get any better, being paid to learn. Too bad that is not an option for school. I had such a great time this summer. My goal before starting was either finding a field that greatly appeals to me or limiting my options since I have a broad range of interests, and the goal was fulfilled. After being involved in this program, I have decided to take a less focus approach concerning my first year of university. I was certain that I wanted to enter the honours program in biological sciences. However now, I feel that will only limit me from the start, and I should attempt everything before really concentrating on a certain field. That is why it was great to talk to my lab members and hear their opinions and stories about how they arrived where they are. It is so hard to judge whether you are making the right decision by just reading outlines of courses or textbooks from school. What also was a great experience was listening to other women in science talk about their careers and obstacles they confronted. I am the first to admit that I do not know all of my available options so it was nice to listen to women who were in the same position that I am currently in and why they decided to pursue what they did.

Out of all the Wednesday sessions, I enjoyed the picnic the most. It was fun to talk with other participants and learn more about the different projects. As well, the picnic was just a great time to relax and pig out. It was also bringing back great childhood memories; I do not know how long it has been since I last played on the swings or played tag. That was just a fun day. Also, another memorable Wednesday session was the tour of another lab. I was in the zoology tour. Although I found it interesting, I definitely can say that zoology will not be a career choice. Maybe, I am too fickle, but I could not stand the smell. For example, while venturing through the museum, we entered the cooler where bones are stored. The smell was odious and repugnant. It was awful. While I was inside, I just kept breathing through my mouth. When I finally came out, it left a disgusting taste in my mouth.

On the whole, I am very grateful that I was chosen to participate in WISEST. It gave me an opportunity to experience the sciences beyond the high school classroom textbooks. It also opened my eyes to the opportunities available in research. It was a wonderful six weeks that I will never forget.

Tiffany Marr

During the time I spent participating in the WISEST summer research program, I had the privilege of working with Dr.D Tanner. I was working in the department of chemistry conducting fundamental research. We were trying to find rate constants at which Hydrogen atoms (H) react with organic substrates.

The microwave reactor is set up so that the reactions occur in a vacuum. H2 and He are run at specific rates through the system. As H2 molecules pass through the microwave (A) they are broken apart into their atomic state and carried into the reaction cell (B). Once in this cell, the radical reacts with the organic solutions which had previously been placed in the cell. All reactions are done is sub zero temperatures. The cell is submerged in a liquid kept at between -72 and -94 C. Any evaporated substances from the reaction are carried on into the cold trap (C) where they condense and can be remixed with the initial solution after.

There are two basic phases in the atomic hydrogen reaction. The first is the vapour phase in which H react with olefins to produce highly reactive radical intermediates. From these intermediates we were trying to find the rates of formation, the stability of the radical, other properties of the intermediates, and the products they eventually form.

The solution phase takes place under thermolized conditions (in this case -74 to -94 C). From this reaction we can obtain synthetically useful products. We were looking at the products formed by the intermediates to try to find how they are stabilized by the radicals.

This summer research program has greatly expanded my view of the scientific field. My plans before my experience with WISEST, were to pursue a career in chemistry but this summer has helped me solidify my goal. My time spent with Dr. Tanner was also one of the most fun and most exciting times of my life and I would like to thank those who made it possible for me.

- Nairin Bradbury -

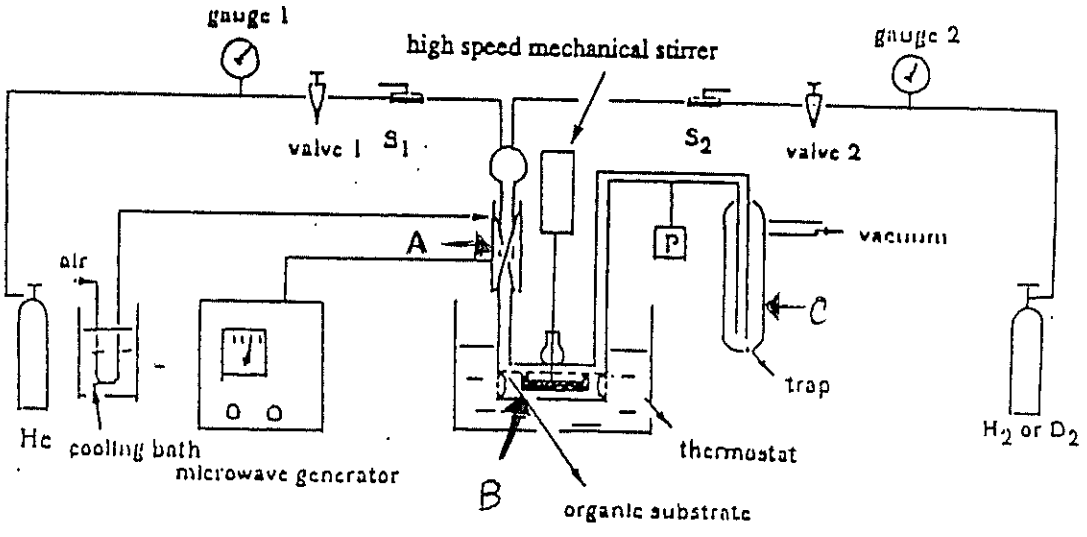


Fig. I. Diagram of apparatus for H atom reactions

Meanook is an area rich in the diversity of its research topics. The main research topic at present was one called TROLS. The Terrestrial and Riparian Organisms, Lakes and Streams study was an in depth look at the effect of differing buffer strip widths in mediating the potential impact of forest harvesting on terrestrial and aquatic ecosystems. As part of this study, Andy Danychuck is focusing on the potential effects of harvesting on the population structure and life history characteristics of fat head minnows; a fish species common in small lakes in boreal Alberta and a rapidly growing "lab rat" for ecotaxicology. Before he can determine the effects of forest harvesting on fathead minnows, he must first attempt to underline what factors regulate the social patterns of fathead minnows.

To better understand the factors that regulate the population, Andy is conducting pond experiments at the Meanook Biological Research Center. The goal of these experiments is to determine the effects of the social structure on the rate of reproduction in fathead minnows. In 1996, he conducted an experiment in small enclosures and found that adult male fatheads regulate the breeding opportunities of maturing males. As part of this experiment young of the year (fish born in the 1996 breeding season) were collected. Part of my responsibility this summer was to measure the YOY collected to determine the effects of the maturity of the male fathead's population structure and the YOY count and mass.

This summer Andy is again examining the same phenomena, but on a larger scale. For this study large ponds divided by a polyvinyl curtain are being used. These ponds better emulate natural ponds and permit a more thorough examination of the behavior that tends to inhibit reproduction and population structure. As part of this experiment, my responsibility were to monitor pond levels, feed fish and take observations on the reproduction of fatheads through the examining of nest boards.

These studies are quickly transferred to the real world as samples are taken from varying lakes with different cut lines (the TROLS lakes). We hope that by discovering the effects of adult males on the sexuality of juvenile males, we can discover the potential effects of cut lines close to the lake shores. Cut lines close to water bodies lead to excess vegetation, decomposition and therefore nutrients in the water of ponds which in turn lead to excess population and eutrophication of the pond environment lowering oxygen levels in the water. This can lead both to devastating winter and summer kill which lead to the premature death of adult males in the fathead population. Our research will not only aid in the scientific community through a simpler transfer of knowledge from the lab to the environment, but also has ecological repercussion through the study of the effects of logging around ponds.

Meanook has allowed me the unique experience of a combination of lab work with field work. Not only was I able to discover the comfort and monotony of lab work, but also the grueling peaceful aspects of field work and that one in a great change from the other. I was also allowed to be emerged completely to a science community allowing me to meet the kind of people in the area, find out why they went into science and its possibility as a future career choice.

Candace Rypien

Cells, Cells and MORE Cells

Cancer is one of the body's most natural diseases, originating from within the body. It is simply a mutation of cells which then causes these cells to divide uncontrollably. The body's own cells work against it, unlike most diseases in which the antagonist is an invader.

Cancer cells lose many normal characteristics of cells, such as cell to cell communication and cell to cell adhesion. These characteristics stem from the membrane proteins which cancer cells lack. The lost of cell to cell communication encourages cell growth, because the cells lose the contact inhibitory factors which halts cell growth. Without cell to cell adhesion, the chances of metastasis of cancer cells is heighten.

Metastasis occurs when the primary tumor starts to shed individual cells into the circulatory or lymphatic system because of the poor adhesion properties of the cancer cells. This trasports the cells to other suitable sites and starts growing secondary tumors. Then the cancer progresses throughout the whole body, virtually unstoppable, simply because there is no way to tell where the tumor has spread.

If there is a way to stop or lower the chance of metastasis, then a patient's chance of surviving would be higher.

In the lab of Dr. Manijeh Pasdar, I am working on E-cadherin and Plakoglobin transfected epithelial carcinoma cells named E/PG A1B5 and the non-transfected cancer cells of the same type named Scc9 A5. In the transfected cells, pieces of DNA was inserted into the cells which encodes two important surface proteins, E-cadherin and Plakoglobin. These pieces of DNA is then able to instruct the cells to produce these cell-adhesion membrane proteins.

My part in this project is to detect the prescence of these proteins by doing mmunoblotting and immunoflourescence and LOTS of cell work. I started by growing two plates of cells. By the end of the summer, growing cells get to be pretty routine, "Not enough cells? Let's grow more."

In immunoblotting, the cells are basically destroyed, extracting all the proteins. The proteins are then separated by using electrophresis by size. The proteins are transfered from the gel, which seperates the proteins, to a nitrocellulose membrane. A first antibody is applied which identifies a protein which I'm trying to identify, then a second antibody is added which binds with the protein-antibody complex. The second antibody reacts with a detection solution, causing it to give off light; to flouresce. When exposed to film, the film would show a dark band to indicate the protein where the antibody was glowing.

For immunoflourecence, the principle is the same as immunoblotting except the cells are not destroyed. The first and second antibodies are applied; the second antibody with a flourecent marker on it. Under the confocal microscope, the protein which the antibodies bind to show up either red or green. That way, you can see the protein where it is supposed to be in the cell.

Both of these tests showed and increase in the amounts of E-cadherin and Plakoglobin, along with alpha and beta catenins, which are also cell adhesion molecules. Under the normal light microscopes, the difference between the cancer cells and the normal cells is very visible. The cancer cells grow over each other regardless of space, while the transfected cells grow in a uniform single layer. The cancer cells also grow much faster than the trasfected cells would, and would have to be split between three or five dishes sooner.

In between of these two important projects, there are of course, the centrifuge (20,000 rpm!!!), the gels (like Jello but not as tasty), the pipetments (do we really need to measure 0.05 microlitres?), the pipet-aids (no squeeze bub technique for measuring 10 mL), the tens and hundreds of gloves, the incubator (nice and cozy at 37 C), the severed rat-tails to make collagen (lunch anyone?), the dark room (spooky), using the silicon graphics computer (I want one of those) and hundreds of other things I have never done before. And of course, how could I fail to mention, the cells. Dozens of dishes full of cells growing and growing and growing...

It was not only work that was fun. There were the Wednesday events, the trip to the Calenese chemical plant. The tour of campus, the picnic at Rundle park (wasn't that cool), the visit to another lab. The six weeks of this summer was one of the most exciting every in my short, 17 years of life. Working with Manijeh Pasdar, Zhi Li, and Nasser Tahbaz was truly exhilerating. Thanks guys.

Annissa.

When my chemistry teacher first presented me with the opportunity to participate in the WISEST Summer Research Program, I was unsure if I wanted to go. Even for some time after I applied, I debated whether I really wanted to lose my summer for the program. I can say now that if I had let this opportunity slip through my fingers, I would never have forgiven myself. I do not think that I lost my summer at all; I think that it was the best one yet.

WISEST proved to be much more than the glorified summer job that I was expecting. In fact, it turned out to be a valuable experience that I will take with me as I finish high school and enter university. I was involved in Dr. Linda Pilarski's lab in experimental oncology. Dr. Pilarski's research group is looking at the motility of cells in multiple myeloma, a cancer of the plasma cells in the bone marrow. Cancer research is interesting because it is so applicable to the average person's life. While the "cure for cancer" mentality drives the research support campaigns, I soon found that that goal is akin to the goal of living on the moon. There is a great deal more research that must take place before either will happen.

In particular, my own research experiment was to determine which of several receptors on the cell surface are involved in the motility of a cell. In the body, a plasma cell is surrounded by a three-dimensional extra-cellular matrix which it can adhere to in different strengths to achieve different results. A cell adheres to one of these ECM's with receptors on its cell surface. A cell may bond strongly with an ECM to remain stationary, or it may form a series of weaker bonds as it moves, caterpillar-like, stretching out and pulling itself together again. If a cell cannot adhere to an ECM, then it cannot move. Not all receptors are involved in movement, however. My job was to determine which of several different ones are involved. I did this using antibodies which have been proven to interact with the specific receptors I was looking at. What antibodies do is block receptors, thereby disallowing the receptors' interactions with the ECM. The theory behind the experiment is that if an antibody causes the motility of the cells to decrease, then the receptor it blocked must have a function in motility. Through this experiment, I have determined which of the receptors I studied are involved in cell motility, as well as those that are not. It is quite an experience to find conclusive results as well as to understand the theory behind them.

To perform these experiments I was introduced to many new machines and technologies with which I would come to be well aquainted with. After a whirlwind tour and practice experiment, I was left to my own work. I was far from abandoned, however, and, being determined not to ruin any equipment in the six weeks I was in the lab, I frequently sought out help. I now have a working knowledge of fume hoods, centrifuges, and incubators, as well as an extraordinary computer/microscope, which I filmed my cells' movement with using time-lapse filming. It will be difficult going back to my old chemistry lab after being spoiled with such things as automated pipettes where I simply dialed in the amount I wanted.

Working in research opened my eyes to a new dimension of science. Rather than the application of new knowledge and developments that we are exposed to daily, I was able to observe the creation of the knowledge. I realized how little I know about the nature of research. It is definitely an area that I will consider for my future.

The WISEST Research Program is one of the most beneficial opportunities that a rural student could have. I was given the opportunity to meet new people with similar interests to mine in an environment that we could share in exploring. During my stay in the city, I was introduced to many firsts. Along with other WISEST students I rode the LRT, watched a Shakespeare in the Park production, went to the Street Performers Festival, and Klondike Days. In addition to this, I rode the bus to work and home every day.

I believe that the rural or out-of town students had an advantage over those who are from Edmonton. We were given the chance to explore a new city and be independent from our families. Because of this and the challenges that we were faced with, we were able to develop as people as well as develop our skills. People have told me that I have changed over the summer (for the better), and I have WISEST to thank for that. The university doesn't seem so large anymore, either, and I have made important contacts.

My time here at WISEST has given me confidence in my abilities. I was able to enter a situation that was totally unfamiliar to me and succeed. I think that this is one of the things that I am most proud of. On my first day I was afraid that I would not be able to handle the assignment that I was given. I did, however, and left with a new understanding of lab techniques and a very complex area of science.

I would like to thank Renate and Grace as well as my new friends for making my time in the program so enjoyable. I would especially like to extend my gratitude to Dr. Pilarski and the women in the lab for welcoming me into the lab and helping me so much. I would recommend this experience to anyone with genuine curiosity and interest in their future. It was the experience of a lifetime.

Allison Sandmeyer

Summer of Computers

I am LieJun and I worked at the Computing Science Department in the University of Alberta. My supervisor was Carol Smith, the manager of computing operations.

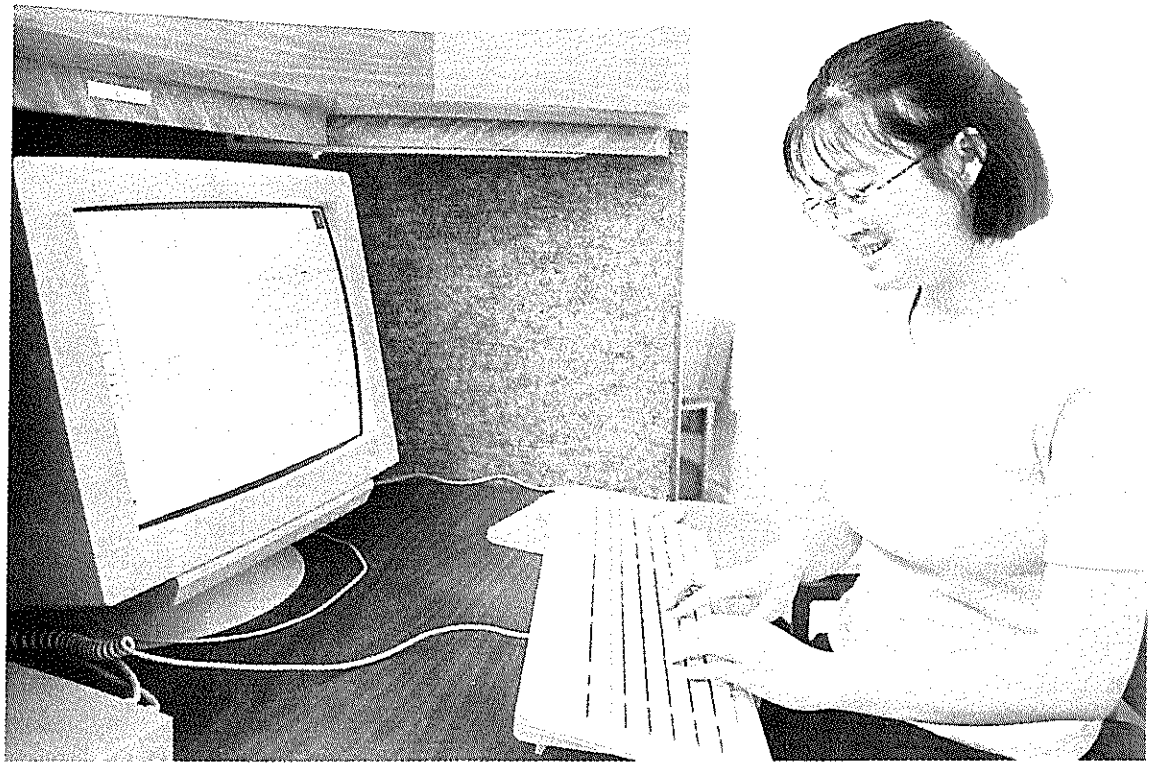
The summer was a golden opportunity to gain new experiences. Working at the Computing Science Department gave me an opportunity to learn about the Unix system, related programs and HTML.

Before, I have only worked with PC and Unix was a whole new territory for me. Even though it functioned similarly to DOS, the commands were different and the windows environment was different. For example, to list all of the files and directories under one directory, you have to type *ls* in Unix while in Dos, you type *dir*. I had to learn about the Unix operating system and adjust to its quirkiness before I could work with the programs in it.

In this summer, I worked with a number of programs. When working with graphics, I went to the Networks Lab where Silicon Graphics machines are kept. These machines have the programs *showcase*, *xv*, and *snapshot*. *Showcase* is a sophisticated paint file that allowed me to construct graphics. With the right gizmo, you can make extremely colorful and 3D images. *Snapshot* is responsible for capturing the constructed graphics for *xv*. The program, *xv*, is what I used to edit the graphics into its final version as a *gif* file. In *xv* I shrunk and cropped the picture until it is the size I wanted. When the graphic is a gif file, it can be displayed on Netscape for everyone to see.

The program I used most frequently is *vi*. *vi* is a basic text editor with too many functions. Though many functions can make a program easier to use, it is impossible to remember all of them. I use mostly *a* to add text, *x* to delete text and *:q* to quit. To open a *vi* file, you simply type *vi filename*. What I usually do in vi is making web pages using HTML.

HTML stands for HyperText Markup Language, the language that allows you to construct web pages. Since my high school doesn't offer computer courses and I have no internet services at home, making web pages is an entirely new experience for me. The language itself is not too difficult for it mainly consists of tags. As long as you have the appropriate tags, you can insert pictures, add links, make tables and applets and all sorts of things. To learn about this language, I experimented by making my own web pages. When I was more comfortable with HTML, my job was to design a home page for the Computing Operations Group. Web pages are always under construction so some of the arrangements are not quite done on the Computing Operations Home Page. However, I finished most of the page and I think it looks pretty good.



To look at other people's pages for inspiration and to look at the pages I made all by myself, I used Netscape 3.0.

Besides working on web pages, Carol introduced me briefly to LUDE, a program that keeps a record of all the software under it so you'll always know what it is, its version and where it is. After looking at LUDE's capabilities, I transferred information from old HTML files into LUDE files for a couple of softwares.

During the time I worked, I also tried scanning. To scan actual pictures into computers, I went to the Artificial Intelligence Lab where the scanner exists. When working with the scanner, I learned about the connection between resolution and memory, color adjustment and size adjustment. I also learned about how convenient scanners can be and how beautiful some pictures can appear on the computer. It's enough to make me want to buy a scanner at home!

My supervisor, Carol, was very friendly and helped me when she could. The other people I met, like Jim who I shared an office with and Steve who showed me the internals of ancient computers, were also friendly. When I had a problem, there was always help around. I was very impressed.

Overall, I think the summer was terrific and I wouldn't trade it for anything in the world.

LieJun Deng

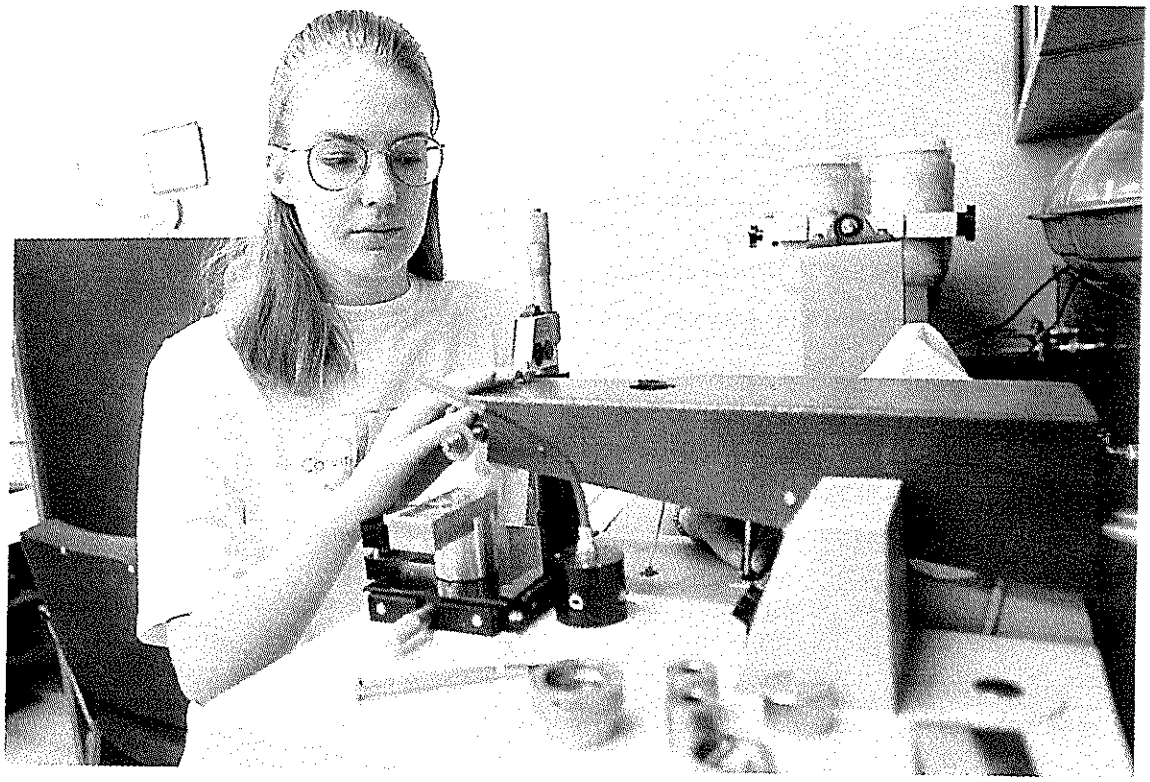
My Summer in Materials Engineering

by Cynthia Handford

This summer, I worked in materials engineering, which is the use of knowledge about the internal structure and properties of materials to create products needed or desired by society, on the research team of Dr. Douglas Ivey. My project related to a new method of producing metal powders, called the Impulse Atomization Process, or IAP. This process is supposed to produce a powder with a more uniform size and a finer microstructure, which means the powder has better mechanical properties such as strength and fracture toughness. Our job was to examine the microstructure of a magnesium alloy with 9% aluminum and 1% zinc and to compare the structure of the powder produced by IAP to that made by the more common cast method. The results of this project would be invaluable to the automobile and aerospace industries that utilize the lightweight magnesium alloys. My role in this project was sample preparation.

I started out making Scanning Electron Microscope (SEM) samples. To make these, I used heat and high pressure to create a plastic mold containing my powder. Then I would grind, polish, and etch the sample until it was ready to go to the SEM. The Scanning Electron Microscope was really cool! Many thanks to Tina, the SEM technician for showing us (the five WISEST girls in my building) her job. Tina let us look at petals, leaves, and pollen, et cetera, under the microscope. She even used strands of our own hair to show us how the Pantene commercials are done. After I made a few SEM samples, I was ready to move on.

I started working on Transmission Electron Microscope (TEM) samples. Making TEM samples was a lot more difficult than it looked, and I wasn't very good at it, but I enjoyed the challenge. This process involved cutting tiny copper discs and gluing small beads of metal into them. Then began the delicate process of grinding, dimpling, and polishing during which I broke many a sample and had to hunt for even more that were lost in the horrible, dusty place under the fumehood. To give you an idea of exactly how small these samples actually were ... they were about 2-3 mm in diameter, started off the dimpling process at



a thickness of about 200 μm, and ended up being only 30 μm thick in the center. When you could see light coming through your sample, it was time to ion mill. Ion milling is when the sample is put into a vacuum and blasted with argon gas (used because it is inert and will not react with your sample). This causes your sample to get even thinner until you have an actual hole. The TEM was also kind of cool, though I only say it once. You sit in an almost pitch black room and stare at the fluorescent green screen that shows the image of your sample.

I would like to thank all the people I worked with this summer. Thank you for teaching me how to make samples, and for many other things (especially listening to me practice my oral presentation). Thanks as well to Dr. Ivey for giving me the opportunity to work for him this summer in materials engineering.

WISEST has been a wonderful experience for me, and I am so glad I decided to try out the summer research program. It was my first real job, first real pay check, and my first time living on my own at Lister Hall, (I really loved that, even if I was a bit of a slob). I got the opportunity to meet so many wonderful people at the WISEST get-togethers, such as the Tuesday bag lunches, Wednesday afternoon sessions, and outings like Shakespeare in the Park and the Space Science Center. I know I will cherish the memories forever.

A Summer At The Devonian Botanic Gardens

By: Tara Gallagher

When I first heard that I would be working at the Devonian Botanic Gardens this summer, I was pretty excited. However, after reading my job description, I was a little leery as to what my summer might hold for me. ". . . Participating in a biodiversity study of rare Alberta mosses with work involving soil analysis and publication of documents for the Internet." Working on the Internet sounded all right, but rare mosses? As soon as I met my supervisors, Dr. Rene Belland and Karla Williamson and actually visited the Garden, any doubts I had were washed away. It's a wonderful place to work; the atmosphere is incredible, the staff are friendly, and the Garden is beautiful and tranquil. As much as I would have enjoyed spending my six weeks just wandering through the Garden, I was kept busy with a variety of tasks as well as aiding Dr. Belland with a couple larger projects.

Dr. Belland is currently compiling a list of all of the rare or endangered mosses in Canada so that list can eventually be passed onto the federal government which will give legal protection to any mosses considered to be endangered. To qualify for the list, a species must only be known from twenty or fewer locations in all of Canada. The tough part is that there is no dream list where every location of every species is documented so the information must come from many different sources, like data bases, books, maps, and a lot of Dr. Belland's own field research. That's where my job came in. I had to go through some different data bases to try and eliminate the common mosses off of the list. It took some time and was a little monotonous, but it's rewarding to see that our original list of fourteen pages is finally down to four, and is much easier to work with!

Another project that I was working on by myself was testing the pH of some soil and rock samples. It's an incredibly easy but time consuming task. Each rock (about 86 of them) had to be powdered so I spent some time smashing rocks with a hammer. I don't think that my neighbors in the building appreciated the noise too much!

Finally, I spent some time working with Megan Flanders, another WISEST student. Together, we potted plants and did some plant collecting, which is getting samples of some of the plants in the Garden. These were some fun times because Megan, if you remember, we had some fairly interesting conversations while singing along to the radio!

I've really loved my time at the Garden and I'm looking forward to possibly returning to work again next summer. I made some new friends, had fun, and learned a lot both about the University and working in general. Thanks to everyone involved in the WISEST program; the organizers, volunteers, and other participants as well as everyone at the Devonian Botanic Garden. This has been a great summer.

Yours truly,

Tara Gallagher

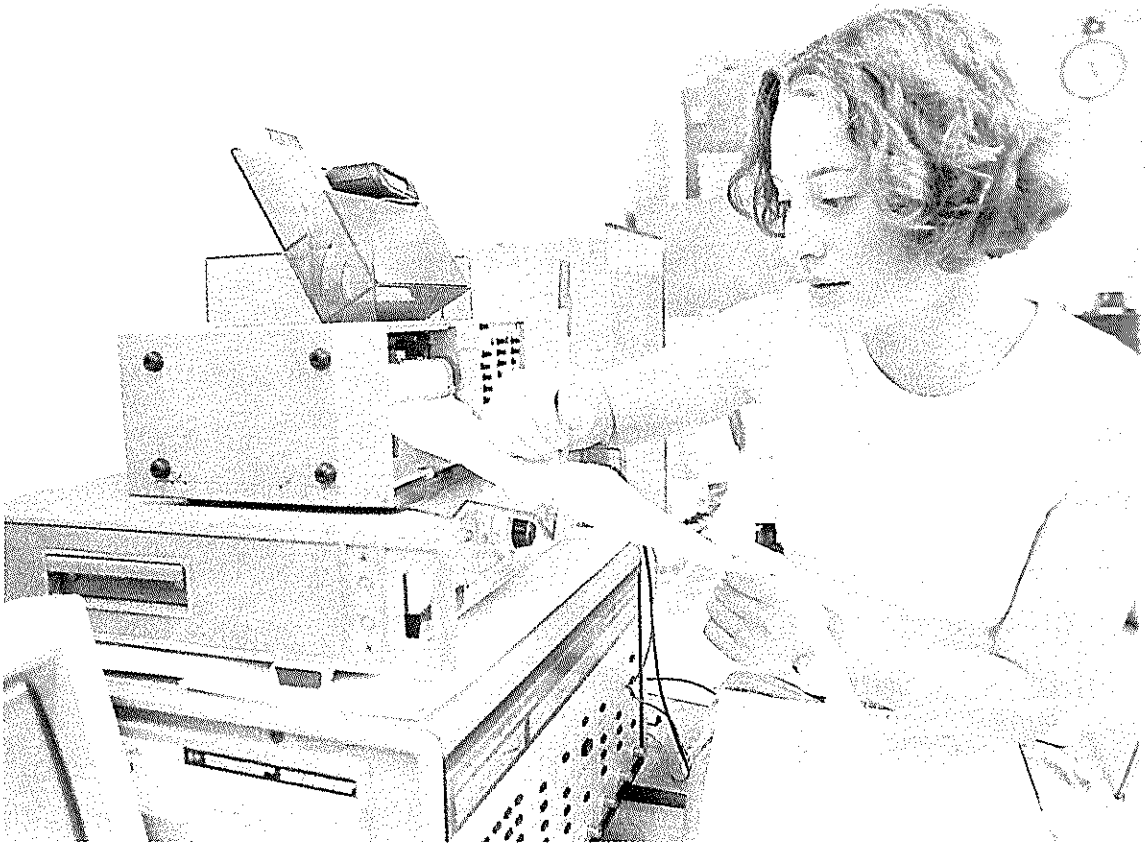
Tara Gallagher

THE BEST SUMMER JOB

On May 24, 1997, I received the best phone call. I was absolutely thrilled when I found out I was accepted into the WISEST Summer Research Program. I was a little nervous on my first day of the program, but met 49 others that felt the same way. I instantly fell in love with the job! I enjoyed my project and the people I was with. I was placed under the supervision of Dr. Jingli Luo in the department of chemical and materials engineering. My first project was to determine the relationship between potential (energy) and current (the rate of electron movement through the circuit). I quickly learned how to use all of the different equipment that the corrosion engineering lab had. I mainly used a potentiostat. This machine measured the current while I controlled the potential. Although I had my share of troubles with the machine, my tests were for the most part successful. I concluded that the relationship between current and potential varies, depending on the electrode and the solution. I eagerly moved on to my next project: testing the capacities of different battery electrodes to find out which composition was the most efficient. I ran my tests on a galvanostat. This machine worked much like the potentiostat, only it measured the potential while I controlled the current. These tests were the most frustrating! I just could not get the expected results! Sometimes, it took weeks before I created an electrode that even had a capacity! I even overcharged the first electrode that I made, and all of the metal alloy powder that it was made of, fell off! I made and tested many electrodes, but I have not found any of them to be more efficient than ENERGIZER!

While my lab activities were educational and exciting, the WISEST activities were excellent, too. My favorite was the picnic in Rundle Park! We're going to have to get together again so we play on the slides and play tag! I also enjoyed such things as the bag-lunches with Renate, Ping-Pong at lunch (and early morning!), and interviews. giving a tour to Dr. Mary Ferherst, a chemist from DOW Chemicals also proved to be a valuable experience. She answered alot of questions for me, clarified alot of information, and invited me to job shadow at DOW! This certainly was a great opportunity for me!

I also enjoyed the oral presentations. I thought it was very interesting to learn about what everyone else had been learning. I thought it was an excellent idea to do oral presentations, and I found it really neat. I'd never made overheads before!



I MADE ALOT OF FRIENDS DURING MY WORK AT THE UNIVERSITY. I GOT TO KNOW THE PEOPLE IN MY BUILDING, OTHER GIRLS IN WISEST, AND I BECAME GOOD FRIENDS WITH A COUPLE OF PEOPLE WHO WERE FORMERLY IN WISEST.

MY SUMMER EXPERIENCE AT THE UNIVERSITY WAS VERY ENCOURAGING. THERE WERE THREE PEOPLE THAT I GOT TO KNOW IN MY BUILDING THAT WERE IN WISEST. EACH ONE OF THEM IS NOW IN ENGINEERING! I HOPE I SEE THEM IN A COUPLE OF YEARS WHEN I AM BACK AT THE UNIVERSITY STUDYING ENGINEERING!

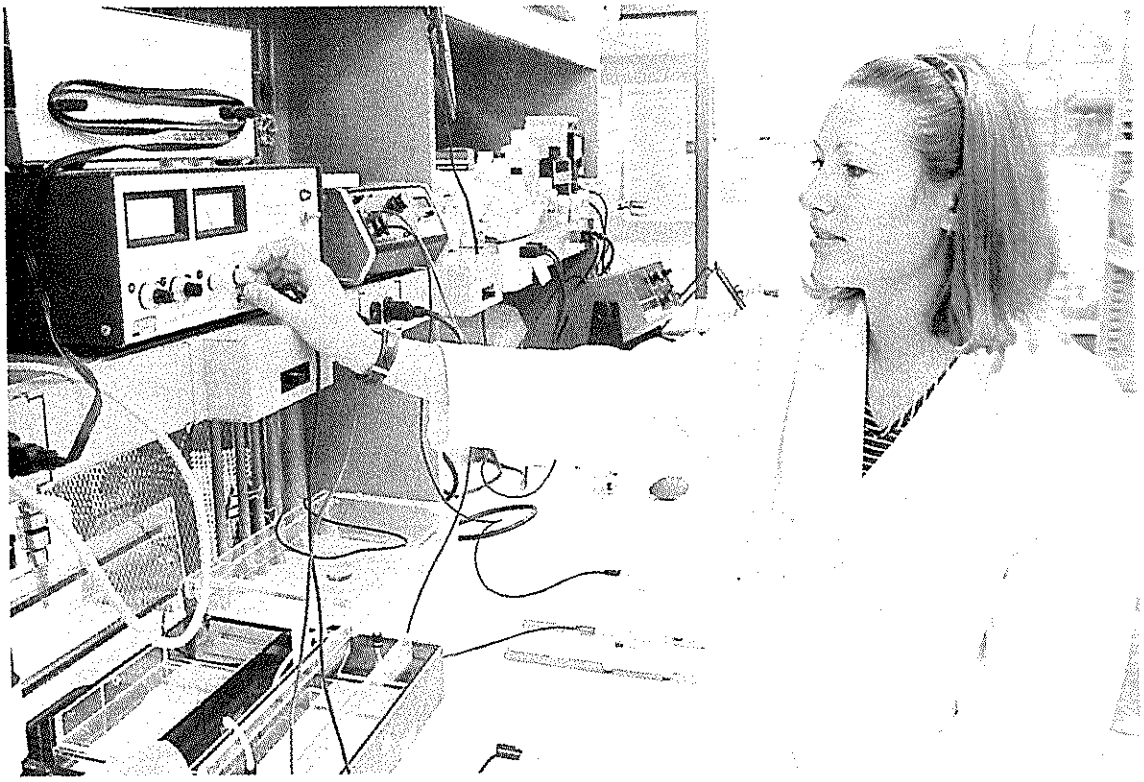
THROUGH MANY QUESTIONS AND DIFFERENT EXPERIENCES, I HAVE DECIDED THAT I WANT TO BE A CHEMICAL ENGINEER! I WOULD LIKE TO THANK RENATE AND GRACE FOR GIVING ME THE OPPORTUNITY TO DISCOVER MY GOAL! I ALSO WANT TO THANK ALL OF THE OTHER WISEST ADMINISTRATORS. I THINK WISEST IS AN AWESOME PROGRAM, AND EVERYBODY SHOULD BE ABLE TO EXPERIENCE IT!

THANK-YOU,

Mae Mullen

My Summer Playing With DNA

For the past six weeks I have had the privilege of working in Dr. Stemke's lab. He is in microbiology and does research on deoxyribonucleic acid (DNA). Jasmine Pui and I worked together. We were given two different plasmids which had inserts in them. We had to grow them up over night so that there would be enough material to work with. The DNA then had to be extracted from the cells. This was done by lysising the cells which breaks open the cells and lets everything out, including the DNA. The plasmid DNA has to be separated from the bacterial DNA which was used for replication. This is done by centrifuging. Once the DNA is extracted, we added certain enzymes to digest it. Each enzyme has a certain site that it cuts at. If the enzymes cut where they were supposed to, we could use this to tells us if the insert was really there or not. Agarose gel electrophoresis was used to tell this. We added a loading dye to the DNA to make it dense and then added it to wells in the gel. DNA has a negative charge so when a current is added the DNA is pulled towards the positive electrode. The smaller pieces move faster separating the DNA into bands. The dye which is added is also used to show how far the DNA has moved in the gel. The distance of the bands are graphed and compared to a standard. The graph tells us if the enzymes have cut in the right place or not. We also ran gels to find out if we had DNA at all and to find the concentration of it. The



DNA was then given to another person to find the sequence of it. With the sequence known, we could see if it was the right insert and make sure it was still there.

I learned many thing this summer. A couple of examples are: a need to keep things sterile, record procedures and results, label properly, follow instructions exactly and a few valuable life lessons from Debbie, the under grad student who would help out and keep us company. I also got to know the University campus a lot better. I am glad to have had this opportunity this summer.

Aysha Seagrave

Aysha Seagrave

An Icy Summer

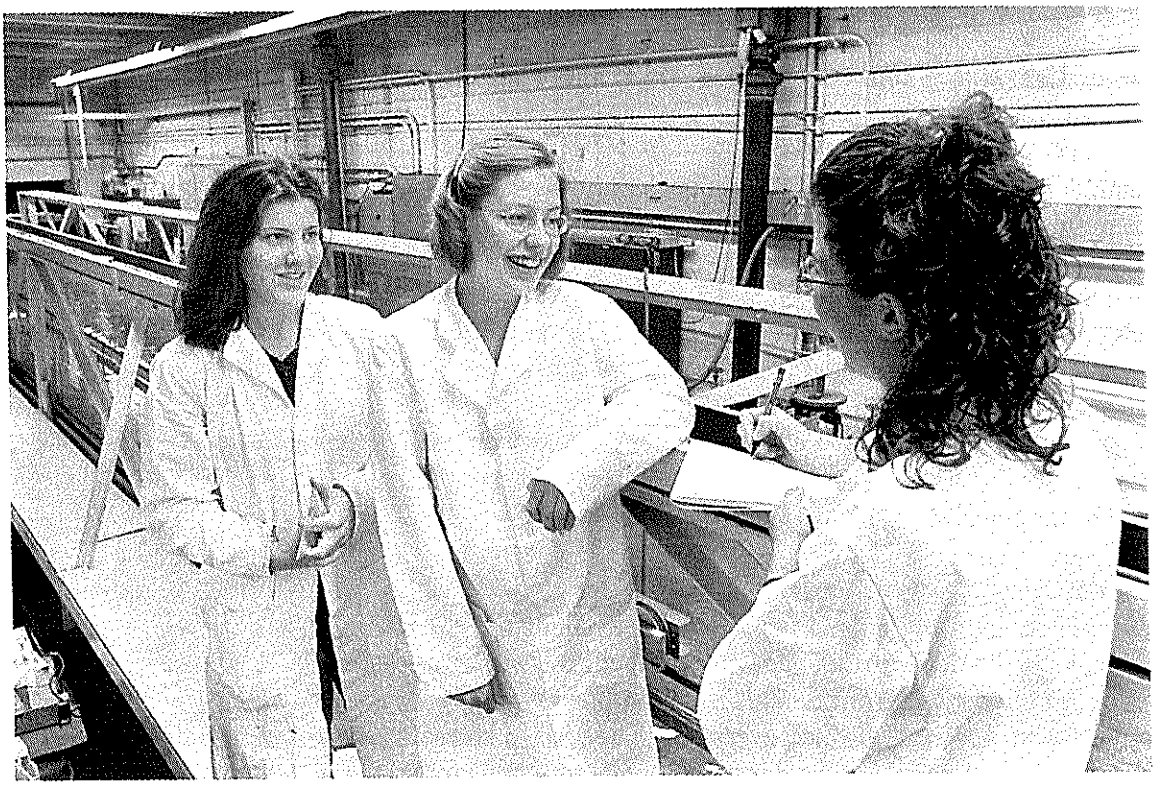
The research project that I participated in was conducted in order to determine what effects unsteady flow has on river ice jams. The project was executed in the T. Blench Hydraulics Laboratory using physical modeling. The results of this project will further the current understanding of ice jams and will contribute to the prediction of ice jams and flooding due to ice jams. Dr. Hicks, a Professor of Civil Engineering at the University of Alberta, along with Marta Dmytruk, a graduate student, is conducting this project. At the time that I began working on this project, the project itself was also just beginning. As a result, the work in which I participated varied from day to day and gave me a full spectrum of research experiences.

My first task was to gain some basic knowledge about ice and ice jams. To achieve this, I read many chapters from various textbooks and watched several videos and slide shows. This independent reading led to a meeting with Dr. Hicks in which she answered my questions and clarified any confusion that lingered. Once this reading was done, I searched through sections of the Cameron Library and through the filing cabinets of the Hydraulics Lab to find research papers on ice jams and physical modeling of ice jams. Once these papers were collected, I began the task of reading through many of the papers and providing vital statistics about them in the form of short reviews. Through reading these papers, I received some helpful hints on procedures and methods used to model an ice jam.

Moving from behind a desk into our lab requires a brief description. Our experiments and measurements were all conducted on a large yellow flume located within the walls of the T. Blench Hydraulics Lab. A flume is defined as an artificial watercourse. Our flume was 31.56m long, 1.14m wide, and 0.555m deep, with an adjustable slope. It was raised about four feet off the ground and had a walkway running alongside it to allow us to take measurements.

Two instruments were used for the measurements, a point gauge, and a level. A point gauge is used to measure water surface profiles and flume bed profiles. The level was used to verify the flume bed measurements taken by the point gauge. The ice jam was simulated by using various shapes and sizes of polyethylene pieces. Polyethylene plastic is used because its specific gravity is comparable to that of ice. A stationary 'ice cover', simulated using a piece of plywood, was used to initiate the jam formation.

The first step of our experiment was to take measurements using the point gauge. Marta would adjust the flow and we would take measurements at half metre intervals along the entire length of the flume, including both water surface and flume bed measurements. Each set of measurements took about two hours to collect. We preformed these measurements on three different flume slopes and about six different flows on each slope giving us a total of about eighteen sets of data. Each set of data was plotted on a graph using Microsoft 'Excel' along with a set of calculated data. The calculated data was used to determine a roughness coefficient, Mannings 'n', for the bed. A range of values for Mannings 'n' was determined by manipulating the calculated values graph to match the measured values graph as closely as possible. When this was achieved, the final range of the Mannings 'n' was used to determine whether or not a textured substance should be added to the flume in order to achieve a fully developed flow more quickly. A fully developed flow is necessary because it is the condition that exists in natural rivers.



Marcie Reinhar
Katherine Leicl
Marta Dmytruk
(left to right)

The next stage of the procedure was to attempt to simulate an ice jam in steady flow conditions. The stationary 'ice' cover was lowered into the flume and small polyethylene pellets were added into the upstream end of the flume. We tried to achieve maximum input of ice into the flume but also minimal splashing. The first few attempts to create an 'ice' jam did not produce the desired 'thickened' ice jam. Video recordings of each ice run were taken and analysis of the tapes provided insights into methods to create the desired jams. We then tried to use our largest pieces of 'ice' to create a jam...and succeeded! Marta manipulated the discharge to determine the maximum discharge under which a stable jam could exist. Once the jam is stable, water level measurements and ice jam thickness can be determined. At present, we have been able to create 'ice' jams in steady flows. The next step will be to attempt an unsteady flow situation and observe the outcome.

Throughout the past six weeks, a hands-on, learning experience has been given to me. Indescribable amounts of knowledge have been offered through this experience. Learning about ice jams and floods enabled me to get a taste of Water Resources Engineering. The reading, the in-lab experiences, and the analyses have provided a glimpse of the work that is involved in research. In addition, volumes of knowledge on the value of team work, communication, and cooperation became available on a daily basis. The list of what I learned could continue forever, including such experiences as working in a full-time job, and accomplishing even small practical successes. I am pleased to have been fortunate enough to participate in such a valuable program and I realize that without the involvement of certain people, I might not have been so lucky. On that note, I'd like to thank the staff of WISEST, Dr. F. E. Hicks, Marta Dmytruk, and the staff of the Hydraulics Lab for giving me the opportunity to participate in such a wonderful project.

-Katherine Leicht

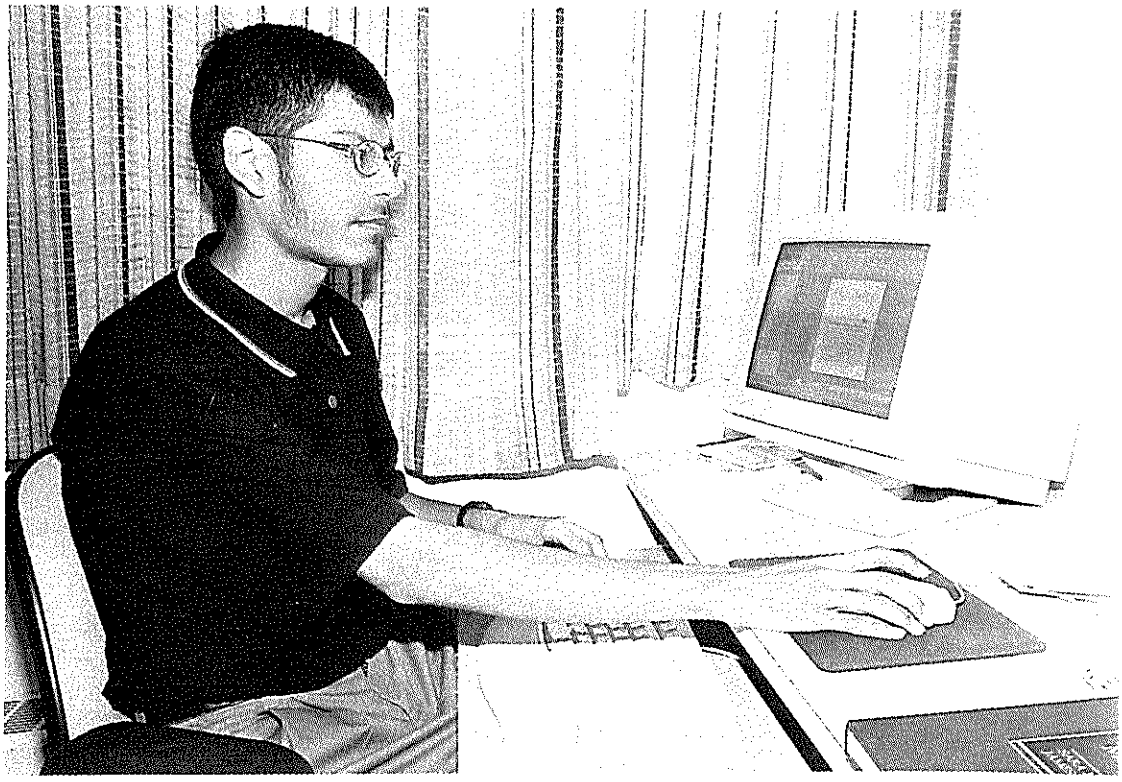
A Summer Learning About Metabolism, Iron, and The University of Alberta
By: Shaheed Merani

This summer I spent my time working in the Department of Agricultural, Food and Nutritional Science in the Agriculture-Forestry Building at the University of Alberta. It was an experience I will never forget because of all the people I met, the experiences I went through, and most of all for the knowledge I gained. Through the WISEST Summer Research Program I worked six weeks on two research projects: the first project looked at women with metabolic rates either higher or lower than what would be predicted for them; and the second project was an investigation of how iron status depends on beef consumption in teenage subjects. My supervisor was Dr. Linda McCargar. Dr. McCargar headed the iron and beef study, but most of my time was spent working with graduate students. Jacqui Gingras was a graduate student working on completing her masters and was also responsible for conducting the metabolic rate study.

The first day of work was very exciting, I met all the students who were working in the department over the summer and learnt about their projects. Jacqui gave me a list of things that I was to do over my six weeks in the department. The work seemed overwhelming, especially since I did not have a clear understanding of the project. This small problem was solved as the day went on. I spent most of my time with Jacqui, she explained everything I needed to know about her project as well as introduced me to the people in the department. She took me around the building and showed me her office, the labs, and room 4-04. Room 4-04 was where I spent most of my time, this room is also known as the Metabolic Testing Unit. Although the name makes it sound like some large ward of the Agriculture-Forestry Building, it is only a small room with a machine to measure resting metabolic rate and a desk with a computer. There is also a smaller room inside called the "washroom", but it is more of a storage room than anything else.

As the days went past I grew more and more comfortable with the Agriculture-Forestry Building, as well the people with whom I was working. My first few assignments included scoring questionnaires that were filled out by subjects in the metabolic rate study. Three of the four questionnaires had keys to them, and therefore were fairly easy to understand, but the fourth was the longest and had no real key. This questionnaire was called the Food Frequency Questionnaire (FFQ), a large list of foods with blanks in the right hand column to fill out how much of that food a subject would eat in the average day, week, or month. My job was to find a way to calculate the total calories, as well as the amount of proteins, carbohydrates, and fats that the subject consumed in an average day with the information provided through the questionnaire. I was equipped with references that outlined the nutritional value of common foods, as well as a very powerful computer program called The Food Processor. This program has the capability of finding the nutritional value of a meal, recipe, or daily intake of food. The only problem was that the program has 13,163 food items documented and I had to find the ones that matched the food items on the FFQ. For example the FFQ asked how many apples the subject would eat in a day, The Food Processor documents 10 different types of apples, and 13 more dishes with apples as their main ingredient. This experience was frustrating, but there was much to be learnt about foods and their nutritional value.

I also helped with the metabolic rate study by preparing the results package. This was a small package that will be delivered to the subjects once the data has been collected and analyzed. This package was customized for each of the 30 subjects, including all the data that had been collected about them as well as averages for the group in the study. I also helped with lab work on two occasions, helping to prepare standard solutions of glucose that could be compared to the blood taken from the subjects in the study.



The iron and beef study was just beginning when I came to the department. A grant had been applied for to fund the project, and a questionnaire was in the process of being developed. Dr. McCargar had drafted two questionnaires that were to be used for determining the beef consumption as well as the knowledge about beef that was possessed by the subjects in the study. She asked me to review the questionnaires and suggest improvements. I had to read about iron, beef, questionnaires, and the proposal of the study to gain a greater understanding of the project before I could help Dr. McCargar. The reading that I did at this time along with all that I had learnt from scoring the FFQ for the metabolic rate study made me more aware of the importance of eating healthy food and taking care of your body through a balanced diet and exercise. At this time Dr. McCargar informed me that she would be using the same FFQ that was being used in the metabolic rate study in the iron and beef study. Since I had already developed a way of scoring the questionnaire, I was to create documentation on how someone would go about scoring the questionnaire in the same way I had.

By this time it was approaching the end of my stay in the Department of Agricultural, Food and Nutritional Science. One of the last major assignments that I was instructed to do was search for articles in medical journals that applied to the research that was being conducted in the metabolic rate study. I spent several days just learning how to operate the computers at the John W. Scott Medical Sciences Library. This was a great experience and I know that it will serve me well in the future when I have to search for journal articles for myself.

On the whole my stay at the university was a learning experience. Not only did I learn about metabolism and iron, but about university. By speaking to students at the university I was able to learn more than I had in the past couple years through reading books. It was also a fun experience, the friends I made through WISEST and the people I met through work were great. They encouraged and taught me many new things.

MY FIRST JOB

When I received the phone call that I was accepted into the WISEST program, I was both happy and terrified at the same time. When I first found out about the program, I knew it would be a helpful tool in determining what I would do with regards to my university education, which is about a year away. I had an idea of what field I might be entering but like most of the students I've met in the program, I did not really know for certain. I felt that I did not have sufficient information about my choice and I still had many questions. I had hoped that the program would help answer some of them. But I wondered about what I would be doing for the six weeks? When I found out that I was working on a project that involved the detection of a landmine, I panicked. What did I know about landmines? I knew that if you stepped on one, you would either be killed or injured. I felt totally unprepared.

The first day was probably the most difficult. When I entered the room, I saw unfamiliar faces. I had a little struggle finding my way around the campus that morning and my stomach was full of butterflies. But as the day progressed, I made new friends, received a whole folder packed with information and I met my supervisors, Dr. Ken Fyfe and David Skaley. They took me to the building where I would be working (Mechanical Engineering) and gave me a thorough introduction of their project and what I would be doing for the next six weeks. Suddenly I lost the butterflies in my stomach and fear turned into excitement.

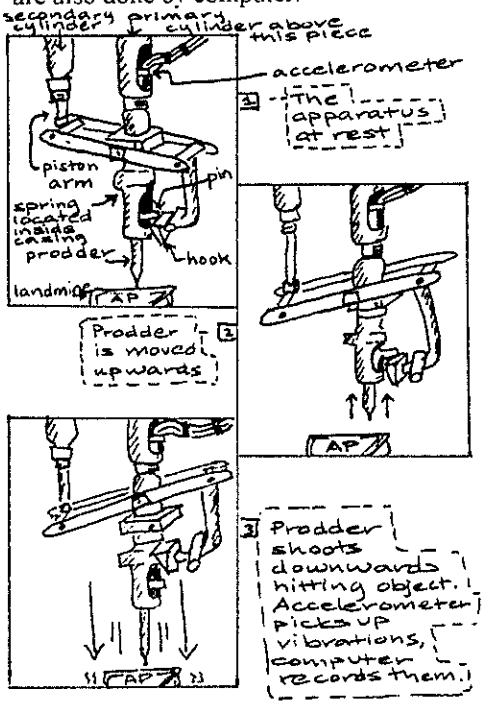
The first impressions Dr. Fyfe and David Skaley gave me about the project was that it was an important one. I really felt that there was a real purpose for that particular research project, and I soon learned why. If one were to think about a few of the major problems in the world that we should solve, it would be easy to come up with the obvious problems. They include world hunger, poverty, disease, pollution and etc. but there is another problem that not enough people are concerned about. That problem deals with landmines. There are over one hundred million landmines scattered in over sixty different countries. A few examples of the countries with this horrible problem is Bosnia & Herzegovina, Croatia, Iraq, Cambodia and Angola. Each month more than two thousand people are killed or maimed by these

buried killers. The victims were probably farming, or gathering firewood, or maybe they were children just playing and having fun.

That is the main reason why demining is so important. Current detection methods are either too dangerous, too costly, too time-consuming or has a large false alarm rates. It is a race against time so more efficient methods of detection are being researched.

The project I worked on involves a prodder that takes information, or vibration signatures. Tests were done on different materials: an anti-personnel mine (designed to explode when a person steps on it), three anti-tank mines (explodes when vehicles runs over them), fakemine, wood and steel. There were also tests done in different conditions. For example, tests were done on the surface of the objects, with the objects buried under dry soil at different depths as well as wet soil. The vibration signatures can later be analysed. The different properties (in the signals) found for the different objects can later be used to help automatically determine which vibrations come from landmines and which vibrations come from other types of material.

The following is a simple explanation of the apparatus and how it operates. The basic structure of the device is a double pneumatic cylinder system, which is supported by a steel frame. A steel prodder is propelled to strike the object and an accelerometer, attached to the prodder, will record the vibrations from the prodder. The entire process is controlled by a computer and the data recorded from these tests are also done by computer.



The primary cyclinder is placed so that the prodder is in contact with the object beneath it. The secondary cylinder controls the movements of the hook.

The hook slides over the pin, which is attached to the prodder, and pulls the prodder in an upward direction. At the same time, this compresses a spring located near the top of the prodder inside the casing

The pin does not travel as far a distance as the hook. Therefore, the hook just slips over the pin. The pin is left only with the energy in the compressed spring and gravity to shoot it downwards. The prodder strikes the object and the accelerometer records the vibrations produced.

The WISEST program was not all work and no play. There were many social events organized like Shakespeare in the park, the group discussions and not to mention the field trips. So not only was the program educating but fun as well. It was truly a memorable experience.

I would like to thank Dr. Ken Fyfe and David Skaley for making sure I learned something new everyday, and also for answering my many questions about the project, university and life. I learned so much from the both of you.

Lastly I would also like to thank all the WISEST administrators for giving me this wonderful opportunity. I am certain that I am interested in the field of engineering. The WISEST program has given me that little push I needed. Thanks again for the *stepping stone*!

------Sheryl Vi Fajayan

THE SMALLEST BACTERIA THAT EXIST: *MYCOPLASMAS*

When I received a phone call informing me that I was one of fifty students chosen to take part in the WISEST Summer Research Program, I became awfully curious and began wondering what research was actually about. I was rather excited when a letter from the mail told me I was working in the Department of Medical Microbiology and Immunology with Dr. Janet Robertson. I began looking forward to the day I was to meet my supervisor and other laboratory associates.

Soon, I discovered what my research study exactly dealt with. I was to work with the smallest known form of life, besides viruses, called *Mycoplasmas*. I worked with *Ureaplasma urealyticum*, a particular kind of mycoplasma. They are present in the genital tracts of many people, but usually not a problem. However, if ureaplasmas are present in a women giving birth, her baby will aspirate some from the birth canal. If these ureaplasmas thrive in the environment, they will eventually spread to the respiratory tract, causing further complications, such as pneumonia. This occurs especially in underweight babies (less than 1500 grams) because they must be incubated; this process encourages the growth of ureaplasmas.

Receiving baby specimens (baby spit) from low birthweight babies, the job of our research team was to first determine whether the specimen contained ureaplasma or not, and various methods were carried out to determine this aspect. The first thing that was done was the set up of cultures of baby specimens in different environments called *media*, to grow the bacteria in. The most common kind of medium I used was called b-broth. A simple color change, from yellow to green in the culture, would indicate the presence of ureaplasmas. Microscopes were also used to determine whether ureaplasmas were present.

If there was ureaplasma present in a particular baby specimen, then to determine whether it was one type or another (parvo or T960), the *Polymerase Chain Reaction* (PCR) was used. This method permits the amplification of DNA large enough to be studied. It involves the centrifugation of a certain specimen, then the addition of various ingredients to isolate just the DNA. Once this DNA is put onto agarose gel, an electric current is ran through to separate the DNA into horizontal bands on the gel. An ultraviolet light permits one to take a picture of the gel to view the bands. The presence of bands indicates a positive for the test being done—either for the presence of parvo or T960.

Once it was known for sure that a specimen contained ureaplasma, antibiotic testing began. During the summer, I mainly worked with finding appropriate and effective antibiotics to work against ureaplasmas. This type of testing, *broth dilution testing*, told us the *minimum inhibitory concentration* (MIC) of an antibiotic needed for it to be effective. In this test, I used different concentrations of antibiotic to test on various baby specimens. The MICs were then obtained and compared to each other to determine the most effective. One reason why the effectiveness of antibiotics vary, is because some work immediately against ureaplasmas, while others must break down
first, in order to work. Cost, availability, and side effects are some other factors that also are considered when choosing the proper antibiotic.

The next step in this research study is to correlate the results and prove various things with the proper data.

Throughout this six-week research program, I have learned to use various equipment around the laboratory. For example, Pasteur, Eppendorf, and battery-operated pipettes, the centrifuge, various microtiter equipment, and gel electrophoresis equipment. Furthermore, I have also learned how to carry out various methods and different techniques used to study bacteria, which I have discussed above. I have

also done some simple tasks during the summer, such as filling pipette tips in boxes and computer data entry. Finally, different problems were also encountered during experiments—both minor and major—but with a little thought were solved. By encountering and solving these problems, my knowledge about ureaplasmas was strengthened.

Apart from laboratory work, there were also various social activities with the other WISEST students that were plenty of fun. "Bag lunches" on Tuesday at the Students' Union Building, and Wednesday afternoon activities, such as the University Campus Tour, the visit to Celanese Canada, and the group discussions with people in non-traditional careers, were always looked forward to. I would like to thank Renate Pfeifer and Grace Ennis for arranging these and other events, such as Shakespeare in the Park, Tea at the Rutherford House, and the visit at the Space Science Centre. Each activity was enjoyable, and a very good way to socialize with the WISEST students working in other laboratories.

I would also like to thank my supervisor, Dr. Janet Robertson, who taught me many aspects of research, both theoretical and practical. She helped me learn about her research study and she helped enhance my laboratory skills. Tabitha Chiu and Ilein Chen have also been an enormous help in the laboratory, and it was quite enjoyable working with them. All in all, it has been an honor to be chosen for the WISEST Summer Research Program. This invaluable experience has been interesting, educational, and has given me a positive introduction to the area of scientifical research.

Sajal Patel

Department of Medical Microbiology and Immunology

The Meanook Lab

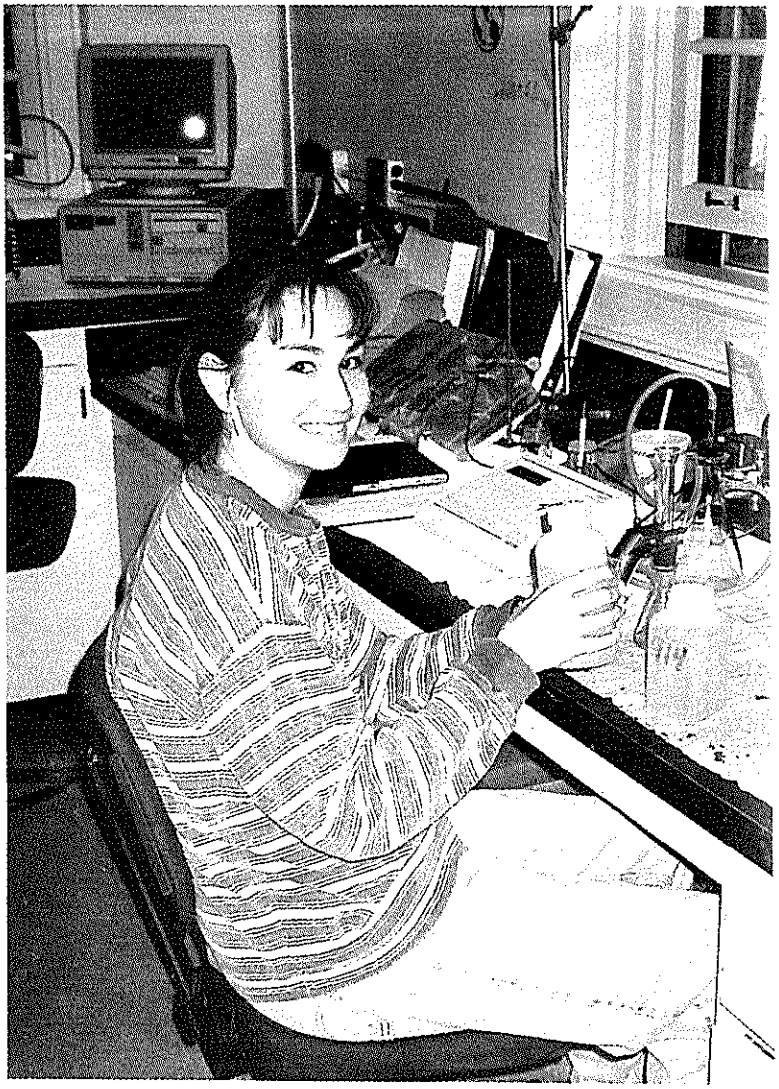
I spent my summer in the Limnology lab at Meanook. There we tested the water quality of several lakes and streams around northern Alberta. We got water samples through two different programs, NCE and TROLS (Terrestrial and Riparian Organisms, Lakes and Streams). TROLS is a program that is studying how deforestation effects aquatic habitats. There are three different lakes that have four buffer zones of forest around them from 20 meters to 800 meters. By studying them they can tell how much forest should be left around the lakes to maintain a stable environment.

I played only a small part in this study. Over the summer I learned how to do several of the tests on the raw water samples. The first one I learned was PH\Alkalinity. That was done through an automatic titrator. Other simple tests I learned were for conductivity, colour and CHN's (Carbon, Hydrogen and Nitrogen). For CHN's I ran the sample through a filter which was sent to Edmonton to be analyzed. Colour was read on the spectrometer.

I also took part in several other more complicated tests TP, TDP and SRP which all deal with Phosphorus. These tests included filtering, adding reagents and a variety of chemicals. Then the data was gathered through the spectrometer and weighing dishes. Another test was for chlorophyll which involved adding methanol to ripped up filters, letting it sit over night, filtering and then reading it on the Spectrometer.

Menial tasks were also part of my jobs in the lab. Everything had to be cleaned in the acid baths and then filtered with DDW (Distilled Deionized Water) seven times. I did book work which involved copying down numbers, averaging and entering them in the computers. Rinsing tubes, washing dishes and emptying the oven were also on the list of things to do.

I learned several things about working in a lab and the process of gathering data, but I didn't get to see the end results of my work. I saw the numbers from the tests but as I was only there for part of the field season and the analyzing is



done in Edmonton, they didn't mean anything to me. I had to be content knowing I was helping out in my own small way.

I really enjoyed my time at Meanook. While I worked in a lab and didn't get to go out in the field, I still got to see other projects working out of Meanook. I occasionally visited the ponds and got to help Thea with her frogs. I got to see what it was like at a research station and also experience living there. I really liked spending my summer at Meanook and all the people I met there. I'll especially miss the basketball games, the trips to the Shop Easy in Athabasca and the late night ice cream snacks.

By Laura Van Veen

Troubleshooting with Esther Bausch at the Laser Lab

What have I gotten myself into? This was my first reaction to the call of acceptance from WISEST headquarters. I was planning on turning it down until my dad convinced me to go. Well here I am, and I must say, it has been a great experience. Six weeks away from home, a big city, people that I've never seen before, and my first paycheck, which I managed to loose. Life over these weeks has also been quite relaxing, as work was not as fast paced as I had expected.

On the first day, my partner and I were assigned to our individual projects. Both of us still seem to like the other's project better. It's been great having Jeena around for the times when I was out of work and could help her out or just talk. She'd call me whenever brute force was required to get a job done, and sometimes I'd supply too much strength, which was evident when three cable ties snapped in a row. Others in our lab seemed to enjoy our joyful chatter until we noticed that one guy moved downstairs. But the lab is so quiet and hardworking, they needed some sunshine to brighten their dull days. In all, I like where I was put, and even though my project was not too thrilling, it had its benefits.

My project dealt with the amount of UV light coming through various fabrics. It was up to me to find out how much percent cover each sample of cloth provided. To do this, I placed the sample between a UV emitting mercury lamp and a camera linked to a computer which picked up the amount of light coming through and converted the resulting image to digital. Different computer programs then analyze the digital image. One of which finds the average light of each pixel on the sample image, full illumination, and background image. The averages create a new image which using another program gives us the light transmitted through the sample and through the covered areas or fibers. Another program is then used to find the percent cover. I choose a threshold, which separated the dark areas from the light areas to best match the sample image. Throughout the six weeks I have taken about 300 images with the camera and run various programs around 800 times. My days were spent sitting in front of a computer or just waiting for something to do.

Through my time at WISEST I learned a lot about computers. I now know how to mess up the screen to annoy coworkers, run many different types of programs, play computer games, send documents to printers across the building and make a printer print endless pages of nonsense. Even the people in charge were scratching their heads, trying to solve my computer problems. At least it kept them awake. During WISEST I had much time to talk to people from various cultures such as India, Kuwait, Saudi Arabia, and Pakistan. I even had a lesson in the religion of Islam.

During my time at WISEST I have been fortunate to work under the direction of Dr. Robert Fedosejevs in the Department of Computer and Electrical Engineering. Atiyah, a third year student, was placed in charge of me, and had a hard time keeping me in line. We had a great time bugging each other, talking, making fun of Jeena, and that kind of great stuff. Atiyah was always around to trouble herself with my computer problems. She was a great person and I'm glad she was my 'boss', even though she had a certain air of superiority about her. A hot, stuffy lab such as the one I was stuck in, is not the ideal way to spend the summer vacation, but working with great people, a few life carving experiences and a paycheck to top it off made it all the more bearable.

"WISEST in the S.M.R.I."

Instead of sleeping in until noon every day this summer, I have been forced to rise daily at seven o'clock a.m. No, I wasn't getting up to watch "Everyday Workout," but instead to participate in the great experience of working in a lab at the University. Under the supervision of Professor Thomas A. Churchill of the Surgical Medical Research Institute I have gained insight into the wonderful world of the metabolism of organ transplantation.

The research being done in the lab I visited is attempting to find new ways of preserving organs and maintaining their viability in order to transplant them. One of the main problems with transplanting organs is that they need to be cooled down to prevent degeneration of the tissue. However, this cooling down also slows down metabolism, thereby reducing the energy supply to the cells. As well as being cooled down the organ must be flushed of blood, and perfused with a standard solution. Unfortunately, with no blood supply, the tissues are denied oxygen, which is necessary to the metabolic pathway providing the cell with most of it's energy in the form of ATP. With oxygen the cell can produce approximately nineteen times more ATP then without oxygen.

One way to alleviate this problem is to somehow provide the cells with oxygen while they are out of the body. This is the problem that I was working on. The way we have been trying to provide oxygen is by flushing the organ with a solution made up of hemoglobin, the body's natural oxygen carrier. Hemoglobin can be made to both bind and release oxygen, so by

flushing the organ with oxygenised hemoglobin we could allow the cells to continue producing enough ATP to maintain normal energy levels. So far, we are still trying to find a workable combination of additives, pH, and temperature to get the hemoglobin to release it's oxygen.

Besides gaining insight into the daily life of a researcher, I had fun and met a lot of interesting people. Thanks Chrissie and Jenn for helping me when I was completely lost, and Tom for keeping the Horn of Dishonour the entire time I was there (and teaching me about units over and over again). I really appreciate the opportunity given to me by everyone involved in WISEST as well.

Brenley Bennett

Fish And Friends - An Incredible Summer

The summer of 1997 will probably be one of the memorable times of my life. Past summer holidays seem very boring and bleak compared to this latest one, which I spent participating in the WISEST program.

All summer long I only watched four television shows, since I had so many healthier activities to participate in. During the evenings, I went for cool summer walks, exercised at the Van Vliet center, (doing more gazing than sweating), visited Klondike Days, went shopping, and relaxed.

However, the mornings and afternooons in the Biological Sciences Building were much more interesting. Aside from being trapped in Elevator 91 in Biological Sciences for half an hour, the days progressed smoothly. In my lab, I studied the survival of fish with two wonderful graduate students, Sue Kiesling and Kim Howland, under the supervision of Dr. Tonn. With Sue, I collected data for the field experiment that she conducted on fathead minnows. On Tuesdays and Thursdays, Kim allowed me to feed and maintain her 2000 baby inconnu. The young fish are kept in a secured area in the basement of the Biological Sciences Building. Naturally, since I am such an angel, I received my own security pass and a set of keys to the building. Hee, hee, hee! I soon learned that taking care of fish is a very WET task. For the first few days I wore only my sandals. But, after a few wet water accidents I succumbed and brought my oversized rubber boots with me to work. Suprisingly, I have actually become quite fond of fish.

Through participating in this program, I have gained valuable computer and communication skills, knowledge and work experience. As well, I have been granted exposure to "University Life". I come from the small town of Barrhead where women in science related fields are very scarce. Having the opportunity to work with Sue and Kim was very beneficial to me. They were able to answer all of

my questions and they have become my role models, as I hope to follow in their footsteps in the field of Biology. Through the WISEST program, I have also discovered that it is acceptable not to map out one's entire future before entering university. Furthermore, many people actually attend university in order to discover their true interests and identities. My experience in the WISEST summer research program has been very informative as well as amusing. I was extremely fortunate to have been selected to take part in this program.

Julie McCormick

Discoveries Despite

Sarah Chapelsky
Laboratory Medicine and Pathology

During the six weeks I have spent working in Laboratory Medicine and Pathology, I have seen many of the techniques I had learned about involving DNA testing lifted off the page. DNA digestion, electrophoresis, and the use of radioactive probes seem less foreign now. Often, things turned out to be much more complex than I thought, while others weren't quite as difficult as I had anticipated. I was often disappointed when I found out the job I was to perform didn't take place in a special room or involve a big machine. At other times, I was surprised at the amount of labour that is involved in obtaining results and the little strokes of genius you encounter on the way.

My project involved working with the DNA of families in which the daughter has co-arctation of the aorta. This narrowing and partial blockage of the artery is life threatening but may be surgically corrected after birth. Among females with Turner's syndrome (who receive only a single X chromosome rather than the usual XX pair), co-arctation is prevalent only among those whose X chromosome is maternal. The affected females I studied have two X chromosomes, so I looked for two possible abnormalities that would mimic the X chromosome activity in Turner's syndrome females who commonly have co-arctation of the aorta:

1. Although females normally have two X chromosomes, one is randomly inactivated in each cell. If this process were nonrandom, so in each cell the paternal X chromosome was inactivated, only the maternal one would be active throughout the affected female.

2. Generally, a female receives one X chromosome from her mother and another from her father. Perhaps females with co-arctation of the aorta receive two maternal X chromosomes instead.

Unfortunately, I was unable to find either of these conditions in the females I studied. Nonetheless, the time I spent in the lab was full of fun and not void of excitement. I made many other useful discoveries while working that I would like to pass on to future WISEST students, especially those who have the good fortune to work with Dr. Bamforth:

1. Instead of being intimidated by the lab, think of it as a really big kitchen. The only difference is you can't eat what you make.

2. Don't panic! You're not locked in the fridge. Just push the door harder.

3. The yellow gown does little to protect you from the hazards of using the sink -- try a yellow raincoat instead.

4. Don't hassle the centrifuge. It always wins.

5. Avoid the hospital's frozen yogurt. One taste results in immediate addiction.

6. Put the lid on the film box *before* you turn on the lights.

Finally, I would like to thank everybody who helped to make my summer enjoyable. To the WISEST administrators, thank you for giving me the opportunity to participate in the Summer Research Program. I came with high expectations, all of which were exceeded. To Dr. Bamforth, although the responsibility was frightening at first, the confidence you showed was much appreciated. To Teresa, you are a great teacher and the enthusiasm you have for your work was inspiring. Thanks go to Cheryl for her patience and willingness to help. And to Jennifer, I'll miss having you there for confessions, lunches, and guy spotting.

The Wonderful World of DNA

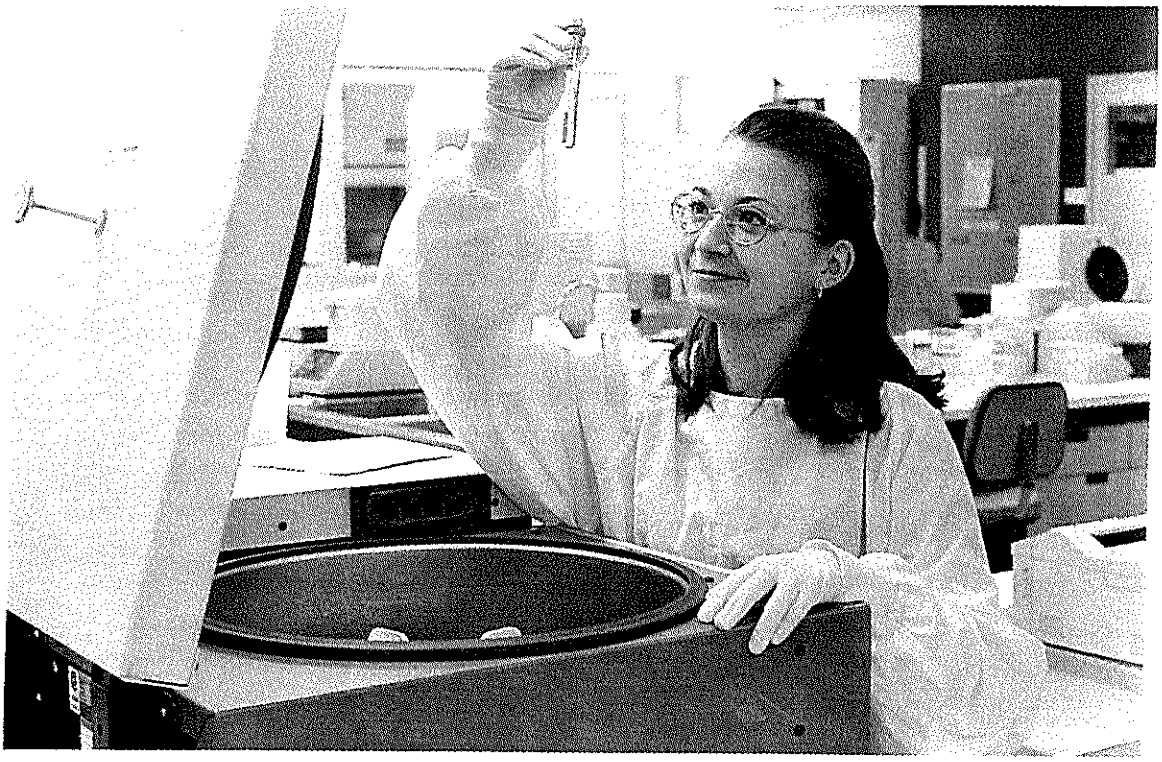
The six week span from July 3rd to August 14th that I spent in the DNA lab of the Department of Laboratory Medicine and Pathology at the U of A Hospital is surely a time I will not soon forget. My participation in the WISEST Summer Research Program has been one of the most positive and beneficial learning endeavours I have ever experienced. The vast amount of knowledge I have gained from the program will certainly prove useful in the years ahead. I not only gained a large new pool of scientific information, but also a better understanding of university life from the campus tours, stories from the staff as they had experienced it, as well as just being in the university atmosphere itself every day.

The project I was working on involved looking at different methods of extracting DNA from blood as compared to the currently used method. The aim was to experiment with various procedures in the hopes that one would be found that was just as effective as the current method, but didn't involve the use of dangerous chemical reagents such as phenol and chloroform required in the current method.

In order to carry out the research, I had to experiment with a number of methods; three in total. The first one I tried involved using a detergent to access the DNA from the blood. The second method involved using a sucrose lysis buffer to access the DNA and the third method involved the use of diatomaceous earth or silica to which the DNA would bind in order to isolate it.

After the DNA had been extracted, I had to set up a Polymerase Chain Reaction or PCR. This procedure amplifies the DNA thousands of times by denaturing the DNA and allowing free nucleotides to bind to it, thus creating double the amount of DNA with each cycle of the thermacycler (the machine that the reaction takes place in). The thermacycler goes through cycles of heating and cooling to provide an optimum temperature for each stage of the reaction. I then added restriction enzymes (either Mnl 1 or Hha 1) to the samples to cut the DNA into fragments after certain recognition sequences of nucleotides.

The DNA was then ready to use in a Polyacrylamide Gel Electrophoresis. This was the part I found most interesting as I could actually see the DNA under UV light after the electrophoresis was complete.



In this technique, a current is applied to the DNA samples in a gel and the DNA is separated into bands according to their size. The smaller fragments travel further from the origin, whereas the larger ones remain closer. The gel is then stained with ethidium bromide and a photograph is taken of the gel under UV light. What made this especially interesting is that I had read about PCR and electrophoresis in my Biology 30 textbook, but I had never really comprehended what was involved until I actually tried it myself.

My WISEST experience would not have been as beneficial or enjoyable without the friendly staff members of the Hereditary Diseases -Histocompatibility Laboratory. I would especially like to thank Teresa, Cheryl, and Dr. Bamforth for their time and patience in helping me learn the ropes of the lab. I would also like to thank the WISEST Administrators for organizing the program of which I feel extremely lucky to have been a part.

J. Moisan

Jennifer Moisan

A ONCE IN A LIFETIME EXPERIENCE

When I learned of my acceptance to the WISEST program in late May, I was so excited because I was finally going to do something productive and challenging. The challenge that I faced came from the research team headed by Dr. Jingli Luo in the Chemical and Materials Engineering Department. For the past six weeks, I have been working with Mr. Qi Yang, one of the graduate students. He quickly briefed me on the research being done. It was about the effects of hydrogen on pitting corrosion of stainless steel.

There were plenty of methods involved in solving this problem, but the main procedure was called hydrogen charging. Hydrogen charging is when a strip of stainless steel is immersed into a solution of sulfuric acid and arsenic oxide. Stainless steel acts as the working electrode and an inert metal such as platinum is used as the counter electrode. The purpose of using two electrodes is to allow the flow of current from the solution to the steel in order for the hydrogen atoms to collect into the surface of the stainless steel. After charging, the strips were then observed under the optical microscope or sometimes under the scanning electron microscope (SEM).

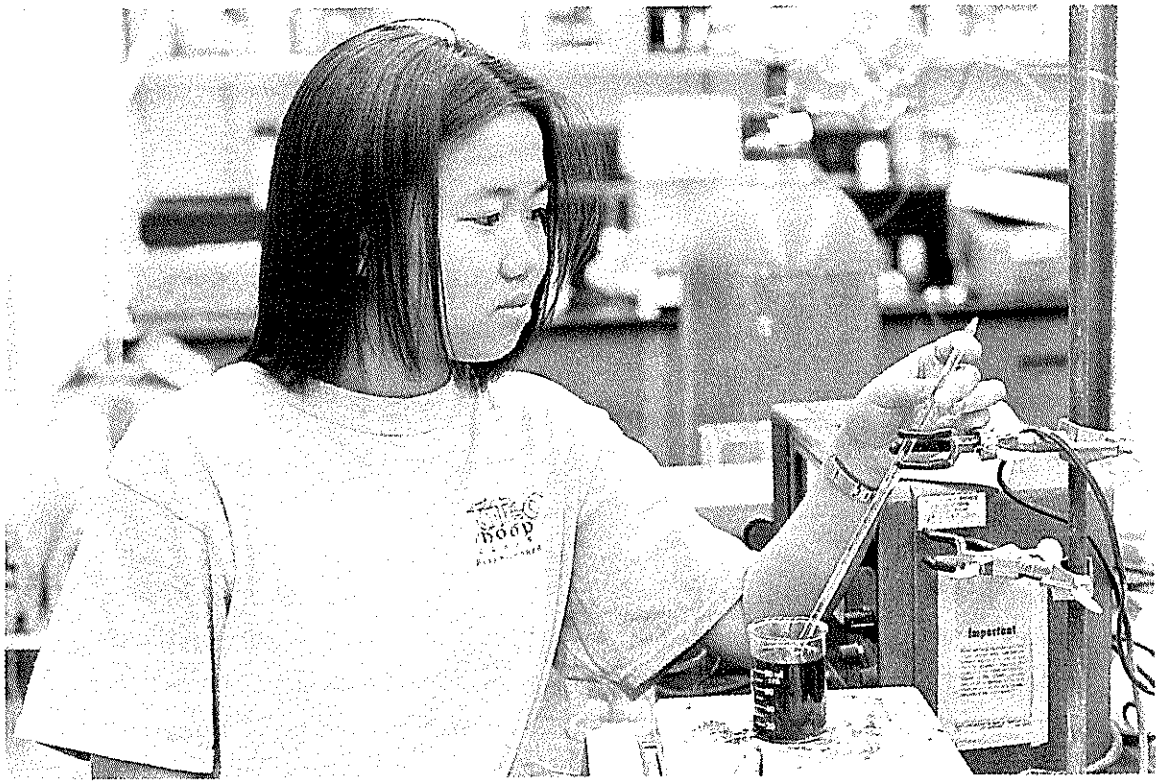
From the evidence gathered over a long period of time, we determined that hydrogen has these following effects:

- it can initiate pitting corrosion
- it can promote pit growth
- the higher the concentration of hydrogen, the more susceptible it is to pitting corrosion
- the higher the hydrogen current density, the larger the pits

WISEST has exceeded all my expectations. Coming into this program I expected to learn, but I also had plenty of fun. I was fortunate enough to work with three other fantastic WISEST students in the Chemical Engineering Department. Mae, Tai and Kyla made the sometimes long working hours short with their enthusiasm, their outrageous stories and of course their Broadway-worthy voices (except for Tai, she only hums).

I would like to thank Dr. Luo for giving us the opportunity to work in her lab. Thanks to Mr. Yang, Dr. Yang, Dr. Cui and Mr. Cheng for putting up with the four of us for the whole six weeks and I appreciate that they trusted us enough to run our own experiments.

I would also like to express my gratitude to the WISEST administrators, Renate and Grace, for the great activities they had planned for us. My personal favorite was the picnic at Rundle Park. It gave us a chance to get to know the other WISEST students and at the same time have fun in the playground. Rundle Park



has the best swings! The Tuesday bag lunches with Renate were also memorable in that we got to share some of our experiences to the whole group in an informal way. I found the campus tour very helpful because I now am more familiar to the university. The session on how to present a scientific report, the session on people in non-traditional jobs and the safety seminar were very educational. Thank you to both Ms. Margaret Anne Armour and Ms. Dorothy Tovell for reminding us of the importance of lab safety.

I have learned so much this summer and I have enjoyed every minute of my time here in WISEST. More power to this program because it is truly beneficial to female students. Thank you for the encouragement and I am hoping that this program would last forever. Thank you for the memories.

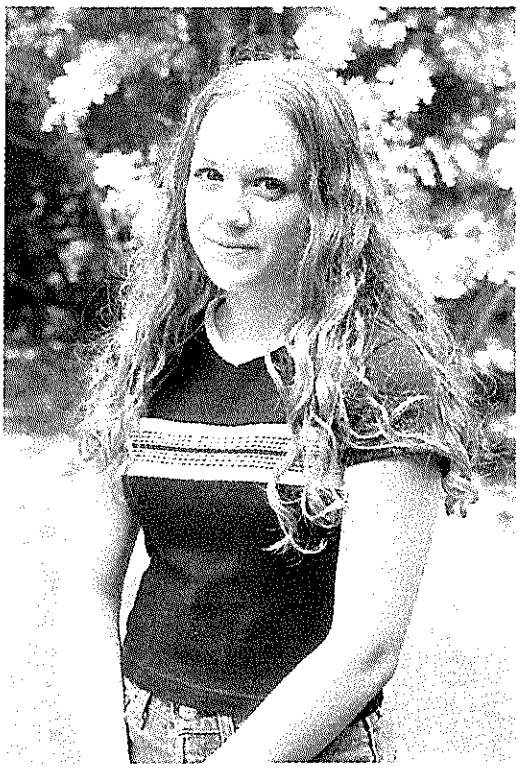
Gladynel Fernandez

WISEST Summer Research Program
Final Report by Jenifer Osborne

When I was accepted into this program, I didn't know what to expect. I certainly didn't expect to discover that research is not as glamourous as I once thought. I made this discovery while spending hours in the sweltering sun crouched over in an endless field of grass and weeds. I'd like to see anyone try to be suave in the company of so many weird bugs of whose biting capability is unknown. Don't get me wrong, research does have its up side- it can be endlessly interesting and rewarding. You just have to focus on the positive and make the best of the negative- research is what you make of it.

My project entailed collecting data to add to a long term study of secondary succession of the various plants growing in the Wagner Natural Area. A 30m by 30m plot in an open field of the area was mowed yearly so that the emergence of the different grasses and weeds from the rest of the field could be detected. This main plot consisted of 150 2m by 3m plots, 60 of which were randomly selected for this study. Three 3m by 10m plots, each divided into 5 2m by 3m plots, were also marked between the main plot and the tree line. These plots served to discover which plant species emerged from the trees. This study has been going on for six years now and the data will be analyzed hopefully this year, as soon as all the data has been entered into the computer. Therefore, no real results are available yet. The results, when compiled, will greatly add to our bottomless well of knowledge, as well as provide a basis for further research into this topic. The Wagner Bog Society is anticipating our results and will undoubtedly put them to good use.

Throughout my six weeks in this program, I have learned a great deal about one of my favourite things- plants- from two exceptional people, Dr. Mark Dale and Debbie Mucha. I learned many of the things that I wish I would have had the opportunity to learn in school. Besides just this, Debbie gave me some invaluable tips for surviving my first year of university, and I also had a chance to learn my way around most of the university. I can't forget how much I enjoyed hiking the trail through the Wagner Natural Area, as it was wonderful to see the incredible flora and fauna of the place. Above all, the most important discovery I made was that into my own future. I realized that though field work is never dull, I would not be satisfied in doing just that the rest of my life. I had a fantastic time and also got a great tan while finding this out, anyway, plus it also narrowed down that future-shaping question- what am I going to do with my



life?. Oh, one more thing I learned- survival of field work requires a mosquito netting hat and gallons of insect repellent.

I am so glad I had this amazing opportunity so I would like to thank all those who deserve it for making this possible- all you wonderful WISEST people, especially Renate Pfeiffer and Grace Ennis who helped me when I was dazed and confused, an incredibly busy Dr. Mark Dale who somehow found time for us, and Debbie Mucha who taught me that work can actually be fun and much more.

While looking back on everything that I have done and learned, it's hard to believe that it has been only six short weeks since I nervously attended that first WISEST meeting. During this seemingly short period I have gained experience both on and off campus. My work at the Devonian Botanic Gardens, under the supervision of Dr. Hickman, has been both educational and interesting. Also, the exposure to the University and the various applications of science that it offers has been invaluable.

The research that I undertook at the Devonian Botanic Gardens concentrated mainly on the making and observing of Lychnis cognata cuttings. These cuttings, planted in a sandy-based medium, were placed in a hot, humid environment. The Lychnis cognata seem to be well suited to this environment as most of the cuttings are looking healthy. In fact, I have already discovered new growth beginning on some of the individual plants.

Lychnis cognata, native to China, is currently being tested for its compatibility to the climate of Canada. The research which I contributed to will help in determining whether or not cuttings are a suitable method of propagation for this particular species of plant. With this information added to other research being conducted on the perennial, it may be possible to successfully introduce the Lychnis cognata into Canada's environment, thereby helping to increase biodiversity.

My work at the gardens has not only focussed on my research of the Lychnis cognata, but has also exposed me to the many different aspects involved in the maintenance of the gardens. For example, I spent a large amount of my time "pricking out" plants. That is, I separated and potted up newly germinated plants. While this task may at first seem trivial, it is very important to the continued existence of future research projects. This is because these plants may be used as the subjects of future experiments, or may be sold to raise funds for other projects.

I was also able to help in the gathering and mounting of plants for the herbarium. This collection of dried plants serves as a reference by which plants can be identified if, for example, they are unlabeled in the garden.

The experience that I have gained on the campus of the University has also been exciting. I especially enjoyed the opportunity to see and use equipment that I had learned about in school. For example, I was able to use the scanning electron

microscope, a technology which I had only read about before. This type of experience was invaluable in the combining of practical use with theoretical knowledge.

This summer has been filled with new and interesting experiences. Not only has WISEST given me the opportunity to explore the independence of the work world, but it has also enabled me to examine some of the numerous aspects of science. I have also enjoyed meeting new people with interests similar to my own. In addition, the WISEST program has assisted in the building of my confidence when approaching new situations and I am grateful for the chance to have participated in this worthwhile program.

Megan Flanders

Research on the Farm

My placement within the WISEST program this summer was quite a bit different from many of the other placements, and it was also quite unlike anything I was expecting when I applied. I was working on the University of Alberta Experimental Farm, in the Poultry Research Unit. Even though being surrounded by chickens all summer was not exactly what came to mind when I thought of research, it turned out to be a placement which really suited me, and made for a great summer.

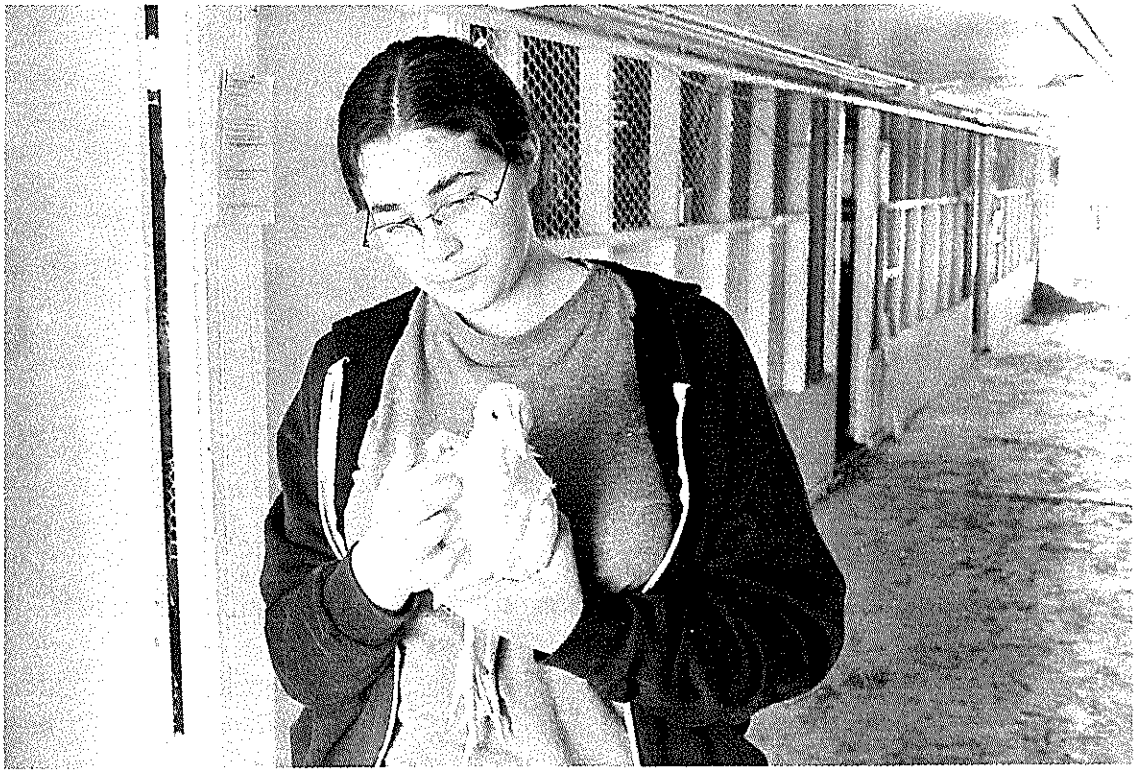
Hmm . . . Where to begin? I never knew there was so much to learn about chickens! My main project over the course of the summer was to develop the second version of a specialized chicken feeder for broiler breeder chickens. This feeder had to have mechanisms in place to monitor and control the weights of the birds using it, and keep them in a target range for their age group, so that they would grow slowly, and be good breeders when they started to lay eggs. I began construction on the feeder as soon as I arrived, and then I monitored the birds' behaviour and weight changes over the summer. By the end of the summer, the birds' weights were coming closer together, and they were being fed by an auger hooked up to a computer, which dispersed feed automatically. But while this was my main project, it didn't take up all my time, and there were many other interesting things going on around the farm.

While you wouldn't generally think of a farm as a research facility, there were many experiments in progress on this one! One experiment involved observing the effect of different light intensities on a hen's egg production and egg quality. Every day the eggs were weighed, and every second week, a total of almost 250 eggs were broken, and data was collected.

On one occasion, an ultrasound machine was brought in to observe the ovaries of a chicken, and try to do a follicle count. The follicles are what eventually becomes the yolk of the egg, and there are several of these inside a chicken at one time. Traditionally, birds had to be killed to count the number of follicles, but the use of ultrasound technology has the potential to make it possible to do a follicle count without harming the bird. The ultrasound can also be used several times a day to trace the progress of an egg through the oviduct. (As promising as this technology seems, our test bird didn't much appreciate its ground breaking role.)

While I was at the farm, we also had a hatch of chicks, and not just a few but almost 5000! There is one hatch each year on the farm, and once those chicks are grown they can be used in upcoming experiments. The day of the hatch was by far one of my favourite days on the farm. I spent a good part of the day vaccinating some of those baby chicks, watching the sexer (with chickens, the sex is not so apparent, and the sexer is a professional who has training to determine the sex), and bringing these chicks from the hatchery to their new home in one of the barns.

Towards the end of the summer, a group of birds reached sexual maturity, and I was



able to see how hens are artificially inseminated, as well as helping to inseminate some of the over 300 hens myself.

When I entered the program in July, I was unsure as to what I wanted to take in University, or what kind of career I wanted, but working on the farm has given me a focus, and I am now considering taking Animal Science, and perhaps going on to veterinary medicine, an option I had considered in the past.

While the research was interesting, and I gained great deal of new knowledge, the one aspect of working on the farm that really made my summer terrific was the people I worked with. Most of the people were graduate and undergraduate students, working there over the summer, and all of them were very friendly. By the end of the summer, I felt right at home, and was sorry I had to leave.

My summer in the WISEST Summer Research Program was an excellent experience, and has really broadened my perception of what research is. Research on a farm! Who would have thought?

Thanks to all involved in the WISEST Summer Research Program for making this a great summer!

Erin O'Dea.

GENETICS

Elaine Gan

This summer I had the chance to discover more about the fascinating field of genetics. My supervisor, Dr. Reha-Krantz and her research team are interested in DNA polymerase, the enzyme that carries out DNA replication. When a cell duplicates itself, it needs instructions on how to do it, called DNA. The building blocks that make up the cell are called nucleotides. DNA polymerase directs this whole process. As well, polymerase acts as a proofreader -- checking on the accuracy of DNA replication. We examine the DNA polymerase of the T4 bacteriophage (bacterial virus) since we can obtain a fantastic amount of phages in such a short time period, which helps since polymerase function becomes more evident. Phages need bacterial hosts for survival, somewhat like parasites. Mutants that we find in phages help us to investigate DNA polymerase function too.

Normal wildtype polymerase is fairly accurate in replication, but they sometimes make mistakes. Their reversion (mutation) rate is one in a hundred million. Mutant polymerases can make a higher number of replication errors than wildtype, yet other polymerases can replicate with fewer errors! My specific project is to find out what makes these mutants replicate more accurately than wildtype polymerase.

DNA polymerase that replicate DNA with fewer errors are called antimutators. What is the molecular basis of the increased accuracy? There are two models to explain this. One is that the antimutator DNA polymerase proofread more. Proofreading is achieved by a DNA polymerase activity that removes wrong nucleotides. A second mode is that the antimutator DNA polymerase are less likely to insert a wrong nucleotide.

To test which model is correct, I used genetic methods to isolate new mutations in the DNA polymerase gene of the phage the alter the accuracy of DNA replication. I think that I found some. I used a phage that carried an antimutator DNA polymerase called R335C. This is called so because the mutation encodes amino acid Cysteine for Arginine on residue 335. To characterize my phage I grew this antimutator strain on several different bacterial hosts and compared it with wildtype phage . My mutant phage R335C that I cultured was 50 fold *more* accurate than my wildtype DNA polymerase, hence confirmation of the antimutator phenotype.

I learned many new things like how to use the spectrophotometer and autoclave, how to grow and toothpick bacteria, how to titre and purify plaques, prepare media, make phage and mini lysates. I learned a lot about science (particularly DNA polymerase and replication) through my experiments, the books to explain the experiments, and my teachers to explain the books. But it was fun, and the lab parties funn*ie* r!

Aside from the lab, I was really inspired by the guest speakers in non-traditional careers, these women have advanced so far in the field of science and accomplished such a great deal, and the visit to the Cardiology lab has me interested in this field for a possible future career.

Thanks to *Zerrin* and everyone at the lab for their kindness, special thanks to my supervisors *Dr. Linda Reha-Krantz*, *Hannah Cheung*, and *Lisa Salyzyn* for their effort, time and consideration. I truly thank WISEST for giving me the opportunity to gain a vast amount of knowledge and experience in scientific research.

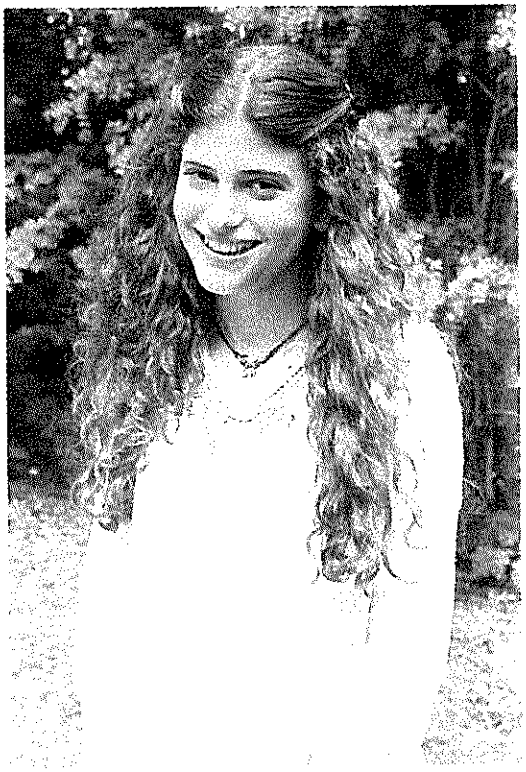
WISEST Summer at Renewable Resources

For the past six weeks, I have been working for the Department of Renewable Resources. For all of you who have no idea what this department deals with, (and I'm sure there are a few), let me "enlighten you". I have worked for a few grad students this summer, and all of their projects deal with reclaiming land that has been harmed either by human activities such as coal mining, natural occurrences such as precipitation, or by both human and natural causes.

The first project I worked on is located in Mundare. On this site, there is a high amount of salt (high salinity) in the soil. Darlene, the grad student, is identifying the species of vegetation growing in her plots and researching which plants (some have been introduced) do the best in this type of soil. With the information gathered from Darlene's project, the vegetation that grows in this soil can be used as a seed mix for other damaged areas with similar soil conditions. For example, a barren strip mine location can have its soil analyzed, and if it has high salinity it can be reclaimed with vegetation researched to be successful in salty soil.

The second project I was involved in is located at Elk Island National Park. Within the park there is a badly eroded slope. Jim, another grad student, is solving the problem of how soil erosion on the slope can be prevented. Erosion on the slope is caused by wind erosion and precipitation. People are also a part of the problem, as the guests of the park walk on the slope to get to the lake, and push soil off the slope and into the lake. To prevent soil erosion due to precipitation we built terraces on the slope. These terraces look like giant stairs. With the terraces in place, it is expected the soil that erodes due to precipitation will be stopped by the terraces from falling into the lake. To prevent soil erosion due to the wind and precipitation, the next part of the project will be to plant native vegetation within the terraces. When the plants become established, their roots will trap and absorb precipitation that would otherwise fall into the lake, taking the soil with it. To prevent soil loss as a result of park visitors walking on the slope, we have built a fence surrounding the slope and a sign has been placed by the fence to educate people of the problem and how the project is attempting to solve it. As overpopulation has placed an increasing pressure on the food supply, we can no longer afford to lose land due to soil erosion. Projects like this one may introduce new ways to prevent soil erosion or reclaim land lost due to soil erosion.

To add to my knowledge I have obtained this summer, I have also made many new friends. I would like to thank all of the great people at the Renewable Resources department for making thirteen hour work days livable. Kelly and her "vegetation grooves"; Kirsten (SMELL THIS NICOLE!); Mae and her "minions of death"; Darlene and her thistle patch; Jim and all the other people of "the private sector"; Dr. Naeth, Dr. Chanasyk, Dr. Water and Dr. Dirt (or should I say Dr. S. Berries?); the Genesee crew (debating the wind-chill factor on 34-degree days); and of course Mr. Tim Horton, AM radio, and a certain light-speed camel; I won't forget y'all anytime soon, go inside and enjoy some air-conditioning (I hear it's really great!).



Thanks to everyone at WISEST for making this such a great summer, educationally and socially. I really enjoyed all the Wednesday afternoons and the social outings. Six weeks have never gone by so fast before!

Thank you Nat and Chris!

To all of my WISEST pals...Long live Celenese, MIB, the Beatles, Disney, Shakespeare, Harvey and Face/Off. In order to trap him...

Nicole Pfeifer
WISEST '97 :-)

My WISEST Summer

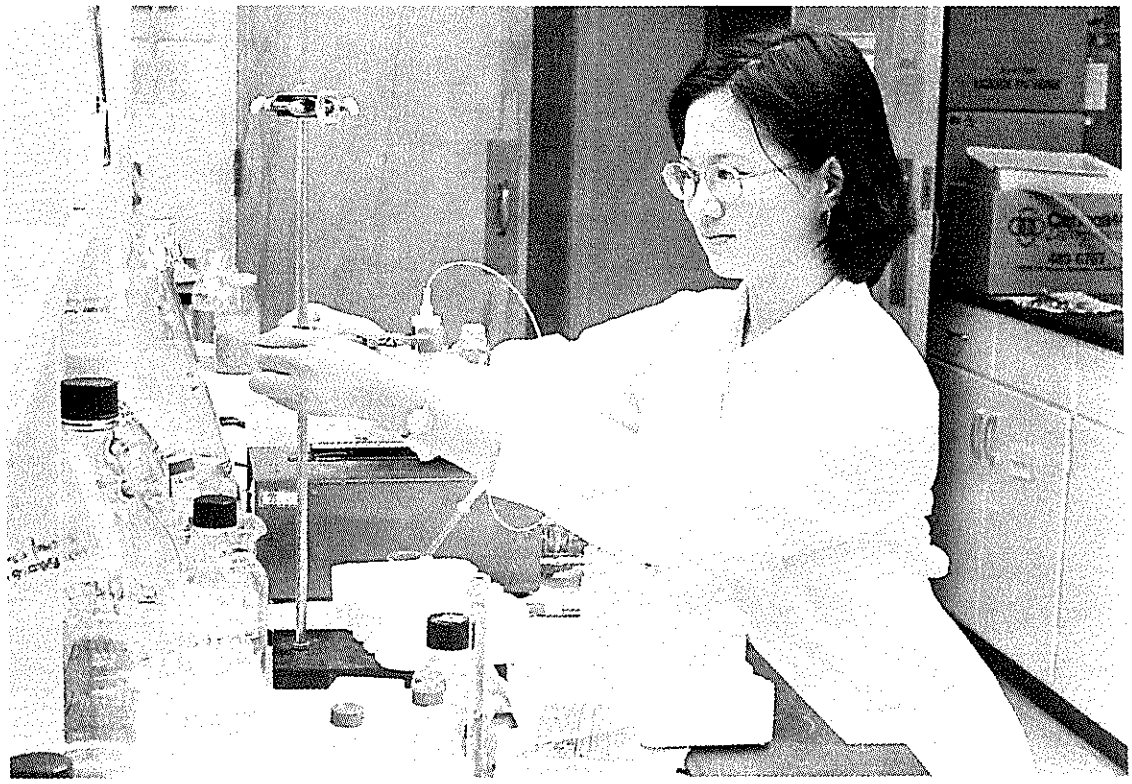
By Elena Liew

I spent six weeks of this past summer working in the Faculty of Pharmacy, and I would have to say that those were probably some of the most worthwhile weeks I had spent in a while. These weeks passed so quickly, and before I knew it, the WISEST Research Program was over. The program turned out to be more than I had expected it to be.

I worked as a member of Dr. Beatrice Leveugle's research team. We were doing research to work toward finding an immunotherapeutic treatment for prostate cancer. This project required me to recall the biochemistry and information about the immune system that I had learned in Biology 20. (That was probably the hardest part of the whole job.) I was given two cell lines to grow: one which produced the antigen we wanted to attack (prostate specific antigen, or PSA, for short), and one which produced an antibody to attack the antigen. This part was quite interesting, as I would always be curious as to how my cells were doing -- whether they were flourishing or whether they were dying because I, out of my careless nature, contaminated them. Another task I was given to do was purifying and concentrating the antigens and the antibodies. In my opinion, this took a relatively long time, and sometimes it did get tedious. I also did a number of ELISA assays, each one taking up much of one day's work time. It was rewarding when it worked out and gave us information we could actually use, but sometimes the results showed that *everything* was positive, and after six hours of work, it was kind of frustrating. The moment of truth came in the final week, when we would see what five weeks' worth of work amounted to. We ran an SDS Page to see how pure the antigens and antibodies were, and we also did a FACS analysis to see how well the antibodies bound to antigens on the surface of tumor cells. Our results might have been a bit off, due to human error -- namely throwing out cells because we did not know how the new centrifuge worked.

The team worked under semi-chaotic conditions, as we had to travel between Dr. Suresh's lab (where I did most of my work during my stay), the new lab (which we *finally* moved into during my last week), and AltaRex. Despite this, we managed to get our work done virtually without a hitch.

Besides learning about things related to our project, I learned that there is more to being in Pharmacy than just biochemistry. One must possess many different skills to work in the labs. (a) It helps if one likes to read. This is when one has to leaf through the thick manual, which is written in a roundabout manner, on *How to Set Up Your New Incubator.* (b) Experience with fixing things comes in handy every so often. (c) It is also an asset if one is extremely neat by nature; 'A place for everything, and everything in its place' is *the* motto to follow around the labs.



On a personal note now, I had a really positive experience being in the WISEST Summer Research Program. I had the opportunity to work with some of the best people one could have the pleasure of working with: Dr. Leveugle, known as 'Beatrice' around the Pharmacy building, who could make *anyone* smile with her bubbly personality, and who was *so* patient with me, even after I threw away all of those antibodies (!); Amal, who was meticulous with everything she did, and who was very easy to talk to; Fengmin, who had to be one of the most quiet, hard-working individuals I know; various members of Dr. Suresh's group with whom I could have, and did, discuss everything from world politics to music history to Marilyn Manson; and the Dean of Pharmacy, Dr. Moskalyk, who was kind enough to take time to visit our lab. If I had to choose a faculty to work in based on the nature of the people alone, Pharmacy would win hands down.

These six weeks were truly evanescent. Before the six weeks started, I really did not have a clue as to what I was getting into. I thought that I would be spending my entire summer slaving away in a lab while my friends were having fun in far-off lands. But it was not so. I probably had just as much fun in the labs as my friends did (wherever they were), but I had the added bonus of learning included in my summer. I think that it was time well spent.

I do not like to bring abrupt ends to things I enjoy, and I write very poor conclusions. Thus I end these six weeks and this report in mid-sentence with a semicolon;

Hi! My name is Anne, and I've been working in Dr. Glen Loppnow's lab, in Physical Chemistry, during my time in the WISEST program. All I can say is, this has been an INCREDIBLE summer!

When I walked into E3-25 on the first day of WISEST, I had no idea what to expect. It didn't help that I got there nearly last, meaning that I had to scuttle quickly into the seat nearest the door, scrutinized by a sea of unfamiliar faces. At that point, I wasn't even sure if I wanted to stay.

But after that, things improved. At the Taco Bell lunch they fed us I got involved in an interesting conversation about dropping taco shells on peoples' heads - and after that I felt right at home! And once I had met my lab group and heard about our project, I decided that this might be a great summer after all.

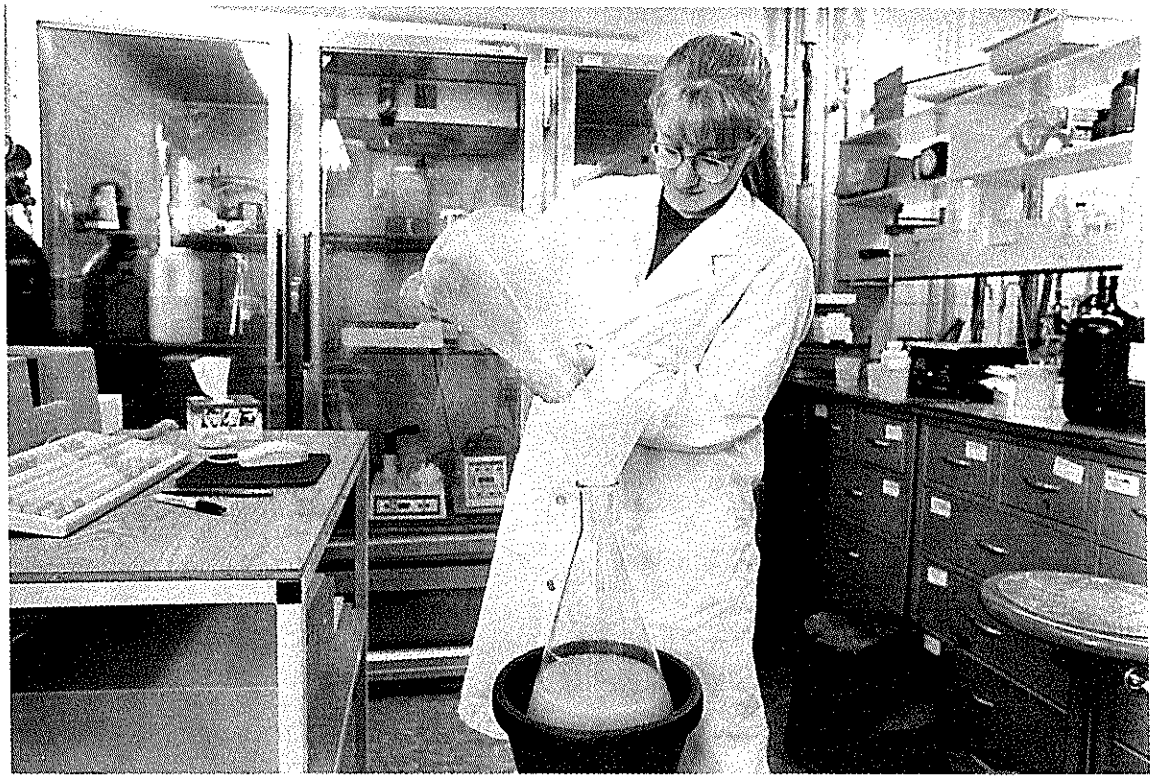
Going into this program, I had sort of expected to spend a lot of time by myself. After all, I don't live in Edmonton, and I didn't know anyone. Boy, was I wrong about that. There is a social aspect of the program too, and I didn't have a chance to be a loner for long. By the first week I was putting names to faces (well, the name tags they made us wear helped!) and at the picnic after the Celanese tour I was recognized as a fellow out-of-towner and had thrown in my lot with the Lister Hall people.

After that, Jennie (the "big sister" at Lister Hall, in charge of taking care of us poor out-of-town people) made sure we had plenty to do. She organized trips to the Street Performers' Festival, to Klondike Days, to A Taste of Edmonton... we were kept pretty busy! Between these trips and the social events and Wednesday afternoon sessions organized by WISEST, I didn't have time to be homesick. The six weeks just flew past!

There was also the day-to-day contact with the people I've met... like Renate's Tuesday bag lunches, which we sort of expanded by meeting for lunch every day in Quad. We did a lot of discussing, sitting in a circle in the grass, and I quickly got to know a lot of the other out-of-town people and quite a few of the Edmontonians.

Of course, suddenly finding yourself living in a big city does have its downside - it takes getting used to. A few of us took one memorable bus trip. All of us wanted to go to Southgate, but none of us really understood the bus schedules. We took the right bus number... but the wrong bus. We were treated to an hour-long tour of downtown Edmonton via the transit system, before ending up right back where we started. And THEN we went to Southgate!

But I can't write about a summer research program without mentioning the actual research. And that IS what I spent most of my summer doing. I was really lucky, in that I found our project fascinating. I was working in a lab group that has been doing experiments using Raman Spectroscopy. One of the things they are studying is a protein called plastocyanin. Plastocyanin is a small blue copper protein found in the electron transport system of plants. As such, it is used by the plant to obtain energy for life from the sun during photosynthesis. There are small variations between plastocyanin molecules from different types of plants, and by studying these slight structural differences the group hopes to better understand the way the electron transport system works within a plant, and why it is designed the way it is. Knowledge of this process could give us insight into new ways of collecting energy for our own use, perhaps leading to technological process that may someday replace our diminishing supplies of oil and gas.



My job was to help isolate the plastocyanin for use in the experiments. I isolated zucchini and cucumber plastocyanin. This involved blending large amounts of leaves with buffer and acetone, then centrifuging, dialyzing, and running the resulting liquid through columns to separate the proteins (column chromatography). It also involved going out to the University Farm and picking the leaves. There were days when I would have been glad to never have seen a cucumber again!

Although I wasn't involved very much in the experimental aspect of things, I found the work immensely interesting and I learned a lot. Not just about our project - about all the other projects going on in the lab, and about Chemistry as a whole. I also discovered quite a bit of knowledge about University life that I know will come in handy.

So, with working at the lab, picking cucumber in the field, trying to figure out the transit system, going out to festivals.... it seemed like there was always something to do. I had a great time, I learned a lot, and I met a whole bunch of new and interesting people. I got used to living in Edmonton, and I figured out most of the campus. It's been quite an experience. I'm really glad I stayed that first day and had a chance to experience the WISEST Summer Research Program!

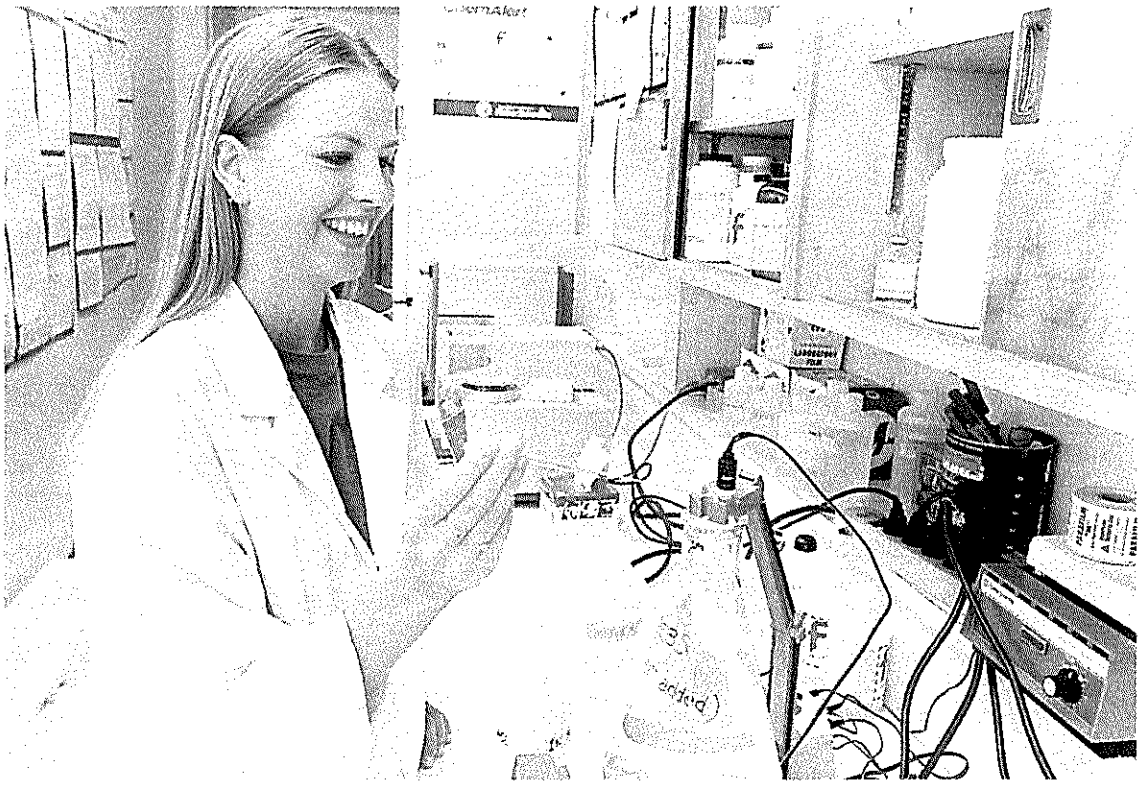
MY WISEST RESEARCH EXPERIENCE

This summer has been an experience to which many others cannot compare to. When I received the call telling me that I had been accepted into the WISEST Summer Research Program, I was ecstatic. I wondered what the summer had in store for me. I soon found out. I was dropped off at Lister Hall, which was to be my home for the next six weeks, and began getting to know the other girls staying at Lister. At the opening session, I met the rest of the group and began to understand how my summer was going to be.

For the first couple of weeks, I worked under Dr. Rabourn doing literature reviews. I learned how to do searches on the University library system's computers and how to search for articles among thousands of journals. In between my time at the library, I visited numerous labs. I visited Dr. Dennis Carmell and learned about histology. I spent a few days with Dr. Nadine Milos and her students helping them and learning about their project on the differentiation of neural crust cells. I even had the opportunity to visit the dental clinic and assist with some of the work they were doing.

The majority of my time was spent working in Dr. Dan Pehowich's lab with Charlene, Jody, and of course Dr. Pehowich. Their project was of great interest to me. We are examining if estrogen therapy for post-menopausal women is an effective solution for increasing the chance of survival from heart attacks. We used female rats as test subjects and, after ovariectomizing all of them, performed numerous tests on their papillary muscles and the mitochondria from their heart cells. Through all my lab experiences, I have acquired a great deal of knowledge and skills. I now know the inside information about a few of the research projects going on in the Faculty of Dentistry / Pharmacy. I have become a keen observer, and a team worker. I can also perform several lab procedures.

But the WISEST Summer Research Program is not only about work. There is a social element as well. I enjoyed the several outings and activities that were planned. The bag lunches with Renate, the visit to the Space Science Center, watching Shakespeare in the Park perform 'Twelve Night', the tour of Celanese, and the panel discussions all allowed us additional opportunities to learn more, but just as important, they allowed us time to interact with each other and build lasting friendships.



This program has proved to be an invaluable experience and I will highly recommend it to anyone who is considering a career in science. I want to thank everyone who made this program possible. Thank you for an unforgettable summer.

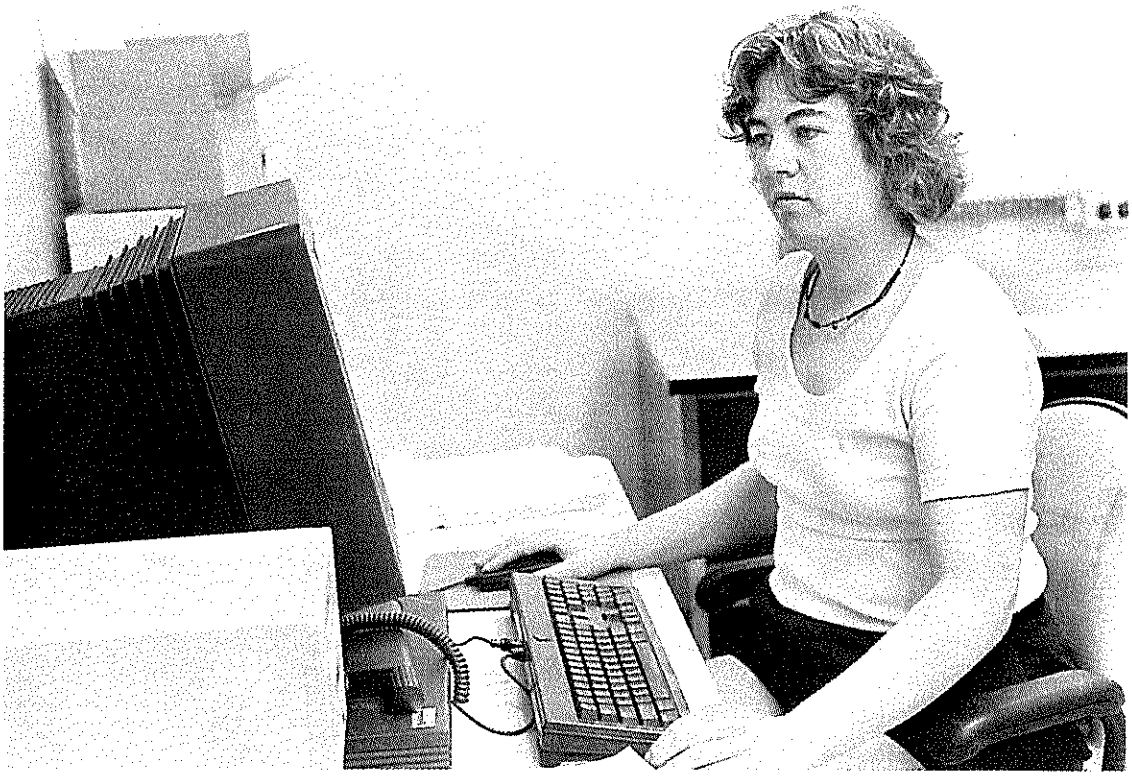
By: Pamela Waayenberg

A Summer as a Researcher

I was very pleased, even overwhelmed, when I was informed I had received a position with WISEST. I was also left to wonder what exactly I would be doing for six weeks at the University of Alberta. Would I be repeating simple experiments thousands and thousands of times over? Would I be researching information at the library? I did not know, but I soon found out...

I was placed in the Space Physics department and my supervisor was Dr. Gordon Rostoker. On my first full day, I received a lecture giving me some background as to what it was I would be working on this summer. It was a very interesting lesson and I learned a lot about the Northern Lights [also known as auroras] and about many forces and currents that exist in space. After the lecture I felt more prepared to tackle my summer project.

My project was to compare [meaning graph] two magnetic currents that exist in space, at different distances from the earth's surface. One of the currents is associated with auroral activity and is measured in an index called Kp. This current, at times, can be found about 100 km above the earth's surface. The other current is located about 25,000 km from the earth's surface and is called a ring current. It is measured in an index called Dst. I would look specifically at the Dst values and when I found a large fluctuation and a steady decrease in values, I would consider that to be an electric storm. I found the corresponding Kp values and I would graph Kp vs Dst. The results were very good, as linear relationships appeared for both the growth and decay phases of the electric storms. It was very exciting and fulfilling to find results that will be useful in the scientific world. Even though it was not my idea to plot this two currents one versus the other, I got the chance to feel what a scientist does when he or she makes a discovery. I realize that my experience was quite fortunate, since research can be a much longer process and that it can take years to make a breakthrough.



One of the things I did not expect when I went into Physics was the amount of concentrated computer work required. This made me realize that going into science, expecially Physics, Chemistry, and Mathematical Sciences, will require a lot of computer knowledge and skill.

I would like to thank Dr. Gordon Rostoker for all of his time, effort, and instruction. Thank you very much for designing a specific project for me. I also wish to thank Dr. Hamid al Nashi for all of his help with the computer, on my project, and with the report. Finally, I would like to thank Sarah Derr for all of her assistance with my computer troubles.

I really enjoyed the social aspect of the WISEST Summer Research Program, as well. I liked the bagged lunches, as they gave me a chance to meet other students in the program. The Wednesday afternoon sessions were very helpful as they opened my eyes to the many different careers that exist in the field of Science. Thank you for a wonderful scientific experience!

Michelle Vigeant

Jeena Thomas

WISEST Summer Reasearch Report

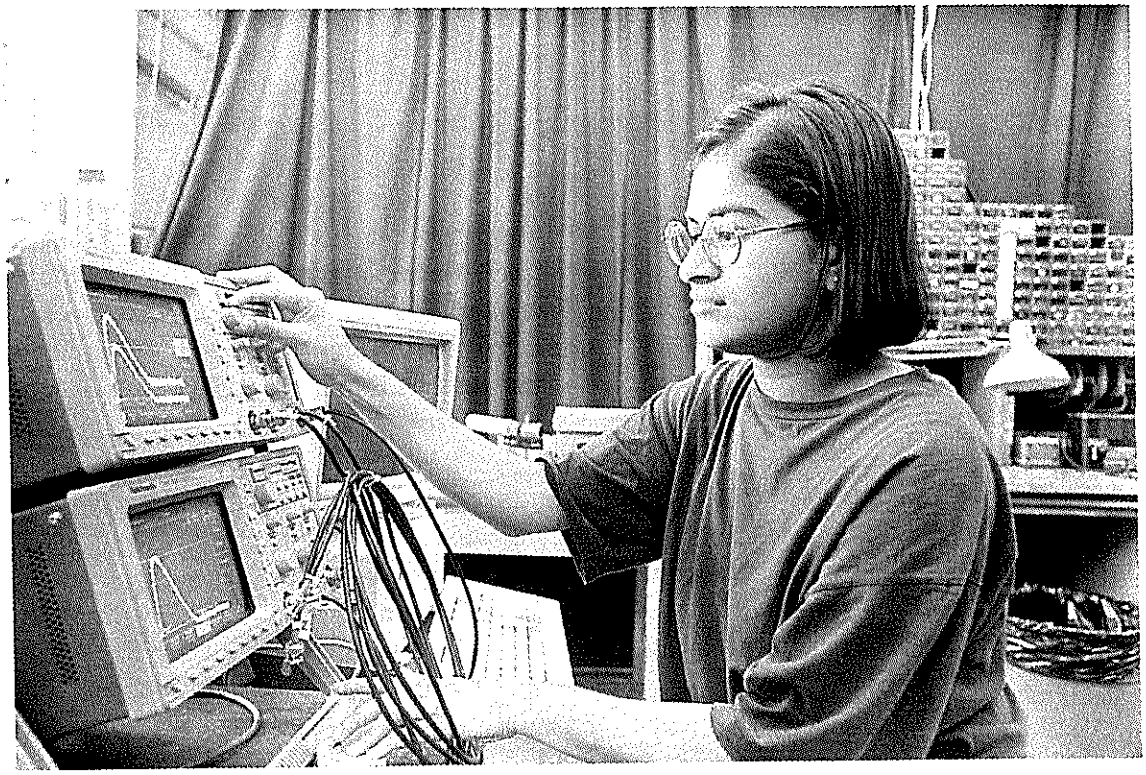
Electrical and Computer Engineering

I was stunned to learn that I had been placed in Electrical and Computer Engineering when I applied for WISEST. Although I was interested in engineering, I was rather taken aback at being placed in a computer atmosphere. My first week here mainly consisted of reading material connected with my project and understanding the terminology involved. It was then I learnt that I had a partner, Esther Bausch, who would work n the same lab as I.

My project basically was trying to create a diamond-like coating to prevent corrosion on important machinery parts. First a laser ray would be pinpointed on a graphite surface and the particles that were exploded apart would form this diamond-like coating. However, some of the particles ended up as chunks of debris that would cause defects in the coating. An idea was developed to use a magnetic coil to move the charged useful ions away from the debris. This was the part of the experiment I worked on. I took measurements of the magnetic field in coils of different lengths so that the exact length and magnetic field required for the experiment could be detected. I also wound coils and helped Geoff make circuits that we used in our experiments.

Esther and I had a lot of fun coiling and taking measurements. Although it was not her project, she would inevitably cone around to where I was working and "help" me and vice versa. Although Esther's idea of "help" usually resulted in a catastrophe of sorts, she and I enjoyed switching projects and doing each other's work. I got to focus pictures, make graphs and watch her scream at the computer while she wound coils and broke a couple of cable ties. Working in this lab has been a most enjoyable experience. Apart form the projects, we were given tours of the labs and a visit to the Alberta Microelectronics Center or AMC to see the Scanning Electron Microscope where my partner in crime actually fell asleep in the doorway!

I have learnt a lot from my six weeks here at the university. Apart from the education, I learnt a lot about the engineering field and the options that are open to me as



a student. I also worked on the computers and learnt about the different programs taht are being used now. I would like to thank Dr. Fedosejevs and Geoff Redman for their patience and willingness to let me get involved with the project. I have found that Electrical Engineering is an environment where intellect and brute force are required to make things work and the hands on experience I received was worth six weeks of my summer.

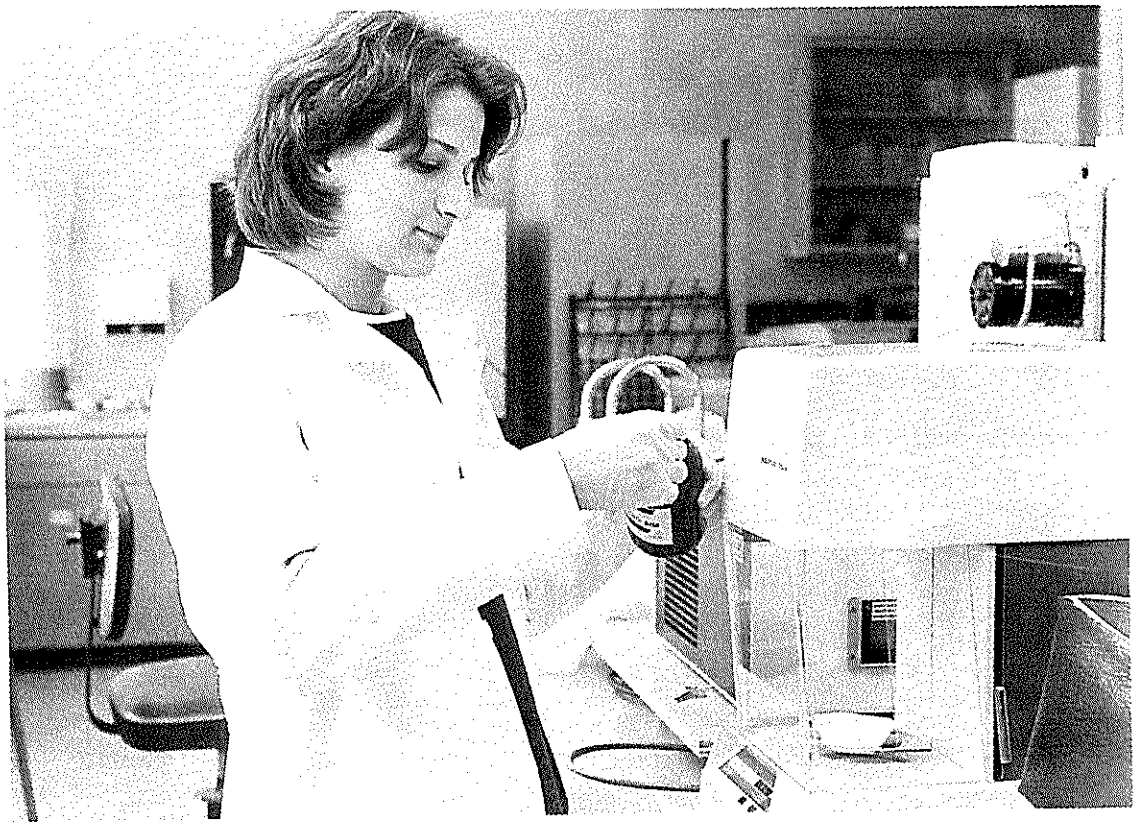
This summer I had the pleasure of working for the department of Renewable Resources with Dr. Ellen MacDonald and Dr. Barb Thomas.

The project that I assisted them with involves examining the effects of forest management and tree improvement on genetic diversity of lodge-pole pine and white spruce. This will allow scientists to quantify effects on genetic diversity of different selections and breeding scenarios to advise forestry companies of options. This project is necessary to determine the impact of a wide range of silvicultural practices on genetic diversity. Previous studies have shown clear-cut harvesting may cause habitat fragmentation followed by reduction in population size and genetic flow resulting in less genetic diversity. The gene pool of a species may be altered by planting seedlings, thinning, or through selective harvesting. This new information will assist in the development strategies of plantation seedling coming from both natural stands and tree improvement programs.

This complex project has just begun, and involves a series of steps. The first step in this project is to create a pine province which involves growing trees taken from other areas and growing them in rows to determine which sample contains the most favourable traits. These trees with the best traits are then selected to produce seedlings in nurseries. Nurseries aiding with this project include Weldwood, Weyerhaeuser, Canford, Miller Western, and Alberta Newsprint. Once seedlings have developed enough, they are then moved to a pine plantation which is usually an empty field at the nursery. Thirty samples are then collected from each sight. Once in a controlled temperature of four degrees Celsius each sample is taken and separated into its new and old tissue. The age of the tissue can be separated by it appearance, old tissue is slightly thicker, and darker than the new tissue. Older tissue is used for DNA analysis, but must be stored at minus forty degrees Celsius. New tissue must be stored at minus seventy degrees Celsius until it is used for the isozyme analysis. The samples must be kept frozen to keep the enzymes, and DNA intact.

The isozyme process begins by grinding needles and a pre-mixed buffer together. Paper wicks are placed into the solution, and placed in a labelled container. Tissue samples are then added into slots of a previously made gel. Electrodes are then attached to sponge wicks soaked in buffer solution at each end of the gel and a current is applied. This causes protein molecules in sample to move through the gel. Later the gel is stained for a particular enzyme by soaking it in a solution containing a substrate for the enzyme along with a dye. A dark band results in the gel revealing the position of the enzyme, indicating if the species is homozygose or heterozygose.

The first step in studying the DNA of a species is to create a DNA library by injecting DNA into bacteria. Once this is done a gel must be made my mixing several ingredients which form a radioactive substance. It is then poured into a thin space between two glass sheets where it is left to polymerize, and harden. The next step is to add samples in between spacing in the gel. Like the isozyme test, a current is run through the gel. Once the dye has run down the gel an x-ray of the gel can be take. The x-ray can be processed onto photography film. The dark bands that appear on the film indicate bands of DNA, which can be studied and compared to the DNA library, related back to the species.



Preliminary results showed a reduced trend of diversity in naturally regenerated plant stands versus unharvested stands. Testing and collecting of samples is only now beginning. Hopefully at the end of the research project a clear understanding of the most effective way to save genetic diversity of forests, especially lodge-pole pine and white spruce will be developed, and passed onto forestry companies.

I would like to now take this opportunity to thank everyone involved for making these past six weeks so enjoyable. The extra effort from Renate Pfeifer and Grace Ennis made Wednesday afternoon sessions interesting, and exciting. I would also like to thank Dr. Ellen MacDonald and Dr. Barb Thomas for letting me be a part of their research project. They were always happy to answer any questions, and helped me make the most of my six weeks at the University of Alberta. I learnt a great deal about the field of science, especially the research aspect. I am grateful for the wonderful opportunity WISEST has provided me with and will always remember this fascinating experience.

Laura Barbazuk

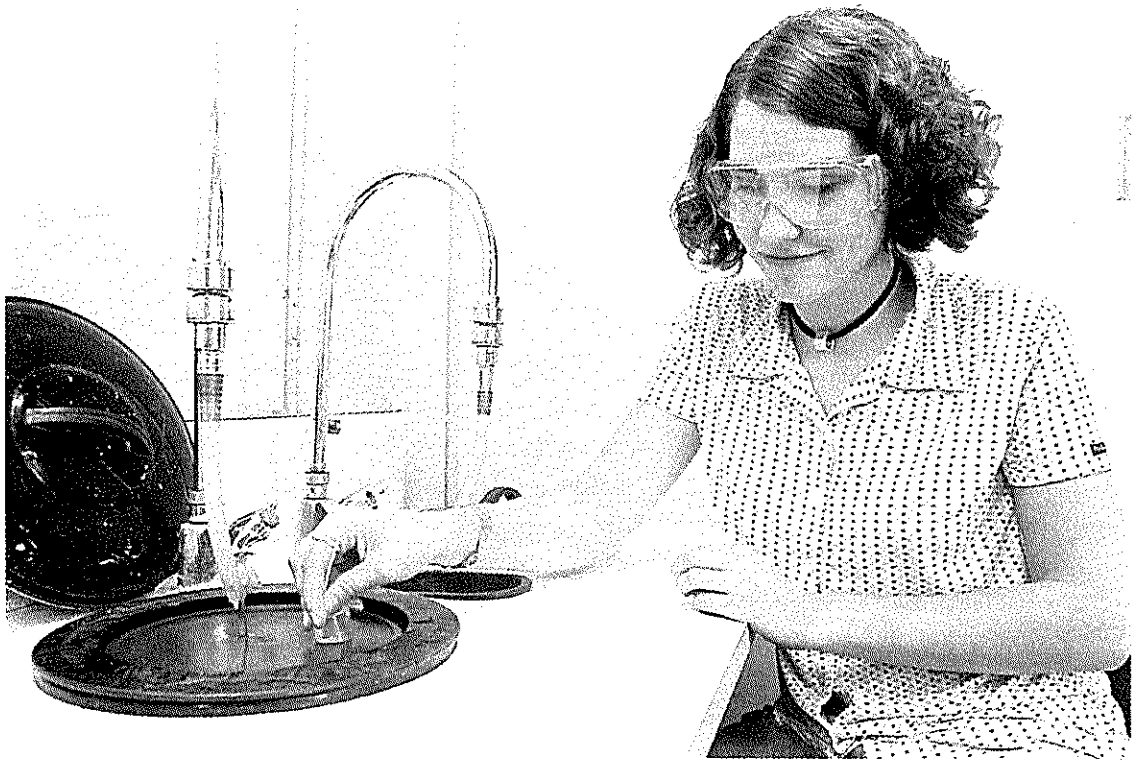
Corrosion Happens...

by Tai Ziola

For six weeks this summer, I had the opportunity to gain an insider's look at a world I never even imagined existed: that of corrosion engineering. Within this mysterious and exclusive field, I had learned, groups of highly specialized, well-trained scientists worked on various methods of... well, preventing corrosion. *Yes*, I decided, *corrosion prevention is important... but could there really be so much to learn?* As it turns out, yes.

So for the remainder of the work period, myself and fellow corrosion engineering inductees Mae Mullen, Gladynel Fernandez, and Kyla Fowlow learned first-hand the ins and outs of the various applications of this vast and complex research field. Some of us worked on building a better battery anode alloy, some of us experimented with the effects of hydrogen exposure on metals, and some of us played a lot of solitaire. As for myself, I was responsible for running a series of tests on carbon steel in various passivating solutions. These solutions (containing ions like bicarbonate and nitrite) react in a certain way with the surface of a metal sample and help to delay the corrosion process. *Obviously*, I thought, *here was an opportunity to participate in real, valuable research with thousands of applications in the real world!*

This positive, productive attitude kept me going strong through the first twenty or so two-hour tests which showed no conclusive results. Even number 29's failure was easy to take, all in the name of Science and the Advancement of Humankind. But by the time I



had run 37 tests, and only 4 had worked, I realized that the WISEST administrators were right. *Yes*, I thought, *research **is** frustrating. But it's also incredibly valuable.*

To be able to learn a lesson like this so early was an incredible opportunity for which I would like to thank all the people who make the WISEST program possible. This program provided me with a great taste of not only research science, but of engineering as a whole. The experience has enabled me to learn more about my likes and dislikes, and will hopefully help me make a more informed decision about my education and my future. That in itself is a chance that not many students get.

My Incredible Journey

By: Kyla L. Fowlow

It was half way through lunch when I received a phone call at school from Ms. Grace Ennis. The news she bore was much to my delight for that is when she told me I was one of the chosen few accepted to attend this summer's *WISEST Program.* After talking to Grace on the phone I immediately went home and told my parents of the news. My parents were ecstatic and proud of my accomplishment for I had received the one thing I wanted most at that time.

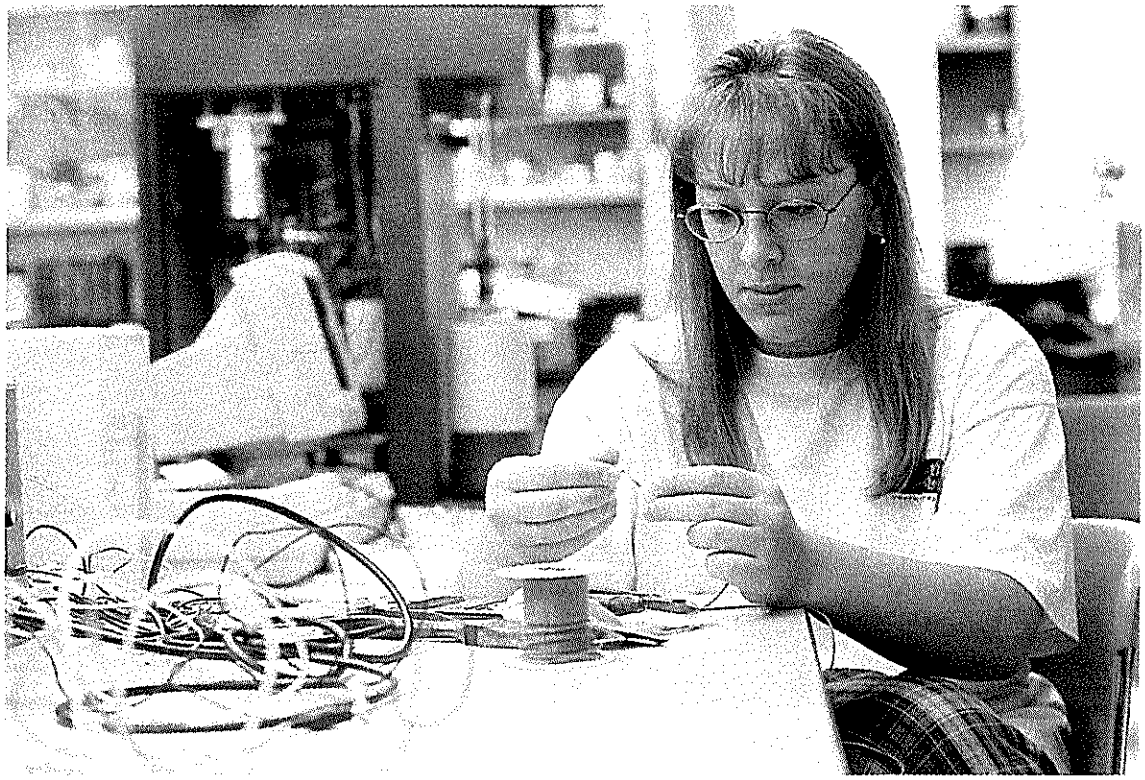
The first night at Lister (away from my parents) my mom was heart struck with feelings of loneliness for she was beginning to miss me already. The funny thing is that she was only at my sister's on the southside of Edmonton. That night all the WISEST girls staying at Lister piled in my room and we talked, and talked, and talked....Finally someone **reminded** them that the first day of work was quickly approaching and that we should be well rested, so....I kicked them out of my room. Before long my alarm sounded for it was now DAY 2 of *my incredible journey.*

As the room E3-25 filled up with people I kept reminding myself that everyone there was just as anxious and nervous as I was (well maybe not everyone. Okay-- maybe it was just me!). Feelings of incompetence began to crowd my head as Grace's talk of "acquiring new knowledge" echoed in my head. All I can remember was thinking, "now that I made it this far I'm expected to make the world's most fascinating discovery," as I awaited the coming of my **SUPERVISOR.**

I soon found myself in the Chemical & Materials Engineering building meeting other members of my research team and getting the low down on this summer's assignment.

Over the summer I assisted Dr. Ning Cui in "acquiring new knowledge" (there are those words again) about the new battery he was inventing. Either he was a great teacher or I was a fast learner because in no time I had already "acquired" skills on how to make negative electrodes as part of a battery cell and soon understood the mechanics behind batteries and their efficiency and potential. I learned about the importance of the use of the vacuum mechanical alloying method for these specific electrodes as opposed to the regular melting alloy method used to make other alloys. A days work consisted of doing such things as making electrodes by combing metal powder such as magnesium and nickel and then spreading it on a piece of foam nickel sheet. After the electrode dried, it was pressed and then soaked in $KOH_{(aq)}$ solution of 6 molar concentration (though highly corrosive, Dr. Cui did not think it was necessary for me to wear gloves when pouring the solution). The negative electrode was then tested about a million times (well more like 100) for charge/discharge capacity and potential using a potentiostat and software to graph ALL information.

At first I had difficulty understanding Dr. Cui because of his broken English but with much patience I was soon able to understand what he meant when he spoke of certain things and knew that when it sounded like he was saying "argon" he was actually saying "hydrogen." I also enjoyed the atmosphere of the lab since it was filled with



sweet melodies such as Yufeng's infamous "ABC's," as well as Gladynel's melody of "I'll Be Missing You" the last day of work ,and oh, I can't forget Mae's "dodo do do dododoo." Unfortunately we had only one unwilling participant who would not join our sing-a-longs but that was only because she cherished our friendship too much to expose us to what she would call music (right Tai?)

All in all my experience here in Edmonton at the University is one I'll carry with me always. The bag lunches, Celanese Park (and Miss Celanese), the Space and Science Center (Hint to all: the kiddy exhibits are the best!), and my first LRT ride (Remember?). Most important of all these was the "knew knowledge" I obtained and the friends I made (of course, anything is better than going to Newfoundland this summer). In conclusion I would like to send a sincere "thanks" to all those who made my stay in Edmonton an enjoyable one and befriended me despite my (sarcastic) sense of humor (thanks for being a great audience T.Z., m&m, G.F., J.Y.,C.H.,S.G.,P.W.). What I leave this program with is not of materialistic value but with something far more invaluable (but the money helps) and that is the intellectual journey I have travelled this last six weeks which I will carry with me as I continue to travel on life's highway.

Ice Jam Research: My WISEST Summer Job

Hi! My name is Marcie Reinhart, and I got to spend most of my summer inside a tiny, non-air conditioned building. In fact, there are very many university students and professors alike who do not even know the Hydraulics Lab exists. The few who do are mostly water-resources engineering students, which is one of *six* sub-disciplines of the civil engineering branch (civil being just one of the many engineering disciplines). One of the first things that I discovered was that the U of A's engineering department is HUGE...and very complex. If engineering is of your interest, there is a massive variety of fields of study to choose from.

As for my actual job, I worked under Professor Faye Hicks doing experiments which involved simulating ice jams. Similar experiments have been performed by other researchers in the past, however, most previous cases were for mere observation purposes. The experiments which we are conducting involve a lot of quantitative measuring, as well as observing, which separates this case from such others.

Ice jams are a major cause of floods in Alberta and other areas of Canada, especially during spring break up. They are quite unpredictable and very dangerous, which is unfortunately why a significant amount of information incorporating ice jams cannot be obtained in the field. Because of this, much remains unknown concerning this natural phenomena. Through our lab research, we hope to gain a further understanding of ice jams and not necessarily learn how to prevent them, but learn how to predict them and their possible effects. Our intentions are that some benefit will be provided to humankind in the future.

The experiments were performed in a 30 meter long flume which recirculated water via a pump. The flume was about 1.5 meters wide and less than a meter deep. For the first three and a half weeks, we only took open water measurements (no ice) of the flow depth at different water discharge rates and different slopes of the flume. This was done to provide us with an idea of the bed roughness so that we could be sure it simulated that of a river bed. From use over the years, the bed of the flume had rusted and dented, creating a suitable roughness that didn't require any further structuring. This process was aided by graphs which we created on the computer using our recorded data.

Finally, the "ice" was added to the water. Because the lab lacked proper refrigeration abilities, we simulated the ice with blocks of polyethylene plastic. The plastic material works well because it has the same specific gravity as ice. Unfortunately, polyethylene does not have the same surface tension properties and internal cohesive forces as does ice, but for our purposes the material was satisfactory. A floating sheet of wood consuming the entire width of the flume was placed about 2/3 of the way down the model, and it was attached to a rigid metal bar to prevent

Katherine Leich
Marcie Reinhart
Marta Dmytruk,
(left to right)

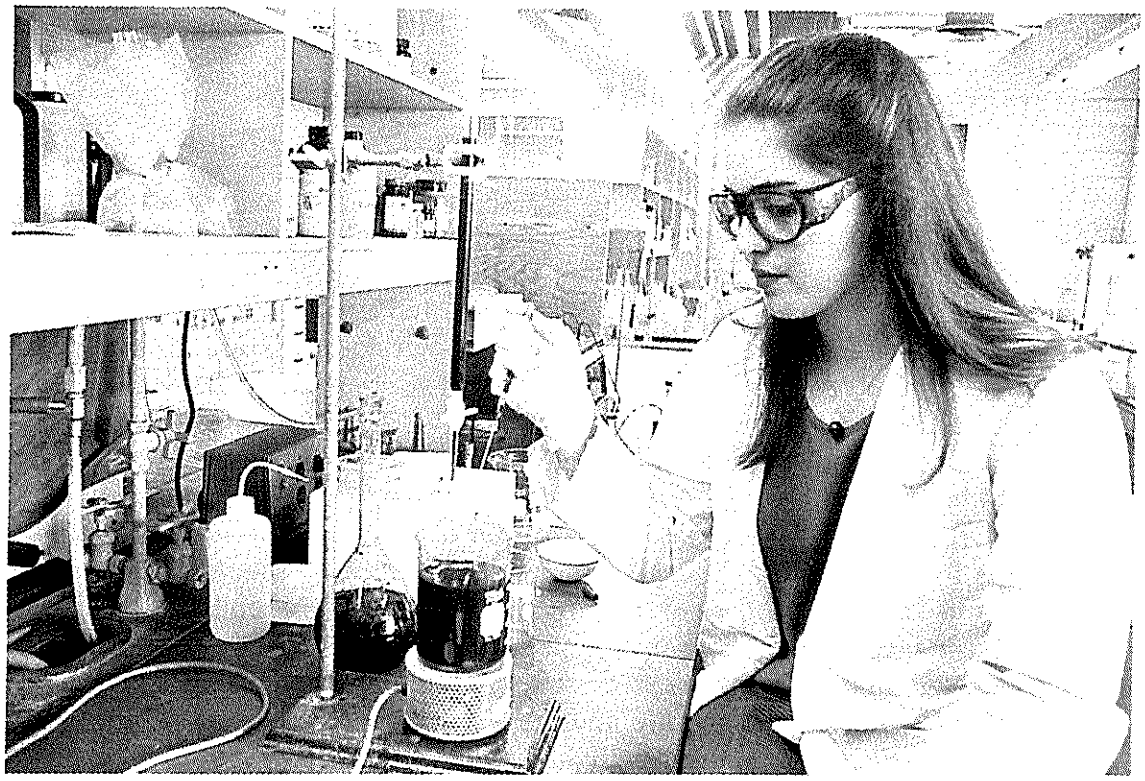
any drifting. The wood represented a pre-existing ice cover on a river. Further upstream, we added the ice. There were many different shapes and sizes of the plastic prepared, and early trials consisted of adding only one shape of ice into the flume at a time to get a general idea of which water discharge worked best with each size. Later, we combined the different sizes together to create the ice jam. Once a sufficient jam had built up, water surface profiles and the jam thickness at different points were recorded. Water discharge and timing were also monitored and noted. All of the experiments were videotaped.

As for results so far, we haven't had many significant findings concerning our objective, as the research is still in its preliminary stages and will likely continue for at least another year before completion. We did conclude that the bed roughness was sufficient for now. Personally, I have observed that the jam tends to be thicker near the centre and thinner along the edges. I have also acknowledged that such jams are very unstable, and without warning the entire thing can suddenly condense or collapse and give way.

Although it may have seemed differently at tedious times in the lab, I really did enjoy working for the WISEST program this summer. I learned a lot about civil engineering, and had some helpful discussions with my professor concerning the different options available in university.

Marcie Reinhart

Throughout our lives we are led to believe that instruments used by modern day society are always correct. We tend to not question the accuracy of commonly used equipment. During my six weeks of research for WISEST, I questioned the accuracy of a commonly used instrument, the Coulter. The Coulter is a piece of equipment used by oil companies, such as Syncrude Canada, to determine the oil sand particle sizes of their mines. The size of particles in a sample determines the grade of oil in the mine and therefore tells how economical it is to extract the oil. The Coulter is tested for accuracy by the manufacturer, but since it can be used to test the particle sizes of many substances other than oil sands, the manufacturer tests are general rather than specifically for oil sands. The Coulter does have known flaws. It does not pick up non spherical particles and although most oil sand particles are spherical, the percentage that aren't can have a fair effect on the readings. Also the Coulter uses very small samples for analysis. Since such small samples are used, the readings may be neglecting a lot of the greater whole. To determine the accuracy of the Coulter I prepared samples of known size content through a process called *sedimentation*. This technique depends upon Stokes Law whereby the rate of settling of a spherical particle is related to the fluid viscosity, the acceleration due to gravity and the density of the particles and the fluid. *Sedimentation* requires adding specified volumes of water, stirring for a period of time and allowing the mixtures to settle for certain amounts of time. By following prepared guidelines certain size fractions of oil sand sediment can be obtained. The size fractions I obtained for my research were: <3.9μm, 3.9-7.8μm, 7.8-31μm, 31-45μm, 45-90μm, 90-150μm and 180-250μm. The last five size fractions were obtained through screening. Once I had obtained approximately 7.0g of each size fraction I prepared mixtures of exactly two of the size fraction. Each mixture contained a known percentage of each of



the two size fractions. Twenty five mixtures were prepared in all. These samples were taken to Syncrude Canada for Coulter analysis. Upon examining the readings of the Coulter some inaccuracies were found. Through graphing the Coulter readings it was seen that many of the larger size fractions did not show up in their proper proportions in the Coulter analysis. In one instance a sieved size fraction that represented 60% of the sample only appeared to the Coulter as 1% of the total sample. I was able to conclude that the Coulter is rather inaccurate for some particle size fractions. My stay at WISEST allowed me to question societies convention that all scientific instruments are correct. The answer I found to this question has given me important insight to the fact that not every commonly accepted fact is true.

Crista Osualdini

MY WISEST SUMMER

When I received the letter from WISEST stating that I was chosen to be a part of the summer research program, I was thrilled. I read on further to discover that I was working with the Pulmonary Research Group. This was even more exciting, as I would be working in an area of science in which I was interested. However, in the next sentence I stumbled over the word 'eosinophil.' I had no idea what an eosinophil was, nor did I know how to pronounce it. Thanks to the help of my biology textbook, I managed to find out that an eosinophil is a type of white blood cell.

Armed with this information I began my first day of work. For the next six weeks I would be working in a lab in the Heritage Medical Research Centre under the supervision of Dr. Redwan Moqbel and his research team. It was here that I would learn what research is really all about. Over the next six weeks my knowledge of the eosinophil grew. Not only did I learn about the function and role of the eosinophil, but I also learned some basic immunology. The eosinophil is one of the main white blood cells involved in the inflammatory response; it plays a role in asthma, allergies and parasitic diseases. Eosinophils normally constitute anywhere from 2 - 5 % of total white blood cells. This number, however, is substantially higher in those who are allergic, asthmatic or suffering from parasitic worm disease. Although the role of the eosinophil is not fully understood yet, it primarily appears to undergo degranulation. Degranulation is the process by which the cell releases its granule contents and, in turn, kills itself as well as other target cells.

The project I am working on involves an understanding of the role of eosinophils in a particular protozoan parasitic disease. An interesting observation was made that a high number of eosinophils provided protection against some parasites. People with high eosinophil numbers had better survival rates than their counterparts with low numbers. This observation prompted the question: How do eosinophils provide protection against parasitic diseases? Not only was I increasing my knowledge of immunology, I was learning about parasitology too.

One of the parasites that eosinophils appear to defend against is *Entamoeba histolytica,* a single cell parasite that causes parasitic dysentery. Although dysentery is not a major concern for those of us in industrialized nations, it is a major problem for third world countries. Each year *E. histolytica* infections cause 10 to 100 times more deaths than AIDS. Approximately 500 million people are infected with this parasite. Spread of the disease is by cysts that are excreted with feces and ingested with contaminated food and water; most often humans infect other humans. Not everyone shows symptoms, in fact most people show no symptoms. Symptoms include diarrhea and acute dysenteric pain and bleeding. Usually the parasite attacks the digestive system; it may however affect extra-intestinal organs. An organ commonly affected this way is the liver. The parasite causes lesions and abscesses of the liver, often requiring drainage.

For the study, a model of *E. histolytica* infection and liver involvement was set up in laboratory gerbils. Three different groups of gerbils were used in this study. One group, the eosinophilic group, had previously been given a *Toxicara canis* antigen to increase the number of eosinophils. A second group, the control group, was given a saline solution in place of the antigen. A third group was not given any injections. All three groups were then infected with the *E. histolytica* parasite. The gerbils were then euthenized at various time intervals and their livers collected, fixed in formaldehyde and

blocked in paraffin wax.

This is where my role in the project began. I was given about 100 tissue blocks embedded in paraffin wax to study. The blocks needed to be sectioned, the sections separated and picked up on slides, and the tissue stained. In order to section the blocks I needed to learn how to use a microtome, a device used to cut very thin sections off the paraffin block. For this study, the sections I cut were six millionths of a metre thick (6μ m). After cutting a number of sections, from each block, I obtained a ribbon of sections which I placed into a tissue flotation bath to be smoothed out. The tissue flotation bath is filled with water between 42° and 45° C. Sections are then separated from one another with forceps and are then picked up on slides. Now the tissue is ready to be stained. The stain I use is called carbol chromotrope 2R; it stains eosinophils and their products red.

If everything goes well we will see a pinkish area around the lesions in the liver to indicate the presence of eosinophil granule products. If carbol chromotrope does not seem to work we will try using a method that uses antibodies for specific staining of particular proteins. In the end, if it seems that eosinophil products are indeed found around the lesions, this will provide evidence that eosinophils and their products may play a role in fighting this parasitic infection. This information may eventually help to develop new treatment strategies for dysentery.

One of the most important things I learned this summer is that if the study does not work, it does not mean that all the time spent working on it is a waste. We will have tested our working hypothesis and found whether the material we have provides us with evidence for or against it. We may be close to finding what happens or we may need to take an entirely different route. No matter what the results are, there is something to be learned. Finally, I would like to thank Ben Bablitz for all the time he spent working with me in the lab.

Katherine Pilger

Katherine Pilger

http://www.ester.destruction.com

Many young people see science as a set of facts to be memorised from a textbook. My experience in the WISEST Summer Research Program has taught me otherwise. Rather than being an objective discipline, the continually evolving and challenging world of science and technology should be regarded as a subjective endeavour.

The WISEST Summer Research Program has been a wonderful once in a lifetime experience that I will cherish for years to come. Not only was I able to participate in ongoing research in a University of Alberta laboratory, but I also met with other young women who are interested in the vast field of science and I gained some valuable insights.

I worked in the Department of Chemistry and thoroughly enjoyed my time there. I acquired more practical laboratory skills in these six weeks than in all my school years. A big part of why I enjoy chemistry so much is that it is a highly hands-on field, rather than purely theoretical. I have learned that in true research chemistry, unlike the planned laboratory experiments at school, things do not always work out as planned. Even though this can be somewhat frustrating at times, it is a lot more interesting than if everything works out the way you thought it would beforehand.

The lab I worked in deals with the identification and disposal of chemical waste generated by various labs on the U of A campus. In the lab, hazardous or potentially hazardous materials are converted into benign compounds that are environmentally friendly. When the lab receives the waste chemicals, they are not always in good condition. Many waste materials are unlabelled, in leaking containers and one can never be sure how pure they actually are.

For my research project, I was involved in the safe disposal of esters. An ester is an organic compound formed by the reaction between an acid and an alcohol; this process is known as esterfication. But what I wanted to do was to destroy the ester. I hydrolysed the ester to produce an acid and an alcohol since esterfication is a reversible equilibrium reaction. Normally it is through the addition of lots of water, the use of high temperature and the use of a caustic catalyst that the ester can be hydrolysed.

The two esters I disposed of were mesoxalic acid, diethyl ester (MAD) and 2-acetoxy, 2-butenoic acid, ethyl ester (AOB). The first ester I worked on, MAD, took sufficiently more of my time since it was a rather peculiar ester. Due to an oxygen-carbon double bond, the electronegativity of oxygen increased the instability of MAD and caused it to break down very easily. In fact, MAD simply broke down into mesoxalic acid and ethanol when it was heated in water. The other ester, AOB, needed to be refluxed (simultaneously distilled and condensed) at high temperature with a caustic catalyst, such as sodium hydroxide, in order to hydrolyse it into ethanol, acetic acid and acetone.

By running gas chromatography (GC) tests on the ester, I was able to trace the reaction of both the esters to ensure they went to completion. The GC print out gives a retention time for each component of the material, with a corresponding peak and a percent area. I ran a sample of the ester by itself to determine its retention time and its purity. Then, I hydrolysed the ester and injected this sample into the gas chromatograph. When the ester peak disappeared and two new peaks appeared, the acid and the alcohol, I knew the hydrolysis had taken place.

The safe treatment and disposal of chemical waste is essential in preserving a quality of environment and human health that is fundamental to our future. After working on this research project, I have come to appreciate what a complex job it is to identify and dispose of waste chemicals.

In addition to working in the research lab, I enjoyed the various social activities with the other WISEST students. Some of the social activities included: dinner at Earl's restaurant, Shakespeare in the Park, meeting for lunch on campus, the Celanese tour and picnic and the Open House. It was a great opportunity to socialise and it was a lot of fun.

The WISEST Summer Research Program has been one of the most enriching experiences that I have had. Thanks to Renate Pfeifer, Grace Ennis and Dorothy Tovell for the excellent organisation of the WISEST Program and the social activities. A special thanks to Dr. Margaret Ann Armour, Dr. William Hunter and Mrs. Sara Salmon for their guidance and expertise in the hazardous chemical waste disposal lab.

Alanna Ward

FROGS, TOADS, AND TADPOLES GALORE READ ON TO DISCOVER LOTS MORE!

When I first found out I had been chosen for a WISEST position I was overwhelmed; when I found out I'd be working with amphibians at Meanook Biological Research Station I wasn't too sure. I had never really done anything with frogs before and I didn't know if I would like it. It turned out to be a great experience and my attitude towards frogs and toads has changed dramatically since now I think they are so cute. I mean, how can you not love a little toad that is the size of your fingernail!

At Meanook Biological Research Station I worked on an amphibian monitoring program called RANA (Researching Amphibian Numbers in Alberta) which was started this year by the grad student whom I worked under, Brian Eaton. The word Rana is also the genus for many frogs such as the wood frog (Rana *sylvatica*). Amphibian populations have been decreasing recently and this program was started so that the populations would be able to be monitored and hopefully to find out what is happening to the populations. We (Brian, his assistant Chad, and I) built a fence consisting of wooden stakes and plastic around one of the natural ponds, as seen in the following picture. Coffee cans were placed in the ground for the frogs to fall into. Each day I would check the cans for frogs and then proceed to measure and weigh them. The majority of the frogs/toads I would find in the cans were Wood Frogs but there would be the occasional Boreal Chorus Frog or Boreal Toad. In the field, at South Calling Lake, Brian and Chad have similar fences and traps set up around ponds that are cut, meaning the buffer strip of trees around the pond is limited, or uncut, where there is a large area of forest around the pond. They are hoping to find what effect, if any, the amount of forest has on amphibian populations.

I also worked on two other experiments to research the effect of fish on amphibians and in the greater sense, amphibian populations. The idea to research the effect of fish on amphibians developed from an event at a pond where one year there were a lot of fish and few amphibians, but after the winter kill there were few fish and a lot of amphibians. Therefore, the two following experiments were designed to investigate the effect of fish on amphibians. The first involved the effect of Fatheads and Stickleback Minnows on tadpoles. There were fifteen barrels (which I got to clean on my first day!) five of which were controls with only tadpoles, five which had tadpoles with Fatheads, and five which had tadpoles with Sticklebacks. I measured, weighed, and determined the stage of development of the tadpoles once a week for about three weeks until they were turning into toads. I also measured and weighed the fish from the barrels once a week. The second experiment was designed to observe the effect of different waters on the toads in terms of possible chemical interactions such as smells or pheromones they would have received through chemoreceptors. We used Rubbermaid containers with paper towels soaked in different waters (such as DDW(double distilled water) vs. Fathead water, DDW vs. Stickleback water, or Fathead vs. Stickleback) on either side of the container. Then I would record the toad's location once every five minutes for an hour to see if there was any effect. There are no results as of yet since the data still has to be gone through.

I also learned what the Fathead Team did since I helped Candace, another WISEST student, with various activities including building extensions for the ponds, checking nest boards, setting traps, and doing some YOY casting.

My summer at Meanook was a unique and exciting experience, and I was able to learn about amphibians as well as many other things since there are many people working on a variety of different projects. Some of these other projects include water chemistry where Laura and Kathryn (two other WISEST students) worked under Shelley, Scott, and Andrea; algae research which Nicole and Sue B. worked on; Greg's parasite research; soil research which Nadia and Heather worked on; and of course the Fathead minnow research conducted by Andy and Sue T. There are also many others but these are the ones that I was able to learn a substantial amount about. I found my WISEST experience broadened my horizons into yet another field of science, allowed me to grow as an independent individual, and was FUN!

Entomology

Entomology (the study of insects) is a very interesting field to work in. The supervisor, Dr. John Spence, has many graduate and summer students, so there were a variety of projects to work with. Brianne Hudson and I helped with experiments involving water striders, beetles, spiders, aunts, springtails and even tent caterpillars. This taught us new skills. I learned many things and enjoyed the experience very much.

The main experiment assigned to Brianne and me was studying the relationship between the body size of a female water strider (*Gerris* buenoi) and the number of eggs she lays. The life evolution theory assumes that the bigger the female the more eggs she will lay. Though our experiment wasn't quite finished, we analyzed the data we had and found sometimes, such as when there is little food, this doesn't always hold true. During this time, I learned certain mechanical skills involving microscopes when we had to count eggs. There were also specific skills, such as how to catch escaped water striders when they are hopping across the floor, that we learned.

There were many other experiments we helped with to a lesser degree. Often, the rest of our mornings were spent working with pitfall traps. These are containers full of antifreeze that are sunk into a forest floor and insects will walk in. The insects are collected and sorted in the lab. Brianne and I did the sorting. We had to separate two types of beetles, carabids and staphilids as well as spiders and ants. Occasionally, some things we did not need fell into the traps and surprised us. Guess what it is like to open some cheesecloth expecting insects and find a frog and two mice staring up at you? It was interesting though. We found out later that the students wanted to show the difference between clear-cutting and forest fires.

Another project involved separating springtails into families. Springtails are terrestrial organisms that have developed a special limb called a furcula. When they are in danger, they can squeeze the liquids inside their body into this 'tail' and spring away. The graduate student, Jeff, was trying to find out if new species are being introduced when soil from a greenhouse is transplanted. Springtails are very small, so we had to separate them under a microscope using a tiny scooping tool to pick them up. It was tricky to pick out each individual but I got better with practice.

There was another project involving water striders. Rosalind, one of the students, is studying parasites that live in a water strider's gut. Brianne and I dissected the water striders and counted the parasites that were found. We did this under dissecting and compound scopes with small pins and forceps. The gut had to be cut out and then cut open to study the different parasites. You had to be very careful with any of the cutting so that the parasites won't escape to early.

We also helped for a couple of days with a project studying tent caterpillars. The student, Andrea, wanted to know if a tree can tell if it is a caterpillar or not that is eating it. We would cut the leaves off certain trees and let the caterpillars eat them off other trees.

Not only did we work with bugs but we also kept some as pets. I now have pet Walking Sticks. They name them this because they can go into an immobile state that makes them resemble twigs. Their eggs are unusual. This is because they do not crack open the egg but crawl out through a tube already in it.

LeilaniaWatson, Brianne Hudson, (right)

Every Tuesday, we would do an hour drive to George Lake. This is the entomology field site. At George Lake we helped with bug count. Four to six people put on chest waders and bring nets. Then we all try and catch every adult water strider off Experiment Pond. We take the adults and record what sex and species they are then paint dots on their backs. There are different colored paints for every week and then we keep track of what adult appears when. The information we record tells us a lot about population dynamics, how climate affects the population and can lead to studies on global warming. George Lake is also where some pitfall traps, Andrea's trees and a few other experiments are located.

From the entomology lab, I learned that sometimes you do not get the results you expect in an experiment or you even find something new and different from what you had originally planned. It was very interesting to see the course of such longer and more complicated experiments. They can be similar in outline but very different than the short high school projects I have done. Watching how controls fit into an experiment was also enlightening. This experience taught me a lot, both in skills and information.

I really enjoyed the WISEST program, learned a tremendous amount and met many new friends. I would highly recommend this experience to anyone.

Leilania (Lani) Watson
Ecole Secondaire Beaumont Composite High
1997

BUGS 101

An intense heat bathes your shoulders as you wade deeper into the pond. The water is cool; a welcome contrast to the 30 plus temperatures. As the chest-waders tighten around your legs, you scan the undisturbed territory. Suddenly, your eyes dart to the left. You lunge forward, and as your net catapults overhead, you fight for your balance among nature's most sophisticated booby-traps. Finally, stability (to some degree) is achieved, and you peer hopefully into the net. It's a fifth instar. Damn.

We only wanted adult water striders for the experiment we were doing up at George Lake, one of the University's many field sites. The fifth instar is the water strider's last nymphal stage, making it easy to confuse with an actual adult (especially in the beginning). We would frequent the lake once a week, during which time we would catch water striders out on the pond, and bring them back to the cabin to count them. All this was going toward a long-running study of population dynamics: my research team was gathering data which might, eventually, show a relationship between climate and the water strider population in that area. To accomplish this, we would paint any newly emerged adults with a color particular to the week, allowing us to keep track of those bugs which lived, died and those who returned the following spring. (This is possible since water striders go through a resting period similar to hibernation during the winter.) Painting the tiny bugs was always a challenge and, by the end of the day, it seemed the water striders had been more successful painting me than I had them. Nevertheless, George Lake was one of the highlights of my work; in fact, I think everyone in the lab looked forward to it.

Back on campus, we were doing another experiment with water striders. Here, we were trying to establish the relationship between fecundity (the total number of eggs laid) and various body measurements of a particular species of water strider, *Gerris buenoi*. Apparently, recent studies suggest that water striders defy the life-history theory: a somewhat ancient, yet accepted idea which states somewhere in a mess of scientific lingo that larger females lay more eggs. Naturally, our experiment was much more complex than that which I have described. We took water striders from different sites, gave them different food treatments and then proceeded to measure fecundity, longevity (lifespan), body length, abdomen length, abdomen width and mid femur length. At this point in time, we are just starting to put all these variables together in attempt to draw some sort of conclusion. As of yet, it looks as though we may have found what we were looking for. Among other things, the data up to this point indicates that larger females under the LOW food treatment generally laid less eggs than the smaller females did. (Hooray for the Department of Entomology!!) This result may not sound that exhilarating, however, I'm sure you can all appreciate the pure excitement that a scientist feels when she/he is actually right.

When the water striders weren't keeping me busy, beetles, spiders and ants kept me employed. I was involved in one experiment which was trying to isolate the difference between the insect population of forest fire sites as compared to that of clear-cut areas. To do this, pitfall traps - small containers holding antifreeze - were placed in the ground at a particular site. Insects would then fall into the traps, and be both killed and preserved by the antifreeze. My job was to sort through the pitfall samples and collect certain beetles, spiders and ants. Of course, pitfall traps couldn't be restricted to insects, and once in a while Mother Nature would leave us some sort of mammalian surprise. (Either that or zoology was sneaking unwanted samples into our lab.) Later entitled "The Freak Show", our collection of mice, shrews, frogs and other miscellaneous organisms proved useful in 'freaking people out' (hence the name) during the Open House. Luckily, my partner and I were desensitized to the display - - exposure to antifreeze fumes for long periods of time will do that to a person.

After the fumes wore off, I could advance to the next level of insect sorting: springtails. Basically, these are tiny, terrestrial insects with 'furculae' (a.k.a. springs) on their rear ends which allow them to jump extremely high. Naturally, the fact that these organisms aren't visible with the naked eye created a bit of a problem; I lost them, spilled them and accidentally flicked them

at myself (don't ask). Nevertheless, I found springtails to be very interesting insects, and I always had tons of fun working with them.

Last but certainly not least, I have to mention walking sticks (or 'WISEST bugs' as I like to call them). These are really cool insects with a population made up almost entirely of females! Walking sticks are parthenogenetic, meaning that the female produces an egg which is already fertilized. On very rare occasion a male will emerge, but unfortunately for him, he is pretty much useless. The body of a walking stick is very interesting; it will readily go into a state of reflex immobility where it will fold up it's legs and antennae, transforming it into an indisputable stick. This makes for great camouflage, not to mention a really neat insect!

I wish I could have about five more pages to tell you about the other insects I encountered this summer, but I suppose that it's about time for me to close. Before I shut up though, I would just like to say that my six weeks with the Department of Entomology was an amazing experience. I learned an incredible amount about both insects and scientific research, and besides that, I had an absolute blast! I would like to thank everyone in the Department of Entomology, as well as the WISEST administrators for making my summer a memorable one. You guys are great! And remember... bugs are cool, and insects rule!

- Brianne Hudson
Onoway High School
Summer, 1997

Research is a vital part of science. Without it, a multitude of questions would be left unanswered and our knowledge of the universe would be even more limited than it currently is. Though there were many days when I perceived my job as monotonous and trivial, I always remembered to focus on the "big picture" and reminded myself that, however meagre my contribution seemed, it was, nevertheless, important.

Through the WISEST Program, I was given a job analyzing water samples in the chemistry lab at the Meanook Biological Research Station. Because several groups brought water samples to be analyzed, I was involved in several different research projects. Each separate project had a different question to answer and a different reason for wanting analysis of their water. The majority of the water samples, however, were brought to the lab by a group called Terrestrial and Riparian Organisms in Lakes and Streams. This group, also known as TROLS, was involved in a huge project that was studying the effects that logging had on ecosystems around bodies of water. One major question asked by this group pertained to riparian buffer strips. In recent years, logging companies have left a certain area of trees between a lake and the rest of the logged area. It was believed that this strip of trees, which measured anywhere from 30 to 100 metres, preserved the ecosystem around a lake or stream. One of TROLS' objectives is to investigate how effective these buffer strips are in the conservation of ecosystems and to observe any correlation between effectiveness and size of the strips.

This question is important to both logging companies and the general public. By testing the effectiveness of buffer strips, TROLS hopes to discover how to best preserve terrestrial, riparian and aquatic ecosystems. The boreal forest is one of the last continuous forests in the world . Because of this, it is important to log this area in a manner that will preserve all of the ecosystems as much as possible.

It is the lab's responsibility to analyze the water from lakes and streams that are surrounded by the buffer strips. By performing several different analyses on the samples, such as pH, conductivity, phosphorus and chlorophyll, the health of the body of water can be determined.

Though this study is far from being over, the results thus far differ from previous beliefs. Former research indicated that all buffer strips played key roles in the conservation of both terrestrial and riparian ecosystems. Current research, however, suggests that only buffer strips that measure 100 metres or more in width provide assistance to the maintenance of these ecosystems. Though knowledge of the effectiveness of buffer strips is limited at the present time, more information will likely be available by the end of the millennium.

Meanook Biological Research Station proved to be a great experience. Not only did I learn much more about the world of research but I was also able to talk to those who had chosen science as a career. Though my job was difficult and the hours of work were often long and strenuous, I did find time to participate in activities outside of work. I enjoyed the Meanook Barbecue, the afternoons at the lake, and the evenings of basketball. The combination of great people, a challenging job and fun leisure activities, made my summer at Meanook a valuable experience that I will not soon forget.

Kathryn Herman

Confessions of a Computer Nerd
Stephanie Gregorwich

Sitting in a windowless cave, staring into a glowing screen and muttering obscenities (or Eurekas!) at the odious machine perched in front of me. That, in a nutshell, was my WISEST experience, but that doesn't even begin to explain what I've done, seen or felt during the past six weeks.

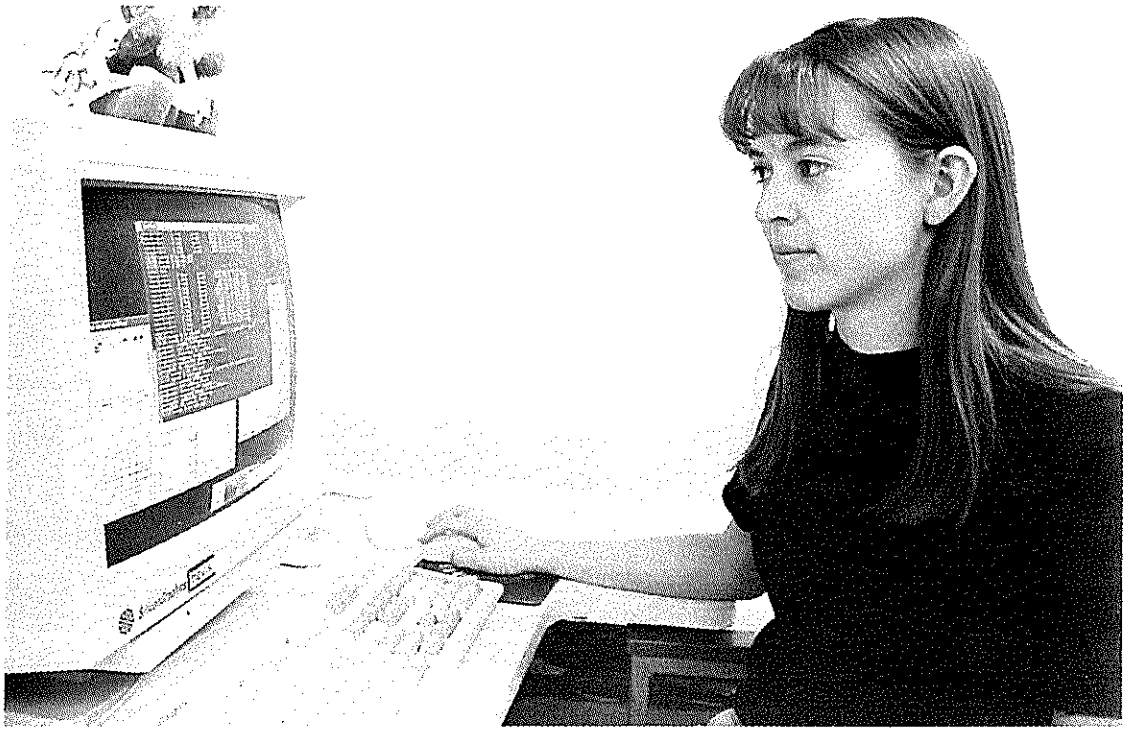
I was assigned to the Department of Computing Science to work on Rob Lake and Jonathan Schaeffer's research team. For the first few days I read UNIX manuals and tentatively typed in commands, only to be met with indignant beeps when I didn't get the syntax just right. UNIX is a type of computer operating system which is command-line driven, meaning that if you want to do anything, you'd better know the correct statement. There were so many times that I wanted to smash the speakers producing the beeps that told everyone in the lab that I was screwing up again, but I could never actually locate them- they were just one more gadget in the myriad of equipment. (Lucky for me- I think they would have been expensive to fix!) Somehow, over the course of those days, I am proud to say, I learned UNIX . Or at least the parts I'd need to work.

During my time with the Comp. Sci.. department I worked on several different projects, none of which were exactly research, but all of which taught me new skills and which were actually quite fun.

My first project was to crop and clean the colors on a digitized Edmonton transit map so that it could be posted to the web as a clickable image. To do this I used the commands xv -crop, giftoppm, ppmtogif, pnmscale and ppmquant, among others. Cropping the map required a special script of commands be run on the main graphic file and each sub-section from that which also needed to be cropped. (The original map was cropped into ninths and each ninth was put into ninths.) "Cleaning" the colors was done using a program called xv, which allowed me to "map" (match) nearly identical colors to one color, thereby decreasing the number of separate colors in the image and allowing for better compression. This means that the image file would take up less memory and therefore be quicker to load off of the internet.

My next project was to create a web page for WISEST. I obtained brochures and textual information from Grace and Renate and then searched the basement of Athabasca Hall for pictures with Dorothy. After typing out all of the information, I added the basic HTML coding. HTML stands for hyper-text markup language, which is the internet programming language. Choosing a format for the information was difficult because although I'd already created my own home page at school, it represented no one but me- I wanted the WISEST page to give the world a good impression of WISEST. After selecting the format and setting up the basic structure of each of the pages, I constructed graphics to be used as link "buttons", opening graphics and titles. I also scanned and shrunk the photographs and added them in as thumbnails. That is, the photos are displayed as small images, maybe 2 inches high, so as to be quicker to load but they can be clicked upon to view the larger image. As I write this, the page is still under construction, but I hope to see it on the net soon.

My third project was to make an internet form of an application form for the department. To do this I first had to learn the HTML coding for forms. I was surprised that it was simpler than I'd expected. During my summer I also had the opportunity to assist in posting the moves from a Grand Master/Chinook Computer Checkers program game to the internet as they happened. It was quite interesting to be part of technology in action.



So yes, while I did spend my summer typing commands in a windowless little cave, I also had a lot of fun yelling (quietly) at my computer when it started blinking and beeping for (as far as I could see) no reason. I have not yet made any decisions regarding my future career choices, but I do now know that I would like computers to be involved somehow.

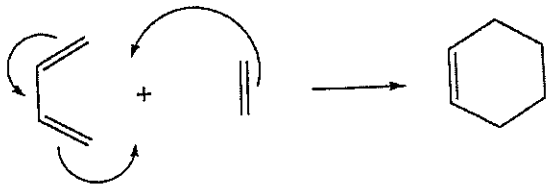
I would like to extend my heartfelt gratitude to Rob Lake for rescuing me every time my computer dissolved into blinking ASCII characters, refused to recognize my user codes or just plain would not work. If it were not for him I would have gone insane very early. Thank you!!!

The other side to my WISEST summer was living at residence in Lister Hall. It was truly one of the most memorable experiences of my life! At Lister I learned a lot about who I am and who I want to be. As a country kid coming to the "big city", I found that yes, I can survive away from my wide open spaces (though I don't like it as much), and as someone who has never lived on her own, I found that I can take care of myself. Contrary to my family's belief, I still did dishes and laundry without being nagged, and I didn't starve. But I also now know that I need to learn how to cook. Living at Lister was wonderful not just for all the things I learned about myself but also just for all the fun we "Lister Girls" had. I'll remember all our Roar nights and Disney movies (I'm sure the floor misses that!), stealing Cynthia's compliments, sitting in our rooms until 3AM talking, rollerblading (only 4 wipe-outs!), and all our "outings". (Another Thank-you to Marc who graciously drove us around and tolerated our company!) Thank-you to Kyla, Pam, Cynthia and Jennie, four of the best people with whom I could ever be crammed into airless res rooms. We had such fun! I can't leave this without also thanking Anne, Nicky, Esther, Allison, Jeena and everyone who came to our lunches in Quad.

WISEST Student Report

Wise? That I'm not...yet. This summer I discovered that there is so much to learn in any one field and so many possible fields to choose from and explore. I have a better idea of what goes on in a research lab because of my time in the WISEST Summer Research Program. My name is Suzanne Brassard and I worked in Dr. John C. Vederas' organic chemistry lab with one of his grad students, Karine Auclair.

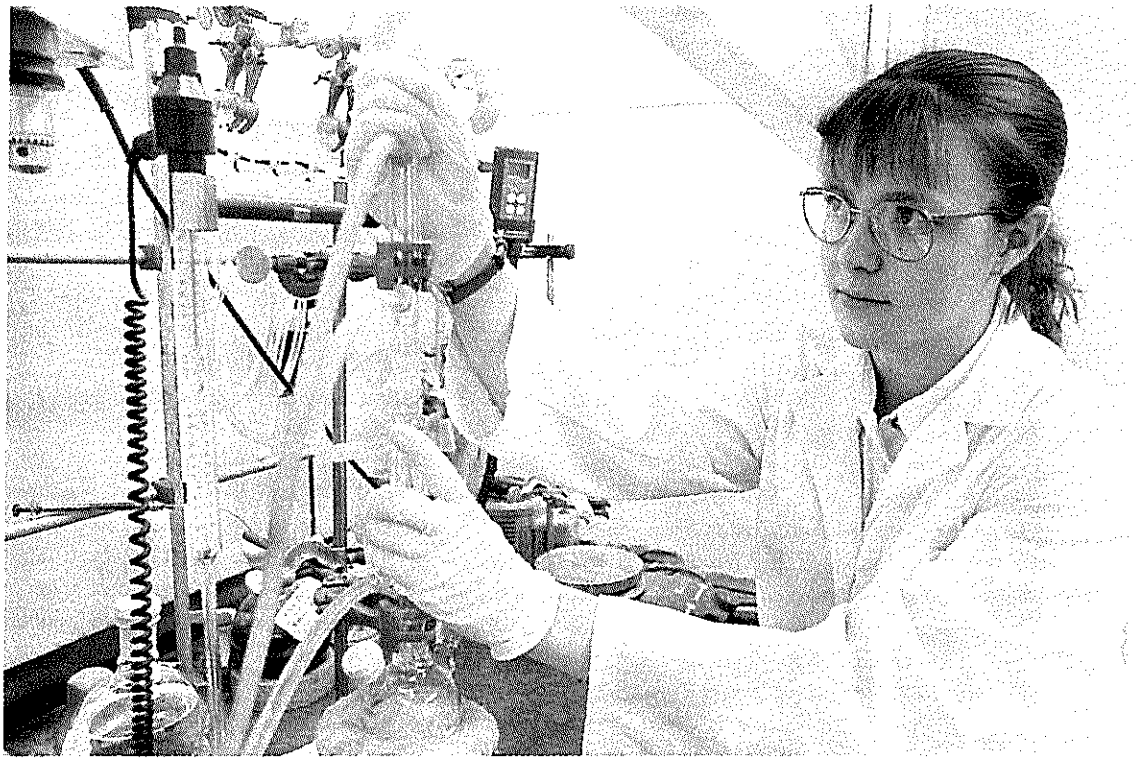
The project I worked on, ultimately, has to do with the synthesis of a product called Mevinolin by a fungus, *Aspergillus terreus.* How the product is made is relatively unknown. We think it might be partially made through a process called the **Diels-Alder reaction.**



This reaction can occur between a diene (the group with the two double bonds) and a dienophile (only one double bond) to form a cyclohexene group.

The part of the project I worked on was centered on trying to prove that enzymes, in nature, use the Diels-Alder reaction. To do that I first had to build a molecule that the enzyme could change. To synthesize the molecule there were six separate reactions that had to be completed. It took me six weeks to finish four steps of the reaction, with some of the steps being repeated several times. My intention was to finish my molecule and then "feed" it to the enzyme *Tyrosinase.* Depending on the product the enzyme produced this experiment would possibly prove or disprove the involvement of the Diels-Alder reaction in that specific synthesis.

The reason Mevinolin was chosen is because it is used to treat people with a high cholesterol level. Being able to synthesize it without using the fungus could help make Mevinolin more widely available to the public at a better price.



I've learned a lot over the past six weeks. Most of it relates to chemistry, from the shapes of different molecules to different methods for synthesizing, purifying, and identifying substances. The opportunity to work with knowledgeable people in a well equipped laboratory environment was a valuable experience. I've found that I really like chemistry and I find it holds so many possibilities in terms of avenues of study and careers. This program has given me valuable insight into what I might want to do and how the U of A works. The sessions on Wednesday afternoons allowed me to see things and meet people who work in the sciences and gave me an even broader view of the University and the people who work and live there. Finally, the social aspect of the program was fun and informative. I enjoyed getting to know the other girls in the program and spending some of our lunch times together. I also enjoyed our trip to see Shakespeare in the Park. I really liked the people I worked with in the chemistry lab.

I would like to thank all those who made this such a unique and wonderful experience. To Renate, Grace, and Dorothy, who make WISEST work, to Dr. Vederas for choosing to take a WISEST student and to Karine (my mentor), Jennifer, Manj, Dean, Aref and all the others for taking the time to explain things to me and for making me feel at home among them, thank you very much and good luck in the future.

Suzanne Brassard

Math is a different place.

Adrienne Grove & Karoline Coleman

Karoline and I must have been the luckiest two people in the whole WISEST program. *No kidding -- we were the only ones who got to work in the math department, and it was way different from what everyone else did.* For one thing, we were the only ones who got to take a real university level math course -- Math 241. *We had a lot of fun doing research for Dr. Liu -- research that actually helped him out.*

For the first part of the day, we would attend our 2nd year geometry course. At first, I found it fairly easy to follow along, but after a while, I was lost. I could understand what was happening on the board, but when it came down to the homework aspect of it (which was entirely proofs, which I have discovered I hate), I had some trouble. Out teacher is extremely knowledgeable when it comes to geometry. I only wish I could have had an easier time of it. I've found that I like answers that are black and white, right or wrong, but I'm realizing there is less and less of that as the work gets tougher. All in all, I gained the experience of attending a university class and became aware of what lies ahead for me. I don't regret having tried out the course, even if I didn't love every second, because I learned much more than I though I could, and I know what I did learn will prove invaluable in the future. Thank you Mr. Tokarsky!

For me, the class was great. Not only did I get to tell people that I'm taking a 2nd year university course, I go to learn things that I had never even considered. Since this kind of geometry isn't acknowledged in high school, it was nothing like real school to me. We learned how to think laterally -- to try to find new answers rather than just memorize the only answer. I'm proud to say that I was actually able to teach the teacher something -- me! I found a whole new way to solve a problem! Okay, so it wasn't really that big a deal, but it sure was a rush. In all honesty, I found that the more you learn, the more you realize how little you know. Out teacher was really great too; he helped us every step of the way encouraging us to do all the assignments. Generally, our mornings were very memorable.

Not to say that out afternoons were forgettable. No one has ever been as familiar with a library as Karoline and I have gotten to be in the math library, nor has anyone gotten the workout in one that we did! We hefted around a lot of books this summer -- but it was not in vain. For 5 ½ solid weeks, Karoline and I dug up every single little thing that we could find on graceful graphs. Graceful graphs -- now there's something that nobody's ever heard of. In fact, nor had I until Dr. Liu sat us down in the 'prohibited' math conference room to give us an impromptu lesson on the subject. Of course, now I could spew out a definition without a thought, but I'm pretty sure we all found some definitions that aren't so every day this summer -- that is why we came here, right?

Myself, I'm very thankful for our assignment to the math department. I'm particularly grateful that the research we did was mostly independent -- we never had anyone leaning over our shoulders. Though I enjoy working with other people, I feel that with the type of research we were doing, it was better that it was just the two of us. We found ourselves working in the math library every afternoon, searching through the endless volumes of mathematical reviews. Our job was to look through every book dated from 1940 through to the present to find all we could on our subject. We collected and organized these reviews, after hours of photocopying, for Dr. Liu's research. We also read many of the actual papers that the reviews discussed, to help us with our project. For our project, we were given a group of graphs which had to be proven graceful or not. This proved not to be an easy task. By the time we finished, Adrienne and I had learned more facts, conditions, and other things pertaining to graceful graphs than we know could exist. (Don't worry, I won't even try to explain, I'll just say that we managed to get most of our project finished, surprising even ourselves.)

Adrienne Grove, Karoline Coleman, (right)

Fortunately, we all did more than just sit in our respective labs and libraries. We got some pretty interesting and fun stuff on the side. I mean, think back on everything - the bag lunches with silly topics like "something interesting or strange about me", the Celanese field trip (you know, the company that single-handedly supports the entire nation's smoking habits) - where we got the awesome pens, candies, and don't forget the very cool banners. We got some major messages on safety and "how to properly present your scientific findings (even if they have no impact on the real world)." Personally, I won't ever forget watching two giant, live pigs get opened up in front of me (they ran in squealing, and left in plastic bags - that has to be some kind of irony). Not to mention the fact that Dr. Liu seemed convinced he hadn't confused us enough with graceful graphs, so he gave us all sorts of brain teasers, that are still bothering me. Seriously, I think that every single one of us learned more than just what we were taught - we learned what life is really like here at the U. I know that I'm definitely coming back in the fall of '98. I can only hope that I'll see some of the friends and professors I met this summer then.

For me, one of the biggest things I got out of taking part in the WISEST program was learning my way around campus. Oh boy! I had no clue that the UofA is nearly as large as my hometown, Ft. McMurray. During lunch or after work, Adrienne and I would explore many of the buildings on campus including: SUB, HUB mall (does anyone know what that stands for?), the Education building, Rutherford Library, all the stores and restaurants around campus, the Dentistry and Pharmacy building, Chemistry East and West, and of course, our own building, CAB. There are so many beautiful buildings on campus! I was literally wowed by the appearance of the UofA! I had a great time meeting the other WISEST students and going on all the tours. The big sister Jenny was very nice, and even took all us out of town kids to K-days and other events. This was a great summer!!

Thanks so much to everyone,

Adrienne x Karoline Coleman

Adrienne Grove & Karoline Coleman

Fantastic Six...Weeks

Today is Wednesday, August 13, 1997. I find it unbelievable that tomorrow is going to be Thursday, August 14, 1997, the last day of the WISEST Summer Research Program. Has it been six weeks already? (*The time has come, William, time for you to face the truth.*) In A Few Good Men, Jack Nicholson said, "You can't handle the truth!" I can totally agree to that.

My experience in the WISEST program could be described with such adjectives as "exciting," "unforgettable," "meaningful," "pleasant," "interesting," "amusing," "entertaining," "delightful," "SCARY," "FRIGHTENING," "HORRIFYING"....

It was exciting, unforgettable, meaningful, pleasant, interesting, amusing, entertaining, delightful in the sense that I was able to acquire plenty of knowledge about a wide variety of things, from the opening day presentations, the field trip to Celanese Canada, the session on women in non-traditional careers.... Through this program, I was able to see the world from a different point of view--because being a male, I worked in an area traditionally dominated by females--and learn things that I did not know about or was not aware of. I was also able to look at my future differently regarding the career that I would like to pursue, and see life in general with a modified attitude.

Moreover, I was very glad that I had the opportunity and pleasure of sharing my experience with a group of wonderfully enthusiastic young people of my age. I was impressed by the fact that the females showed a great deal of competence in doing stereotypically males' tasks. They proved a lot to the world in these six weeks. I was also glad that I got to work with the people whom I saw on a regular basis in the research project that I had taken part in. I enjoyed being with them and had a lot of fun in having everyday conversations with them. I found all of them (Jane D., Gerry, Darcy, Sukitha, Jane A., Lorraine, Treva, Di, Susan, Harriet and Fuchsia, and all those whom I did not get to know their names or whom I have missed mentioning because the list of the names of the people is simply too long) very dedicated because of their contributions to society through our research study. They had taught me a great deal, from the things associated with our study, to general, practical knowledge that I could use in life. (*I feel like I am giving a speech in response to my receiving the Nobel Prize. What a moment that would be!*)

This program was scary, frightening, horrifying in the sense that among the fifty individuals participating in the WISEST program, forty-eight were females and only two were males (including me). Nevertheless, I would say that this program gave me an excellent opportunity to learn how to socialize and coexist with people of the opposite sex.

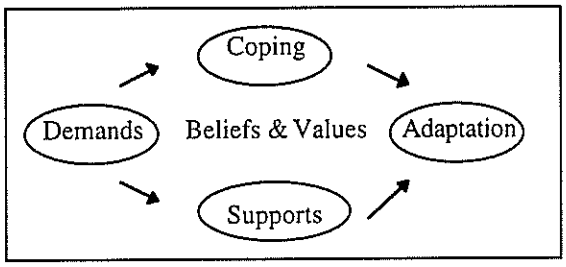
So, what is our research about? I have said very little--actually nothing--about it.

Throughout these six weeks, I worked, along with my supervisor Dr. Jane Drummond and others (Harriet Harvey, Fuchsia Howard, and Susan Neufeld) of the Faculty of Nursing, and people from the Department of Educational Psychology (led by Dr. Gerard Kysela) on a project called "Child and Family Resiliency." I worked almost exclusively in Education North; there were times when I went to the Clinical Sciences Building. (I had never seen a man on the floor where I would go visit our Nursing office.) (I am just told that there are males working on that floor.)

Our project is a research study on evaluating the effectiveness of certain family-centered (means involving and focusing on the participation of the parents and other family members) intervention strategies

in benefiting families of different types--in enhancing family resiliency (being able to adapt to situations within a family); it is based on the Family Adaptation Model developed by various people working in this study.

Family Adaptation Model



This model reveals that within a family, **adaptation** is the consequence--more truly, a desired outcome--of the family members' working together in finding the best way to resolve a situation (**coping**); taking advantage of the types of resources available to them and accepting the help from others (friends, professionals, etc.) in generation a solution (**supports**); knowing what their beliefs and values are, in response to the presence of a conflict or a special circumstance in that family (**demands**).

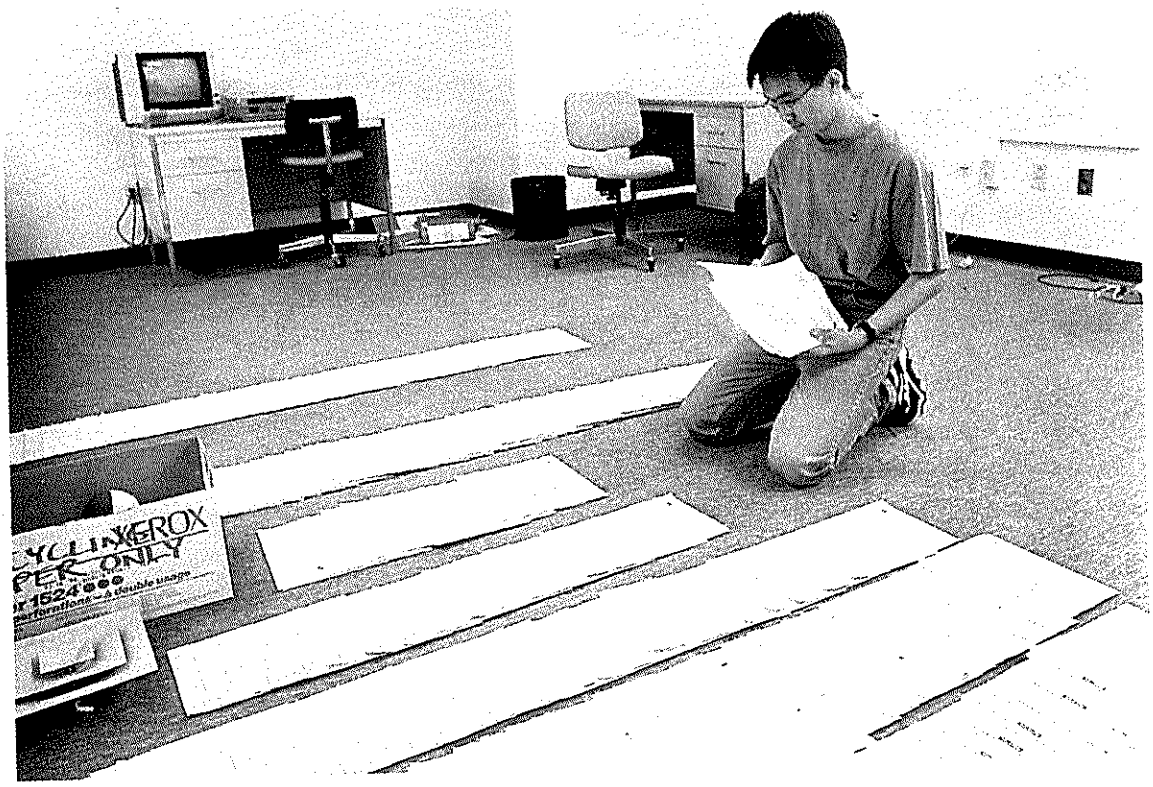
We tested two strategies--Natural Teaching Strategies (parenting skills) and Cooperative Family Learning (family problem-solving skills)--on families having children with developmental delays to see how they would influence the way the families might function.

In helping with this research, I did a number of different tasks. At the beginning, I did a considerable amount of reading about the research through the manuals published by the people on our team, and information on our web site (I must say that one of the coolest things about our research is that we have our own web site at http://www.quasar.ualberta.ca/cfrrp/cfrrp.html.), in gaining some background information to familiarize myself with the study. I learned a lot about psychology from talking with Darcy, one of the researchers . He and I also worked on some statistical analysis on the data collected for the research, using a program called SPSS.

I also learned how to code videotapes (showing parent-child interactions) using specific instruments in working with Darcy, Fuchsia and Harriet (both of them are undergraduate students in the Faculty of Nursing). Some of the instruments used to assess parent-child interactions were relatively simple, while others seemed more complicated and demanded more from the person doing the assessments. I helped to create a matrix containing information about all the partners whom our research is associated with, and did some work dealing with the internet, in addition to other things--which I will not have time to discuss--that I had done during the six weeks.

The types of work that I did certainly differed from the work that the girls would do in their research. My first impressions towards these tasks were either they did not look very interesting from the outside, or that they seemed rather difficult to do. However, I undoubtedly enjoyed doing what I did and found the work not as difficult as I imagined. More importantly, I took pride in the contributions that I made to our research.

One of the surprises that I discovered in the six weeks--through talking with my supervisor--was that nurses did not only take care of sick people in hospitals. They do many more things than that in



reality, as exemplified by the fact that Dr. Jane Drummond and Susan Neufeld (both are registered nurses), and Harriet and Fuchsia are working in the Child and Family Resiliency Project, but not all of their contributions are not properly recognized by society. Dr. Jane Drummond brought me to see the concept of health in a new way. She also told me how nursing fits into the whole idea of the Child and Family Resiliency Project, which was something that I wondered about constantly for most of the six weeks.

I would like to thank everyone in the research team for the help that I have received and the knowledge that I have acquired in these six weeks. I wish I can stay longer because it is hard to face the fact that the WISEST program is coming to an end so soon. Would it not be great if people can live their lives and do things that they love without having to worry about time? But again, life is not perfect (if we have not stressed that enough times).

William Chan

*Note: My mind was completely empty when I decided to use the particular title that is shown presently on my report. It makes no sense whatsoever, which reflects how life often operates.