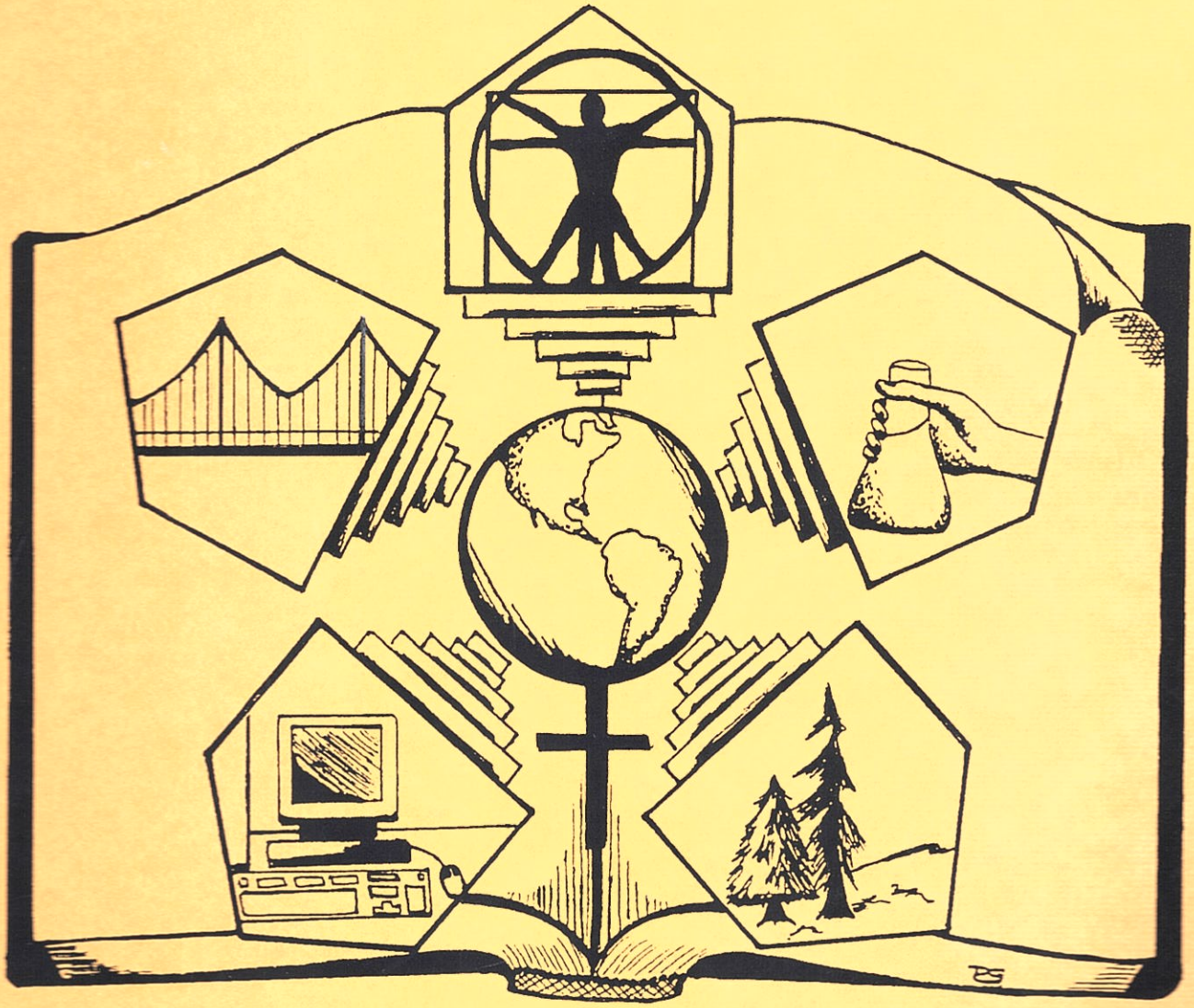
WISEST

Summer Research Program
1995



Student Reports

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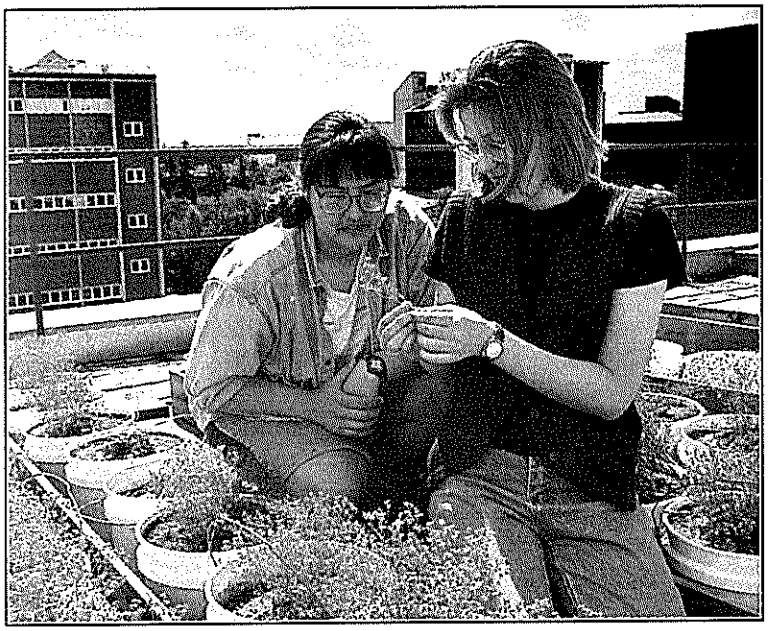


"This positive influence on my life has given me a significant edge as I enter grade 12 ... I cannot think of any negative aspects to this program, it has enhanced and enriched me so much."

"I feel that WISEST is one of the best things that has happened to me ... I am now sure that I have made the right decision when it comes to my career"

The Summer Research Program is one of the initiatives of WISEST: Women in Scholarship, Engineering, Science and Technology. WISEST was the brain child 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 and Medicine with boys working in Human Ecology and Nursing.

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 university and of careers which they may pursue. About 450 grade 11 students have participated in the program to date; these students are encouraged to share their experience with their peers during grade 12. This sharing has been shown to be an effective way of interesting other young women in the sciences.

We express our appreciation to the Edmonton Public School Board and the Edmonton Catholic School District which are very supportive of the program, as are many science teachers in high schools throughout the province. Many of the students are from outside Edmonton and we continue to work towards increasing participation by students from rural areas.

The success of the Summer Program has resulted largely from the excellent work of the program co-ordinators. Dr. Dorothy Tovell, the current co-ordinator of WISEST brings creativity to the planning and warmth to the participants. It was a great pleasure to welcome back Salima Hajee Chatur for a third year as the manager of the program. Her interaction with the students and her ideas added greatly to the students' experience. I thank both of them on behalf of the members of WISEST.

This booklet is a collection of the students' reports of the work which they did during their six weeks in the Summer Research Program and indicates both the quality of the research and the variety of the projects which they undertake.

Margaret-Ann Amour
Vice-Chair WISEST

It is my pleasure as WISEST Co-ordinator to bring greetings to the students who participated in the Wisest Summer Research Program 1995, their teachers, friends and fellow students, their supervisors and all those who generously provided funding for the program.

It is always exciting to see new students arrive at the beginning of July, to see how each one experiences working in a research lab at the University of Alberta, and to hear them confidently and capably describing their work at the end of the six weeks.

Again this year, I very much enjoyed getting to know at least some of the young women who will be our future scientists and engineers and the young men who had enough imagination to spend six weeks in the field of nursing. We were happy to have all of you in the program, and strongly encourage you to tell your friends and schoolmates all about your experiences. I wish you the very best as you pursue your education and work towards fulfilling careers.

We very much appreciate the way in which teachers and school counsellors support 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 want you to know that your efforts do not go unrecognized. We rely very much on your help in publicizing the program, and encourage you to share this booklet with grade 11 students in your school.

This program would simply not be possible without the supervisors and their technicians, undergraduates and graduate students, and research associates. Your commitment of time in training, supervising and encouraging the students is invaluable. I am indeed pleased to add my 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 1995, funding was received from the Summer Career Placements Program of Human Resources Development Canada, the STEP (Summer Temporary Employment Program) of Alberta Advanced Education and Career Development, the Edmonton Catholic School District, the Alberta Heritage Foundation for Medical Research, the Glenora Rotary Club, Weyerhaeuser Canada Ltd., the McNeil Medal Fund and the University of Alberta.

Finally, I want to mention the members of the "WISEST Team". Dr. Margaret-Ann Armour, Vice-Chair of WISEST, has an enduring enthusiasm for the WISEST Summer Research Program which is evident in many ways. Salima Hajee Chatur's efficiency and commitment to the program were once again exemplary. We all appreciate the cooperation of the staff of the Office of Human Rights, with whom we share office space.

I very much enjoyed working with all of you.

Dorothy Tovell
WISEST Co-ordinator

Every year WISEST produces a booklet of student reports. This booklet contains reports as written by the students at the end of the six weeks in the 1995 WISEST Summer Research Program. The students describe their work in the research labs, and also refer to the group sessions which were held each Wednesday afternoon.

This year's sessions included a campus tour, an informal discussion with people who have chosen non-traditional careers, a tour of labs at the Alberta Research Council, a visit to another lab at the University of Alberta, and presentations by the students of their work. Finally the students attended a luncheon with their supervisors as a concluding event for the program. I would like to thank the numerous people whose participation made these sessions such a 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 got to experience city life by living in Edmonton. Thank you to Renate Pfeifer, a warm and enthusiastic "big sister" to the students who lived at Lister Hall.

In addition several social events were planned to give the students an opportunity to get to know one another better. These included attending a Shakespearean play in the Hawrelak Park Ampitheatre and an evening at the Edmonton Space and Science Centre. The students also met every Tuesday for an informal "brown bag" lunch in the Students' Union Building.

Each student report is accompanied by a photograph of the student at work. I would like to thank Paul Dolphin for taking the pictures. As always his commitment to high standards is evident in the photographs. His competent assistance in the production of this booklet is greatly appreciated.

I also want to acknowledge the students who took pictures and wrote summaries for the various Wednesday afternoon sessions and the social events. The pictures and summaries are a valuable addition to the booklet. I want to thank all the entrants of the "Cover Design Contest" for submitting such creative entries. On behalf of WISEST, I would like to congratulate Diana Gee for winning the contest.

Lastly, I would like to thank WISEST for giving me the opportunity to organize this year's program. Without Dorothy's patience and her willingness to answer my incessant questions, I don't think it would have been possible. In spite of her extremely busy schedule, Dr. Armour always had time to be supportive and encouraging. To the participants of the WISEST Summer Program 1995 -- Thank you for a memorable summer.

Salima Hajee Chatur
WISEST Admininstrator

WISEST Summer Research Program 1995

Orientation

You would think that after finding the Chemistry building only the day before, I could do it again. But, you would be wrong. After wandering around the U of A and inadvertently discovering the location of several of the lesser known buildings on campus, I finally made it to Chemistry and confidently pulled out my letter. "Take any elevator to the 3rd floor, then follow the signs that will direct you to Chemistry East." Now, if I could only find the elevators.

My spirits lifted as I spied the plaque reading E3-25. They plummeted again as I walked in and was told to find my name tag. I hate name tags.

The first half of the first day can be summed up in three words: speeches and forms. Wait, make that four: many speeches and forms. Next came lunch, and then, yes, more speeches. No forms though.

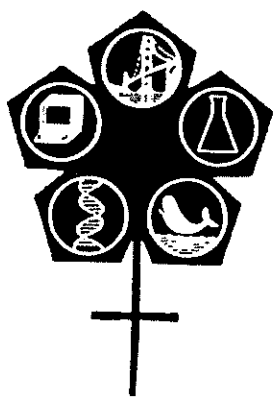
Tension slowly filled the air as the big moment approached. Would this be the best six weeks of our lives, or would it be just another mind-numbing, spirit-crushing, energy-sapping job? That all depended on — The Supervisor. Some of us had their anguish prolonged as a lab assistant appeared instead of the expected Dr. X. I watched as each pale, trembling girl walked to the door, glancing back at her new found friends. And then it was time. "Carolyn Johanson." I would like you to meet —

Carolyn Johanson

The Tour - July 12

Here it was, only two days after we started work, and already we were having a group get-together. After meeting at the Administration Building, we were split up and taken on a tour of the U of A. We power-walked across campus desperately trying to keep up with our guide. As the buildings passed with blinding speed, he would tell us facts about each one which we would promptly forget. Those who were actually paying attention and remembered some of this information, received a gummy bear as a reward during our guide's review questions. Personally, I was just trying to remember where the heck we were. What else is there to say? We came, we saw, we got blisters.

Carolyn Johanson



SORSE Tour

Our tour of the campus started at a fast pace that only seemed to increase as each precious minute ticked by. Fortunately, the speed at which our energetic and helpful guide was dishing out information into our inquisitive minds was equally efficient and by the end of the tour all of our questions and inquires had been answered.

While it would have been nice to enter all of the buildings on campus, being able to at least to situate them and recognize their exterior was helpful. The ones we did enter provided us with a glimpse of the work and study environments we will encounter and experience in a few years time. If the massive library we saw said anything for the three or four other main libraries on campus, it looks as though we will be spending a lot of time studying.

The Mechanical Engineering Building (or MEC-E, paired with the infamous MIN-E) proved to be very interesting, although going through the wind tunnel would have stirred us even more. Besides warning us about fuzzy, pink, "poisonous" plants in the greenhouse, our guide taught us all the university slang; pointed out the oldest buildings on campus; shared some gossip about ol' Rutherford's son and told us a story about the stubborn architects who couldn't agree on anything and built the Biological Sciences Building with stairs going up to the ceiling and doors opening onto walls.

The tour, on the whole, was helpful and although it could have been a lot slower and maybe a bit longer, it helped me to familiarize myself with the campus. The university itself is huge, and I am sure that when fall term rolls around, and the campus is swarming with students, I will close my eyes to the mass confusion and desperately try to focus in on the tour I had a couple years back. Which was the way to Chemistry East?

Michelle Lobkowitz

As We Liked It

Wednesday, July 19 was the date of our first social event. That evening, we watched the Shakespearean play, *As you Like It,* in the Hawrelak Park Amphitheatre. This play is unlike Shakespeare's more well-known plays: it is a comedy not a tragedy.

It even concludes with four weddings — no funeral. (Oops, I just gave away the ending.) The best thing about the play was that you could understand it. It was not like English class where you had to go through the meaning of almost every word. Instead, you could just sit back and relax, because they used an unusual, yet understandable, combination of Old English and Modern-day English. Along with the language, the contemporary costumes and musical interludes made the performance delightfully unique. Unfortunately, there were only a few who attended, the few who did thoroughly enjoyed themselves.

Tam Paredes

The Second Wednesday Afternoon Guest Speakers

On this day we had a chance to listen to people who chose to have a non-traditional career. We were first divided into several groups. Each group had two to four speakers. In the group I was in Dr. Dorothy Tovell introduced the guests.

The first speaker was Bill Leddy, a nurse. He gave us a brief summary of his life, of how he decided to go into nursing. Apparently he had a medical experience when he was a child. Ever since that experience, he wanted to go into medicine. Interesting note: why do people say "male nurse" instead of just "nurse"? Have you ever heard of a "female engineer"? He went on to tell us of how many males there are in nursing. Sorry I forgot to write down all the statistics. Anyway, his idea of the best working conditions is when there are both female and male workers.

The second speaker we had was Ida Tse. She is taking civil engineering at the University of Alberta. Her experience taught her that males and females are different. Her work requires her to operate heavy equipment, which often becomes difficult. Dr. Tovell suggested that machines should be designed so that everyone can use them, regardless of their physical size.

Our third speaker was Frances Fernich a physicist. She gave us some good and bad points about her career. There are few job opportunities for physicists and she has difficulties balancing her work and her social life. With a research career, relationships are hard to manage and there is little time available for children. However, as a funded graduate student, she is able to travel. Why did she chose this field? Because physics interested her and she likes what she is doing.

Dr. Janet Robertson was our fourth speaker. She gave us three useful tips concerning our futures. Tip #1: Always remain yourself. Don't go into something just because the job sounds good or that it's guaranteed. Find something that interests and appeals to you. Tip #2: Do the best of the possibilities available. There is no perfect way to have a career. Common to all these speakers, each one changed their goals while they were in school. When we WISEST students go to university we may not enjoy what we are taking. That doesn't mean we should switch to something totally different. Instead, find something related and go from there. Tip #3: As you go along that quest for a career, look around you, you'll find that there are people along the way who will encourage and help you. Learn as much as you can from them. I say imagine yourself as a sponge and soak up as much information as you can.

Our last speaker was Dr. Dorothy Tovell. She added a few more helpful ideas. She said that you should take what excites you. You should keep a mental list of the areas of study that you have enjoyed. Later, you can use that list to understand what career you'll like. Try to find a balance between your interests and available jobs. Similar to tip #2, she suggested that you should take your training and apply it elsewhere. In research, it's unlikely that you will train once and that will be all. You should learn the basics and learn how to adapt to different situations.

The final advice: learn from your experience. If you found that you disliked your WISEST experience, it is highly probable that you will not enjoy the same thing in university or as a career. However, if your experience tells you, "This is GREAT!", then the next step is obvious. And of course there are people that are like me, who have no idea what they really want to be and have interests in ten different areas. My advice, well, I have no advice. Heck, I'm only sixteen. You could always follow our speakers' advice. If it worked for them, it should work for us.

Like many of you, I just hope I find something satisfactory and stick to it. Wish me luck.

Diana Gee

Meeting People in Non-traditional Careers

The meeting of people from non-traditional careers was an interesting and extremely informative experience. It gave everyone within our small group a chance to get some ideas about different career opportunities and choices.

Our group of speakers included a man in Nursing and four women, who were in the areas of Civil Engineering, Physics, and Medical Microbiology and Infectious Diseases. All of the speakers shared a piece of their lives with us and told us of their careers. They all appeared very confident and enthusiastic when explaining that their jobs entailed.

There was one speaker in particular that caught my interest right away and this person was Dr. Janet Robertson. She discussed that during the time when she went to high school girls were not allowed to enroll in physics and only two girls enrolled in chemistry, enduring the rude comments made by a teacher. I admire her for sticking with it and becoming the successful doctor she is today. Her talk also made me think of how times have

changed. In my Chemistry 30 class not one boy can be found within the four walls of our classroom and only one boy has enrolled in physics. The one thing all the speakers emphasized was that we have to enjoy what we are doing and to keep our options open because the future cannot be totally planned and career moves are sometimes necessary. They also explained that there is life outside the lab and that our lives should not be totally centered around our careers. Having a family and a career is possible. In general, I found the talks to be inspiring and they all shed some light on our little known world.

Heather Cuts

Small Group Discussions

Now, if any of you are anything like me, the thought of spending an afternoon listening to speakers sent you searching to find something in your lab to do that you couldn't possibly leave in the middle of. Unfortunately there was nothing like that in my lab, so I went to our WISEST session on *Women in Non-Traditional Careers*, and much to my surprise it was informative and fun (it's not often that you can put those two words together).

Our group had three speakers; a biology student, a medical student (who at one time was a WISEST student) and a professor of physiology. All three of the women who spoke to our little group stressed that being in science and/or research was more than a job, but that it didn't have to run your life. One of our speakers was extremely athletic and often found time to do sports, and even run marathons! Another loved movies and had a family which she loved spending time with. Another point that these women spoke on was that jobs are not as scarce as we think. As long as we work hard during university and get good marks, there will be a job for us when we graduate. This offered us much hope.

Many positives and negatives were addressed in our session; things don't often work and it is frustrating spending days and days just trying to start your experiment. But on the other hand, these ladies found few words to express the feelings of finding something new, something no one else in the world knew. One of the speakers expressed it as being on a high for weeks and weeks.

It was interesting listening to these ladies' experiences and insights into the world of research and women, but what shone through the most was their excitement. It was plainly visible that these women love what they are doing and look forward to each new experience, which for me was exciting, because in them I saw a lot of what I would like to be.

Kim Peacock

Our Second Wednesday Afternoon Adventure

Our second Wednesday afternoon adventure was a small group meeting with individuals in non-traditional careers. In my group there were two women in the Sciences, one in Employment Equity and a man in Nursing. They each introduced themselves and explained their studies and careers.

I was quite pleased to learn what a nurse actually does and the girl in engineering showed us that there are tons of different career options that can stem from a single specialty. Each of the speakers stressed that you have to like what you are doing and that as long as you like your field, it doesn't matter what other people think. Salima encouraged us to be interactive in the discussion and we talked about similar obstacles and experiences involved in non-traditional areas.

Most of us agreed that women were rapidly increasing their numbers in science and for the majority of the time, teachers treat both males and females the same in our science courses. The speakers pointed out though, that some of the older professors and a lot of regular people still hold beliefs as to what careers men and women should be in. The females spoke about how guys are usually quite intimidated by women in science, and the nurse said that a lot of people are confused when he tells them what he does for a living. We also discussed the sexual inequities of Physical Education. However the speakers had all worked very hard and got very far, and each of them was an inspiration for us to stick with our ambitions.

Tessa McWatt

Alberta Research Council — Field Trip

I rushed out of my lab at 2:50 p.m., checking my watch every two seconds to make sure that I wouldn't get to the meeting place late and miss the long-awaited field trip to some faraway, mystical place known as the *Alberta Research Council.*

Thankfully my fears about being the last one were not realized — there were others later than me (so late that they had to run for the bus!! Hmm... can't really remember who they were though).

Anyway, after an interesting bus ride, we arrived at a great red building with impressively landscaped grounds, including a lake and a fountain with nice greenery. We all proceeded to enter the building, where we were issued snazzy VISITOR tags and then separated into groups. So the tour began. I presume that all the groups got to see the same thing; my group headed towards the analytical chemistry section first, where three or four helpful lab technicians (all female, might I add) explained to us what was involved in their jobs and showed us various analytical tools and instruments. They were all quite pleasant and gave us a good idea of what it was like working in that section. I particularly liked their work environment — it was quite comfortable all around.

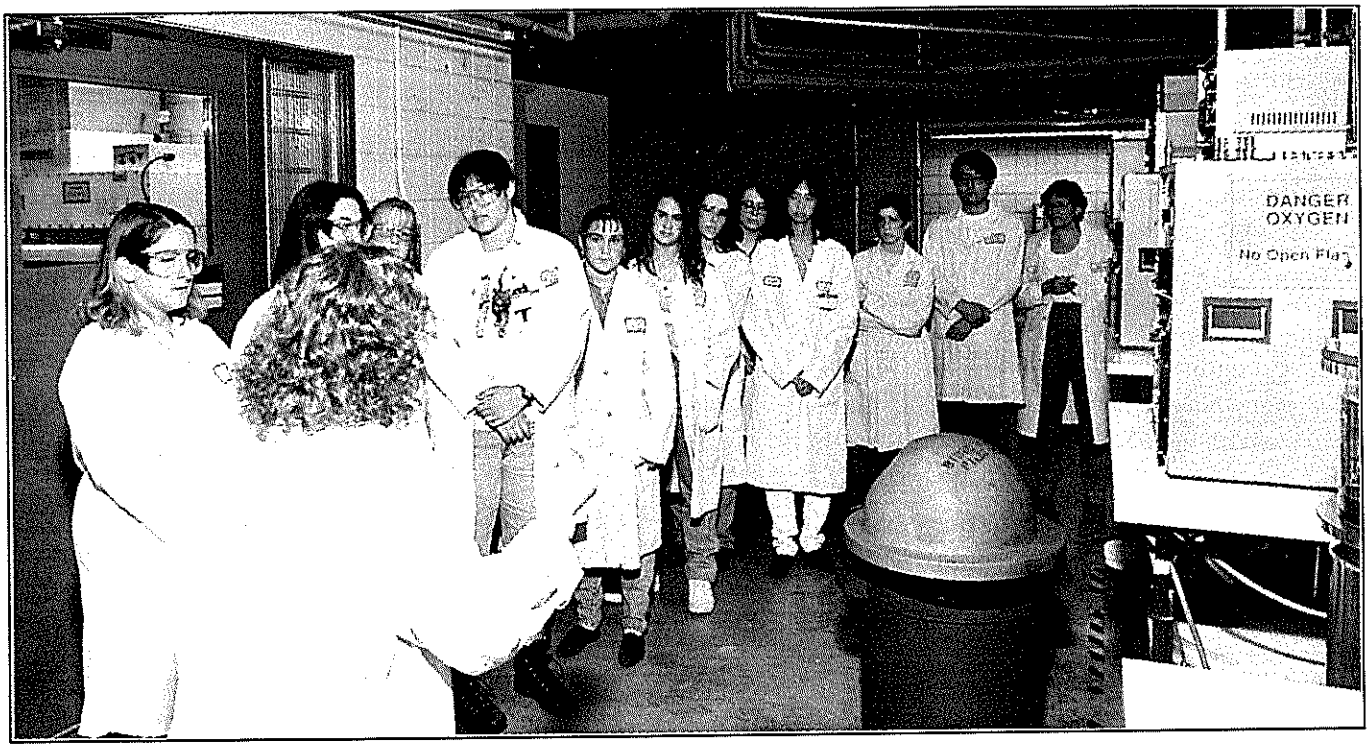
Next we headed off to the mechanical section where a different type of research is conducted. Instead of analyzing and determining the composition of substance, the people there deal with developing and improving the structure and design of many industrial materials and processes: projects included developing a wear-protective coating for metal parts, as well as another which involved improving ceramic mixtures.

Now came the time to address the more abstract, but far-reaching aspects of the council. We settled in a room to discuss one of the important principles driving the council — that of sustainable development. The speaker (also female) delivered a good and concise presentation about this and added to our understanding of research, extending it beyond mere laboratory work to how research ultimately is inter-linked with the rest of society.

The last leg of our journey involved "hiking" to the biology section of the building, a section which unfortunately, was characterized by the most *lovely* odour wafting through the air. As it turns out, the project investigated fermentation of a sort designed to produce essential compounds which are lacking in baby formulas. Our guide was very well versed in her subject and gave a detailed explanation of what was found in that section. Regrettably, my head is like a sieve — nothing really stays in very long. However, I can honestly say that I exited with a greater appreciation of fresh air.

After the tour, we all milled around the lobby, most of us waiting for the phone and the rest waiting for further instructions. Around 5:45 p.m. (I believe), the welcome odour of food arrived and we sat around the nice fountain enjoying our Wendy's burgers, groovy baked potatoes and watermelon. We left, all happily fed and with a new addition to our wardrobe — those WISEST T-shirts.

Janius Tsang



The Trip to the Alberta Research Council

Before WISEST's trip to the Alberta Research Council we knew little of what the ARC was or for what purpose it existed. However, we were shocked to discover that the ARC assumes many roles in its efforts to support industry: research partners, research consultants, subcontractors to industry, sophisticated testing and analytical services, and problem solving assistance just to name a few.

It seems here research is a business, aiding its clients in the development of technology for the future. However, to the WISEST students the Alberta Research Council was full of scientific wonder.

In the biotechnology laboratory, sporting safety glasses and lab coats (let us not forget our security passes), we saw fermenting insect cells and huge 20,000 litre tanks ready for the mass production of the experimental results. This area was still considered high security, we were extremely privileged to be the first WISEST students to be admitted to the biotechnology laboratory.

No less exciting was the manufacturing technology aspect of the ARC. It is here that the testing of new products takes place. Presently they are working on a number of projects including the testing of a new product that may replace the damaging salt used on the province's roads, and the development of a new sweetener that may revolutionize the life of the "sweet tooth".

Finally, we visited the Analytical Chemistry Department where peat moss was being tested for effectiveness and where a new protective coating for metal was being developed.

The trip to the ARC was a unique and thoroughly enjoyable experience. To top off the day we had a picnic, feasting on Wendy's burgers.

A Walk on the Other Side

As my aching feet brought me to the final door, I breathed a sigh of relief and cursed the lack of elevators in this place. This was it, the moment I'd been waiting for, I was about to have my greatest question answered; I was about to enter the hallowed halls of "how to make money from green squiggly things", otherwise known as the Research and Development lab of the Biochemistry wing of the Alberta Research Council. Other people in my group seemed slightly more apprehensive than I, (especially the physics people when they saw the spiky whatchamacallit that says "biohazardous") but we persevered. The metal doors closed behind us with a loud click and we were in. Whoa.

The wonders of Dr. Frankenstein's lab unfolded before me. Vats of various sizes, from babies to great-big-whopping grandmas, were connected to the various colored tubes and blinking machines. The sounds of bubbling, grinding, bumping, sloshing, smooshing, clinking, whirring, buzzing (and any other applicable adverbs you can think of) filled the room. It was a lot noisier than you would expect a couple of zillion innocently fermenting cells to be. And then it hit me... the warm, dank smell you associate with moldy bread and Gorgonzola cheese. I asked the guide what it was and received a very reassuring, "It's just the bacteria." Then I noticed the frantically flashing blue light and the technicians precisely adjusting knobs and dials. I began to wonder if we were about to experience one of those Hollywood scenes where white clouds of germs spray into the air and anyone helplessly caught in them is instantly infected with some deadly disease that causes great pain and the guide just doesn't want to tell us. I began to wonder about my choice of sciences. At that moment, chemistry seemed like a good thing to get into. I mean, the chem labs were clean, well organized and stocked with more bottles than a bar. They had neat gadgets like mass spectrometers and analyzers that can tell you exactly what anything is made of and what it ate for lunch. They were working on useful projects, like what to use other than salt to de-ice the roads and how to purify something sweeter than sugar. Compared to biology, chemistry seems much healthier -- the peat moss balls might explode, but at least they don't bite.

But in the moment of my greatest trepidation, our guide explained that the alarm meant the cells were in danger, not us. So I decided, maybe Dr. Frankenstein's lab wasn't such a bad place after all. And the answer to my question? Well, people make money from squiggly things by making lots and lots of them real cheaply so business can make cheese or yogurt, protect their crops, decompose their waste and vaccinate their fish (go figure).

After surviving the biochemistry tour, I can honestly say that I enjoyed our trip to the Alberta Research Council. I learned that if I make it "up there" lots of great toys will be waiting for me; no matter what I go into. And I saw the other side of research, the work that is done for specific people, for specific reasons, for specific paycheques as opposed to the "pure" research that goes on at the university just because someone wants to know. I guess there is a place for both in the world. I haven't decided which side is more appealing to me, but at least now I have an idea of what the other side is like.

My only major disappointment with this trip is that we didn't get to keep our spiffy goggles and security passes. But they gave us shiny pencils, so I guess that's okay.

Wynne Leung

Those lovely Lunch Hours

In addition to weekly Wednesday meetings in which all WISEST women gather and share their experiences, there are the somewhat less formal gatherings where some of us would seat ourselves around the table and talk to others we would otherwise not see. These lunches were held every Tuesday in the bustling social atmosphere of the food court of the SU building, or in the quite peaceful environment of the small courtyard, just outside the building.

At first, there were only a few of the forty-five WISEST students who actually remembered the existence of such an event and attended. The numbers gradually grew as Salima patiently and subtly reminded us every single week. The first several weeks during good weather, we gathered outside and sat on the grass, going around the circle taking turns telling each other our thoughts on our work in the labs. I found it quite interesting to hear about what the other girls were doing and it never fails to amaze me how varied and large a field that the work of science encompasses.

The first few lunches, however, we were all rather shy as many of us have never really met and found it quite difficult. But as time went by, we all became more comfortable with each other as fellow WISEST students experiencing similar frustrations in our projects or perhaps some misfortune, like suffering the extreme embarrassment of breaking a pipette or a test tube.

These and the social events held after the meetings on Wednesday brought many, if not all, the WISEST students together and gave us the opportunities to better acquaint ourselves with some very groovy people that we otherwise would not have met.

Trip to the Medical Examiner's Office

Wow! What an experience, or at least that is what some of us thought! Here is something to consider, six out of forty-five WISEST students chose a tour to the Medical Examiner's Office rather than a tame, predictable lab involving only chemicals and relatively few people. Joined by fellow curiosity seekers: Cheryl Strydhorst, Dayle Strachan, Rosalie Zinner, Sheena Zachariah and Sylvia Illingworth; some of us were faced with life altering decisions, like Dayle who decided on a career in dentistry rather than pathology.

Upon reaching our destination we were greeted by Dr. Graham Jones. Dr. Jones is a toxicologist at the Medical Examiner's Office, and our tour guide. Our tour began with a brief chat about the different purposes of the facility. We then went on a tour of the entire building, starting at the X-ray room. After that we went to the room where autopsies are performed; it looked like a huge operating theatre. Our next stop was at the morgue where our tour was momentarily stopped due to a delivery. After that we were sure we had seen everything, then they showed us the cooler where they keep their very cool and quiet guests.

After this experience we were taken to see the toxicology lab where lab technicians check for the presence of drugs and other harmful substances. That basically concluded our tour. Afterwards we sat around and talked about the academic requirements necessary to obtain a job at the Medical Examiner's Office. We also discovered that both men and women are equally interested in this field and there are equal opportunities for both.

All in all the tour was interesting and insightful, although not all will admit it.

Miranda Manning

The Electron Microscope Laboratory

To be honest, I was disappointed when I was assigned to visit the electron microscope laboratory. I had no idea what electron microscopy even meant (don't ask me why I put it on my list) and I was the only person on the tour.

I guess I was just lucky.

The electron microscope lab is full of the coolest equipment. I got to see slides of a stomach biopsy with bacteria that sometimes indirectly cause ulcers. This species of bacteria is so similar to the body's own cells that the immune system can not even find it. Dr. Sherburne, the man who uses the microscope to research these bacteria, even let me manipulate the transmission electron microscope and search for some of the bacteria myself. He also showed me an electron scanning microscope which only shows the surface of a sample.

As neat as this equipment may be, the preparation for each slide is a long and tedious process, usually taking about a week. Any error, however minute, can ruin the slide. I guess that goes to prove that no matter how exciting the results may be, it takes a lot of preparation and laborious work to achieve them. This is a lesson I have learned well at WISEST.

Thank you to Dr. Sherburne and Chris for the tour!

Kirsten McLaughlin

An Eye Opening Experience

Although it sounds pretty corny, my eyes were opened by my visit to Dr. Pilarski's lab in the Cross Cancer Institute. The afternoon was quite an experience. Being from a hick town, I led the group on a jaywalking expedition. The building itself wasn't particularly gloomy, but there was an atmosphere of hopelessness about it. A man, bald from chemotherapy, sat wrapped in robes in a wheelchair just outside the front doors, smoking a cigarette. The lobby was very quiet and very empty, except for one boy who looked about eighteen, strong, tall and not a hair on his head. I had to fight back tears for the unfairness of it all.

Then Dr. Pilarski came down and led us from the hospital part of the Cross to the research area. Dr. Pilarski was very cheery and friendly. She started off by showing us around the lab, explaining what is done in each area. Then she taught us about myeloma, a cancer of the immune system (blood marrow and plasma cells especially) and explained to us her theory about it — that is that the malignancy is in the B-cells. We watched a short movie of the very odd, squirmy B-cells from a myeloma patient — squirmy that is, compared to the B-cells of a leukemia patient. After that we played on a computer and I, being allergic to computers and all, accidentally turned something on. A little water came dripping out, but that was all (I hope).

Anyway, that afternoon gave me an insight — I think that oncology and immunology are in my future. Dr. Pilarski said to drop by if we ever had any questions, so I am trying to think of something intelligent to ask. The tour was great — I think it may have played a role in fine-tuning my ambitions.

Tessa McWatt

Lab Visit

So what are the chances of us ever using this in real life? This pressing question, often asked during a particularly difficult chapter, and just as often met by the teacher's disapproving stare, was finally answered for me. Today we were given a tour of the lab of our choice, mine being focused on genetics.

Colleen, a scientist in the DNA lab at the Cross Cancer Institute, efficiently summarized what her group was and the part she played in this rapidly developing field. She took us through the main parts of the DNA lab where we were introduced to the intricacies of genetic material via actual karotypes of patients, various samples that had still to be tested, and the seemingly complicated (and expensive) machines that regularly aid the scientists in their work. Our discussion turned to the even more interesting aspects of DNA, including the race to map every human gene and its function, which could lead to the phasing out of certain life threatening diseases such as cystic fibrosis. As the focus of the tour shifted, I was gratified to have the biology units on DNA I had so furiously set out to memorize come back to me so that I could benefit from the tour by asking informed questions. I found this is definitely a career worth considering; it is rewarding and is predicted to play an ever-increasingly important role in the future of medicine.

Victoria Sikur

On Campus Tour

One warm summer afternoon in the month of August two young WISEST students by the names of Christy Slater, and Celina Northill arrived at the Pharmacy and Dentistry Building for a tour of the Department of Pharmacy.

The two girls were guided throughout the building learning about several research projects. Some of the projects included working with pancreas' damaged by diabetes and working to find ways to correct the problem. The two girls were also shown labs that were working on cancer research.

Christy and Celina learned that pharmacy includes studying the path a drug takes in the body to determine the optimum drug and the most effective dosage. Keith told Christy and Celina about his own research project. Keith's project involves creating drugs made from proteins rather than synthetic chemicals. The problem that Keith has to solve is to somehow coat the medication so that when the drug is taken orally, the protein will reach its destination without being dissolved in the stomach.

Christy and Celina left the Pharmacy Building that afternoon overwhelmed with the wealth of knowledge that they had gained, both excited and intrigued by the studies and discoveries being made within the department.

Celina Northill

A Journey in Space and Science

August 9th, our final Wednesday WISEST session drew to a close, but not before we had another adventure to write about.

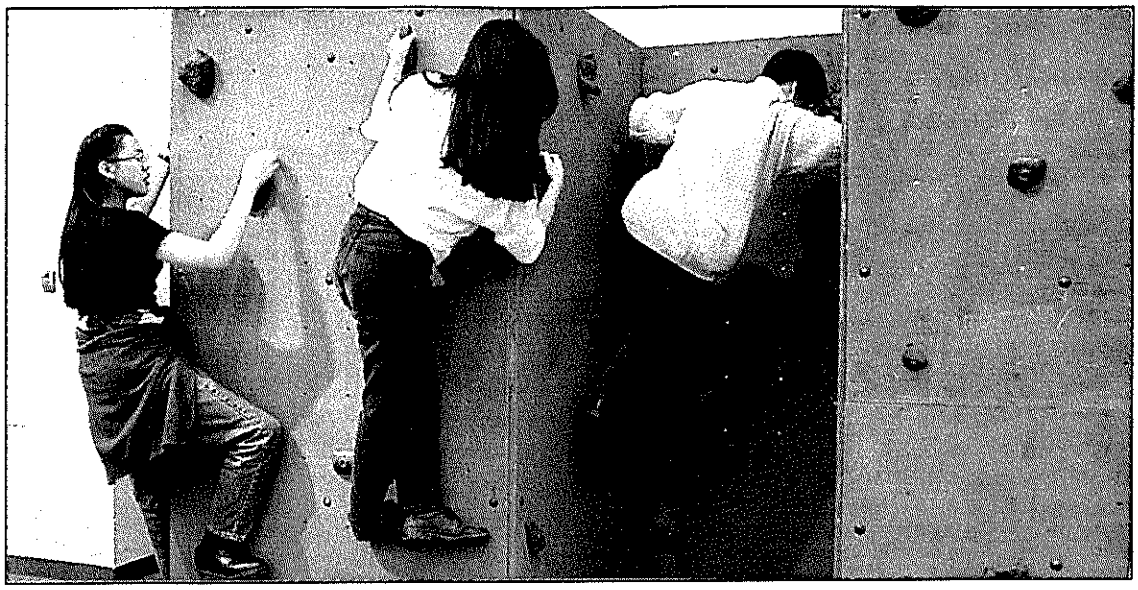
The plan was to make our way to the Edmonton Space and Science Centre, after finishing our afternoon meeting. Once we arrived, we scattered around in search of food and washrooms, but not until we were informed that we had to wait for our trendy blue visitors buttons. After everyone had collected one, we sat back and admired our additions agreeing that they definitely had a unique style. A quick bite to eat, a washroom visit and we were off to the exhibits.

While a stray cameraman tried to catch a few quick snapshots of us in action, we concentrated all our efforts on climbing the rock wall, testing our throwing prowess on the pitcher's mound, displaying our abilities as future NBA players and showing our arm strength, using our extensive Karate backgrounds.

We soon had to leave so we could be escorted to the projection room. We had a behind-the-scenes look at putting together an IMAX production. We were then led into the actual IMAX theatre to see the results, and the little man in the booth really did do his job right. After an amazing look at *Destiny in Space*, we shuffled out in awe over the fabulous sound, lights and visuals of the IMAX experience.

Once again we were chauffeured home by the bus, where we bid our farewells.

Stephenie Litvak



Edmonton Space and Science Centre

I did not think that I would be able to go on this field trip as I had forgotten to pay my three dollars by the required deadline (well actually, we were enjoying a statutory holiday, so I had an excuse). However by some divine intervention, I was given the chance to go, so of course I took it. My group had finished their oral presentations early, around 5:00 and so a couple of us hurried to HUB to grab some grub before leaving. Unfortunately, the other groups didn't get the luxury of eating before going.

Nonetheless, nineteen of us trooped onto the bus and the girls from Lister Hall filled the rest of us in on what great residents they have on their floor and told us some pretty hairy, but entertaining stories. Thankfully, the bus ride only lasted about fifteen minutes and we arrived at the Westmount bus station completely intact, none of us mangled or anything of the sort.

After we got our passes we were free to roam around until 6:30, when we were to go in and see the IMAX projector. Our first stop was the sports exhibit, featuring a most difficult climbing wall, wheelchair races, baseball pitch, basketball and other activities. Most of us did not complete the climbing wall. Diana, Wynne and I were the lucky ones who actually got pictures taken of us looking like daddy-longlegs. There was this booth where you could determine whether or not you are flat-footed, normal or high-arched and somebody wanted to try it but just didn't have the guts, right Dayle?

We met Ron the IMAX projectionist and he was very nice, explaining in English how the system worked and how powerful it must be to project an IMAX film. The tour was short and sweet, so we had approximately ten minutes before the show and so we visited an AIDS exhibit. We all took turns determining what were our chances of getting HIV and I must say, some of us were quite lucky.

The feature *Destiny in Space* was the last activity of the evening. It was quite a good film as are most IMAX presentations. Narrated by Leonard Nimoy (Mr. Spock), it talked about man's journeys and forays into space and what the vast expanse might hold for humanity in the future. As well, the film introduced us, through computer animation, to what other planets, namely Mars and Venus, look like. There were times when my stomach moved as if we were truly traveling in a spacecraft, especially during the sequence which dealt with one particular medical test involving orientation. The subject had a cone-like object spinning around his face — was it just the object which was spinning or was the subject itself spinning? The camera then shot what the subject actually saw and I began to feel as if I myself was spinning.

For all those who were lazy, I have but one thing to say. You missed a lot!

Janius Tsang

Memoirs of a Big Sister

When I was asked to be a big sister to seven grade 11/12 students I was both excited and apprehensive. I was very pleased I was chosen for this job, but at the same time I was worried. What if the girls were unfriendly and resented my intrusion? What if they didn't get along? What if they were prone to getting into trouble? I was very relieved to find out my Lister girls were none of the above, that in fact they were among the finest, most cooperative people I had ever met.

What I wanted most out of this experience was to get to know these girls and to offer whatever support and guidance that I could. I feel I have accomplished that. Julie, Heather, Kirsten, Stephenie, Kim, Kathryn and Tessa are unique individuals with their own wonderful characteristics. I know when they leave on August 18, I will miss them terribly. Activities that we have participated in included the usual video watching, A Taste of Edmonton, Klondike Days (in the rain), a trip to the Muttart Conservatory, The Street Performers' Festival, walks down Whyte Avenue, a potluck evening, trips to D.Q. and a final evening formal. The girls often thought of other things they would like to do, like entertaining themselves with forty members of a British rugby team staying on their floor (Ha Ha), swimming, trips to West Edmonton Mall, skating and going to the movies.

I would like to thank WISEST for giving me this opportunity to meet and get to know seven of the brightest young women (even though their propensity for jay walking had shortened minutes off my life span). Good luck in all you do girls!

Love, your (little) Big Sister Renate

Lister Hall

Imagine what you get when you have seven teenage girls living together for six weeks with no parents, no curfews, few rules, a whole city to explore and many new people to meet!

We could have done many things which our parents may have dreaded, but instead we were very responsible. Don't ask me why. Maybe we were just crazy. Despite acting very reasonably, we lived a great deal of excitement and adventure.

Seven small town and country girls trying to get around in a big city can be quite hilarious. Missing the bus, running after the bus and crossing the street were all part of our little adventures. Walking around in circles in big malls, trying to find what we were looking for, also kept us busy. We must admit though, that by the end of the six weeks we were quite proud of ourselves for not having more difficulty getting around. It really wasn't that bad!

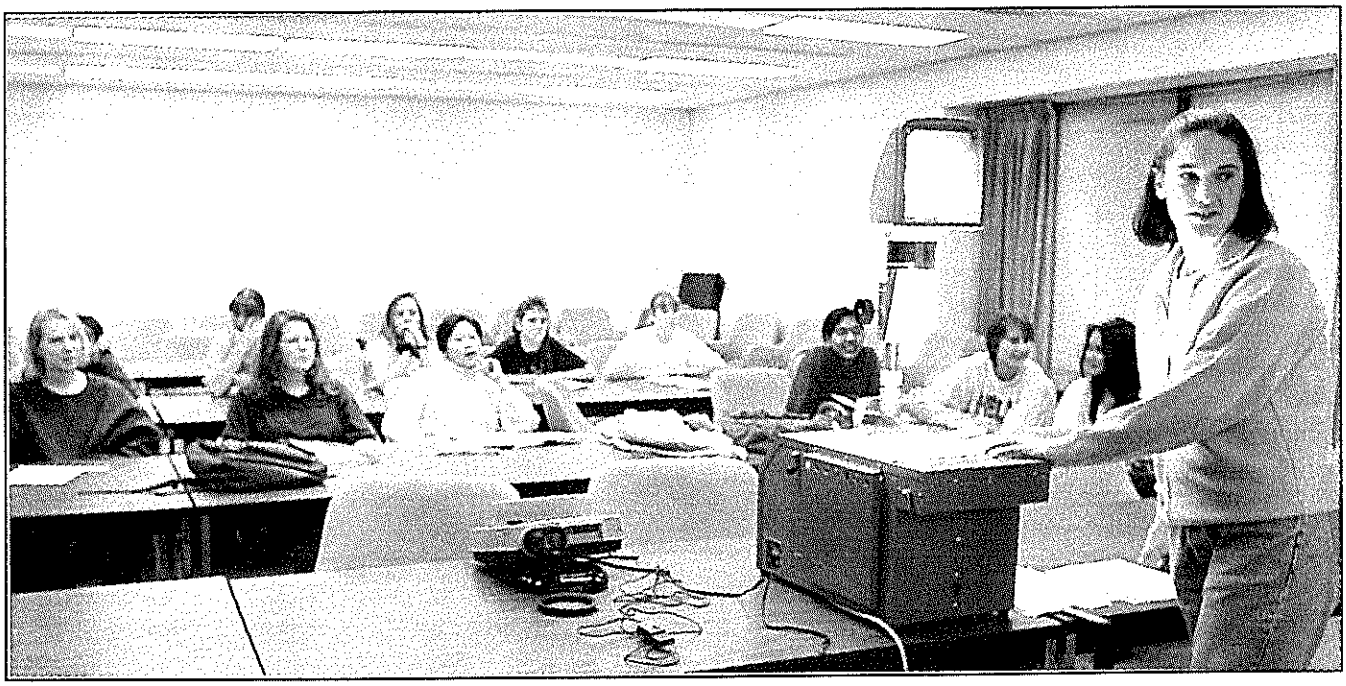
A dull moment was rarely ever lived by one of the girls. Apart from working, we went to the movies, shopping, swimming, playing badminton, watching rugby and volleyball games, eating out, puddle jumping, going for walks on Whyte Avenue (in the pouring rain), and I'm sure I am forgetting some. Even when we stayed at Lister, we always kept busy watching movies, taking dance lessons, playing piano, singing, talking, leap frogging, getting to know people from around the world, playing ping pong and many more activities. Few were the nights when were in bed before midnight even if some of us had to get up at 5 or 6 in the morning. Going to bed after the sun came up was, sometimes, even part of our weekly schedule.

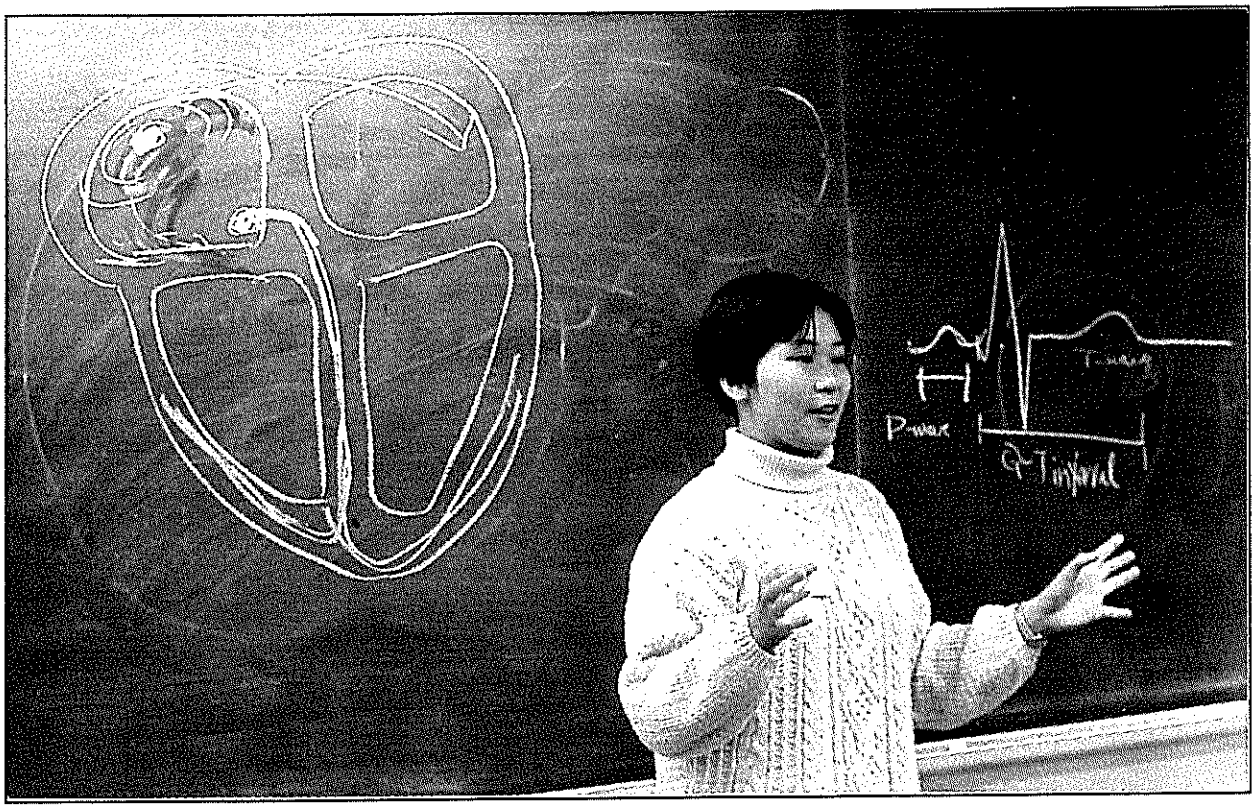
I think the most gratifying part of this experience for most of us was to have the opportunity to get to know other girls who had a lot in common with us when it came to school and education. We were all part of this program because school is important to us and we all are successful in our high school courses. For the most of us, science was one of our interests and this brought us together. Getting to know each other on a personal basis allowed us to become good friends and I'm sure we will keep in contact for awhile.

Stephenie, Kirsten, Tessa, Kim, Kathryn and my roomy Heather, I will never forget you. Good luck with all of your life's endeavors.

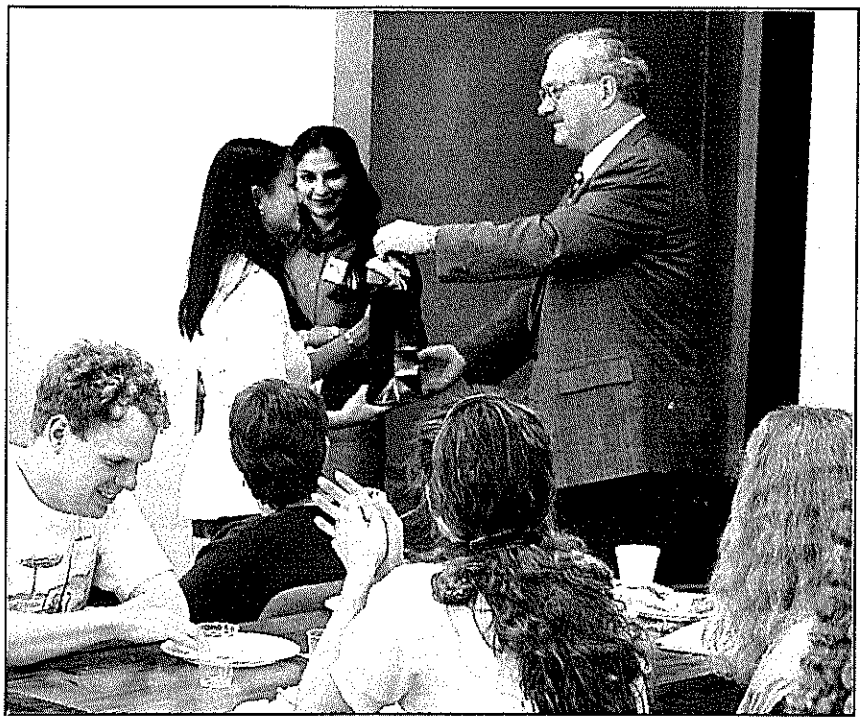
Your Friend,
Julie Monfrette

Oral Presentations





Year End Luncheon



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STUDENT REPORTS

The Summer of '95

by Kimberly Haag

Flowers, trees, and mosses, that about describes a botanist's work. For my WISEST summer research program I worked under the supervision of Linda Halsey, who works for Dr. Dale Vitt, in the botany section of the University, mainly out at the Devonian Botanical Gardens. I was given the chance to do a wide variety of things with the people I worked with. I ended up doing things such things as making and recording coordinates on a map, and recording and interpreting experimental data, but they also had me focus on one main project.

The majority of my time as a WISEST summer research student was spent preparing my own scientific paper. The paper determined the climate factors that are the most significant in the development of a certain form of wetland. I was able to perform the needed tasks to come up with the information I needed (even if it meant manipulating the data a little bit). This included drawing boundaries on maps, locating a large amount of weather stations (148 to be exact), recording different climate data, and working with a statistical program on the computer. Then I extracted the information that I needed, and wanted, and went to work putting together all the pieces that go into a scientific paper. Eventually, after many rewrites and corrections, I finished my paper and was able to say that I had actually done all of the needed work to complete a scientific paper. Through writing the paper I learnt a lot of things, and I found that it was definitely worthwhile research and time well spent.

Through my WISEST experience I learnt a lot of different things. For example, I found out that it is very important to pay attention to every little detail in experimental procedures. I also learnt that nature does not always do what you want it to do. For example, we had one experiment damaged by digging squirrels and burrowing worms. I also learnt more generalized things like how a university system works, and how professors interact with their students. And of course I learnt a lot of information that directly applied to my research - a lot of facts about wetlands.

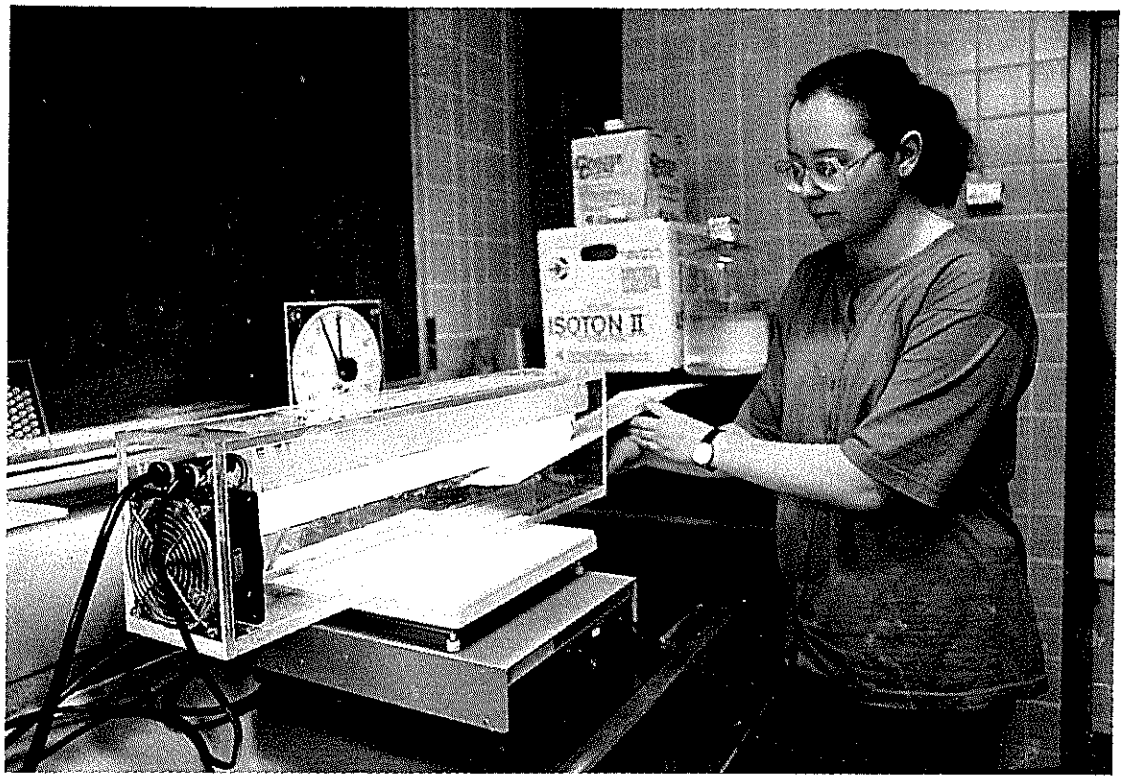
Overall I would say that my WISEST summer research experience was well worth my time and effort. I have discovered many things that I know will help me in the future. I also learned a number of things that have already influenced my decisions and choices about the future, and I know many things that I experienced this summer at WISEST will have a great impact on me in the future.

My Experiences with WISEST

Pillow fights? Superman marathons? Dancing in the halls at midnight? British rugby players? Hmmm...not exactly what I was expecting from my summer while working at the university. What I had expected was many experiments (there were some), long hours (there were many) and a really dull way to spend my summer. Happily, my last prediction was way off.

Following several nerve-wracking and fingernail biting weeks after I found out that I had been accepted into the WISEST program I arrived at Lister Hall, not knowing what to expect. To my surprise (and extreme relief) the other six girls that were staying at Lister and our big sister, Renate, were very friendly and outgoing (which was good because without their help I would never have found my way to E3-25 that first day!)

As for work, I had a great time as well. Working under Dr. von Borstel in the Genetics department, I was trying to find out how p-aminobenzoic acid or PABA (a chemical that is used in sunscreens) works to protect yeast cells from ultraviolet radiation. Despite my hopes at the beginning of the program, I didn't have enough time to find an answer to this problem (six weeks sounds like a long time but it really isn't!). But, I learned a lot about doing experiments and met a lot of really interesting and nice people who visited our lab.



I'd like to thank WISEST and Salima for letting me be a part of this program as well as Dr. von Borstel who generously volunteered his time to help me and David (our lab technician) who was extremely patient in trying to figure out what I meant by, "You know, that shaker thing," even though (and I personally don't share this opinion) he did seem to find my mistakes and questions highly amusing at times.

Also, I'd like to thank the girls from 2nd Mac who made this summer more than a job and who were always there for me, whether it was to sing Phantom of the Opera songs in the Kelsey piano room, throw Smarties into other people's mouths, go to various festivals around Edmonton or simply talk after a long day at work. Thank-you all for making this such a great experience.

Is Dihydrofolate Reductase Present or Not Present.... That is the Question

For six weeks I worked in the Biological Sciences Department under the supervision of Dr. Edwin Cossins in a botany lab. Although, a large portion of my tasks were related to biochemistry.

When I first arrived, I assisted my co-workers on their research projects. Carole, Becky, Sherwin, and Chen were quite patient and helpful, even when my mistakes were unignorable. During this time, I had the opportunity to harvest and inoculate Neurospora crassa, a fungus commonly called "the pink bread mold".

Once I had learned the ropes, Dr. Cossins handed me a project. I was to observe dihydrofolate. In order to do this, I needed to synthesize dihydrofolate through chemical reactions. I added two hydrogens to folic acid to produce dihydrofolate, and two more to produce tetrahydrofolate. This can be accomplished in two ways. In the first way, a solution is prepared and run through a Biogel P-2 column using gel chromatography. In the second way, dihydrofolate is synthesized by a precipitation method.

All of this may sound simple, but there is a catch to it all. While folic acid is extremely stable, dihydrofolate and tetrahydrofolate are not. They are unstable, therefore, they are both light sensitive and must not be in the presence of oxygen or they will proceed to oxidize. This causes dihydrofolate and tetrahydrofolate to be finicky during experiments due to the fact that they are exposed to light and oxygen every time they are worked with.

My second task was to determine the relative amount of dihydrofolate in each of 28 fractions collected from the Biogel P-2 column. Using an ultraviolet spectrophotometer, I performed a dihydrofolate assay to attain the O.D. readings.

In my research, I tried to find good sources of the enzyme, dihydrofolate reductase, in peas. I tested the peas themselves, then the pea leaves. I ground up a sample with a potassium phosphate buffer and centrifuged it. The supernatant was retained and assayed using a dihydrofolate reductase assay. Next, I concentrated the sample with ammonium sulfate from 0% to 40%, and then from 40% to 70%. I assayed the three samples to find the one with the most enzyme activity. Using this sample, I ran a desalting column and collected ten fractions. Finally I assayed the fractions. With the peas themselves, I was disheartened to discover that they were an extremely poor source of dihydrofolate reductase. However, when I tested the pea leaves, I found an abundance of the enzyme. My project was a success.

When I was accepted into the WISEST Summer Research Program, I did not know what to expect. The first day was quite amusing thanks to Dr. Armour's horror stories about compressed gas tanks that had zoomed around rooms and shot through brick walls, and refridgerators that exploded. There is nothing like a good scare before you even meet your supervisor!

Thanks to Dr. Armour, Dr. Tovell, and Salima for the tour of the labs, the Alberta Research Council field trip, and the picnic. All of these activities were enjoyable and greatly appreciated.

These six weeks in the WISEST program have provided me with valuable experience, references, and connections. This summer has instilled in me the confidence to continue to pursue a career in chemistry and probably work towards attaining my Ph.D.

Katherine Stein

Katherine Stein

My Summer with WISEST

My summers of the past used to involve mowing lawns and weeding gardens, but this summer I have had the pleasure of working in a microbiology lab under the supervision of Dr. G Stemke. I have learned, observed, and experienced a tremendous amount over the past six weeks.

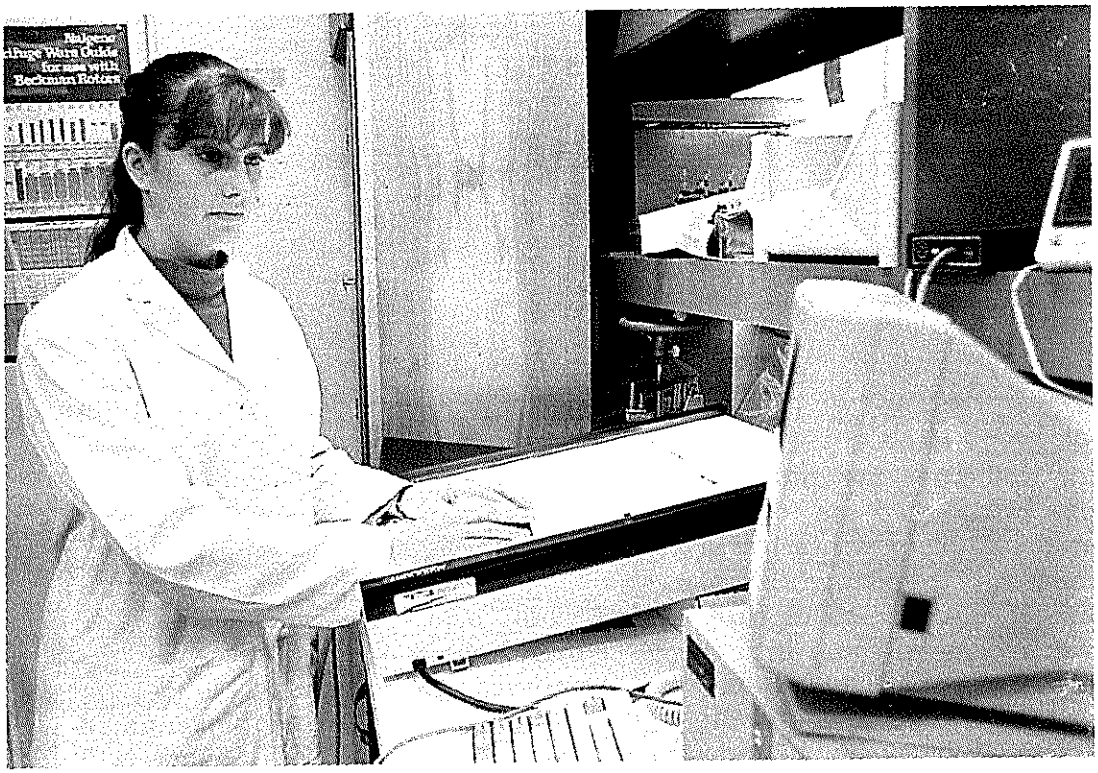
When I applied to the WISEST Summer Research Program I never thought that I would get accepted. Although I am considered above average within my own high school, I never thought I could even compare to other girls who are able to obtain averages of high nineties. So being accepted into this program was a very great honor to me.

I was extremely apprehensive, when I first met my supervisor. I didn't know if I could live up to his expectations. Coming from a small school I didn't know if I had the experience that all the other WISEST students would have coming from bigger schools. I became even more anxious when he began to speak to me of his research because more than 80% of the words leaving his mouth I was unable to comprehend. Words like replication, recombinant DNA, and gel electrophoresis I had heard maybe once or twice in my whole entire life. Soon, however, I began to realize that things were not as tough as they seemed and that I was (amazingly) understanding what I was doing.

I did not have a project of my own, but I was assigned many different tasks in which I was to complete. These tasks included reading DNA sequences, growing bacteria, and even something as complicated as PCR (Polymerase Chain Reaction). I usually completed all these tasks by myself but sometimes a little bit of help from Dr. Stemke was indeed needed. At times I found the work complicated and frustrating but as time wore on, however, I began to understand the goings on within the lab more and more. When it came time to leave, I left with so much knowledge about DNA sequencing, gel electrophoresis, and lab protocol that I realized that what I had done this summer was undoubtedly worthwhile.

Staying at Lister Hall, now that was an experience in itself. Imagine six weeks of lukewarm cafeteria food, sleeping on concrete slabs that they passed off as beds, and having late night dancing lessons from Tessa and Steph. Who ever would have thought that all seven of us would have so much in common and that we would all get along so well. I am so grateful that I had the opportunity to stay there and meet all these great gals. It was the most enjoyable, rewarding and valuable experience that I have gained in a long time. I am not only leaving with a greater insight into my future but also with a great group of friends and memories.

My time spent this summer with WISEST has been one of the most fulfilling experiences in my whole life. I am going to take the knowledge that I have acquired here and use it to make more objective decisions about my future, about what I really want and what I am capable of, which I now know is virtually anything. I control my own future and it is up to me to determine in what direction I want it to go.



I have accomplished many things this summer but I could not have done it without the help of some very special people. I would like to thank Dr.Stemke and Walter for having the patience to put up with my inexperience and my constant question asking. I have learned a great deal from you guys and I hope that I didn't drive you completely mad. Another group of people I wish to thank are the "Lister Girls". Julie (my little french roommate), Steph (the girl who made the "B" word famous), Kirsten (our shy pianist), Tessa (little miss perfect), Kim (our spiritual singer), and Kathryn (my fellow cartoon watcher) thanks for being there when I needed you. I am going to miss our Whyte Ave. walks, T.V. watching's and late night talks. You gals don't know how much I am going to miss you. The last two people I wish to thank are Renate (our big sis) and Chris. Renate thanks for all your support and friendship, it didn't go unappreciated and Chris thanks for putting up with all of us and for getting us our T.V. and microwave, you will not be forgotten.

There is just one more thing I would like to add. Thanks WISEST. This is a great organization and I believe anyone fortunate enough to be part of this program is getting that extra little peek into their future. I know that I have definitely benefited from it.

Heather Cuts

By Heather Cuts

SUMMER IN CIVIL ENGINEERING

Maps, Rivers, and All That Stuff

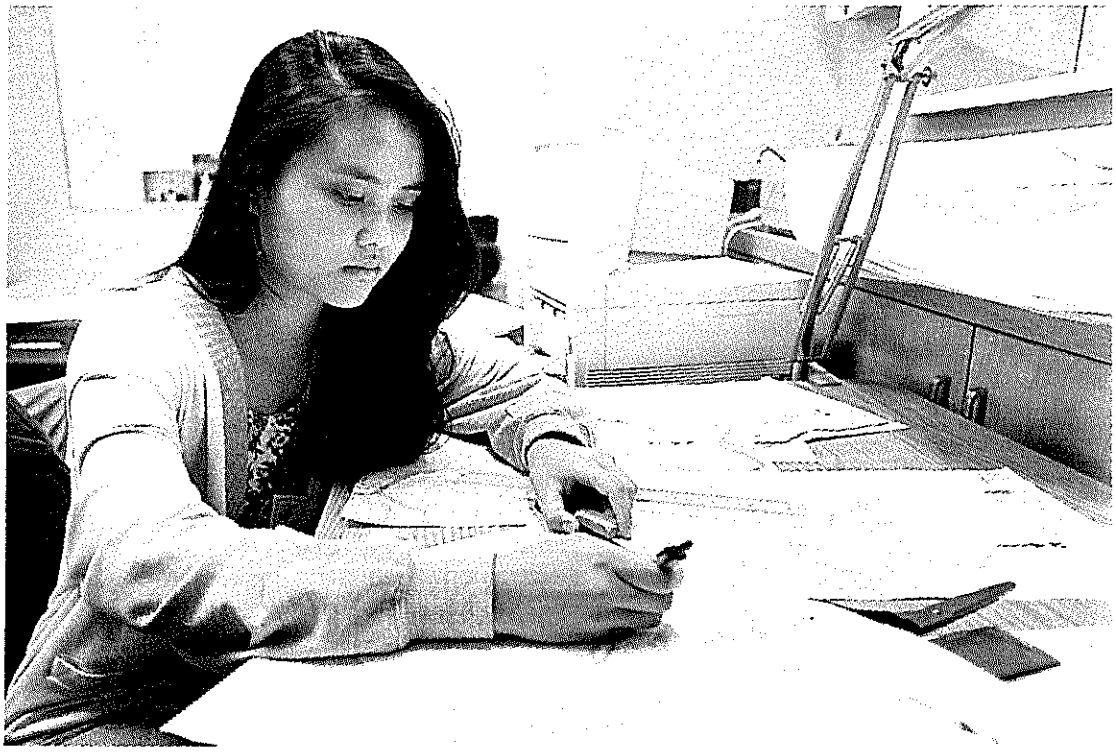
When I first came into the civil engineering building, I had an idea of what civil engineering was like, but I did not know how narrow that idea was. I thought that civil was just about building bridges, buildings, and dams, I could not be more incorrect. Civil Engineering is a large department with many subdivisions underneath. There is structural engineering, transportation engineering, environmental engineering, geotechnical engineering, surveying engineering, construction engineering, and finally the one that I work under, water resources engineering.

My professor is Dr. Faye Hicks and I also work with two university students, Wendy MacKay, a undergraduate, and Kristy McKay, a graduate. All three welcomed me into their workplace and made me feel right at home. Dr. Hicks introduced me to the idea of ice jams, one of the cause of flooding in Canada. During winter, a layer of ice forms on river. Usually, when the ice breaks up in spring, the pieces are carried away by the flow of the river. However, sometimes in early spring, only a part of the river ice breaks up. These pieces will jam into the ice which have not melted yet. Unable to just flow away, the ice builds up, sometimes creating jams miles in length. Eventually, all the ice melts and suddenly there is this big rush of water, flooding any low lying land downstream. Part of Dr. Hicks' work is studying these rivers and collecting information to help forecast future floodings. The information that she receives will help her make a computer model of the river. These models can show the different effects of an ice jam, the most important being the level of the water. A lot of physics are involved and very long equations. One of the information she needs is top widths of the river. To send surveyors out and measure top widths along a 500 km stretch of a river would cost millions. Instead, measure the widths on a map and convert it into kilometers. So that is what I did.

I measured the Peace River and the Porcupine River. The Porcupine River had already suffered the effects of ice jams, but the Peace River study involved a dam. It was not difficult to measure the widths, but it took a long time and your eyes become blurry after a while. I had to measure every kilometer, write down the location and width, and type it up. Three other people measured the Peace River before me, including Dr. Hicks herself. All our data was put into the computer and was put into a chart. I am happy to say that my results were not far off from the others.

Half of my time was spent on the maps, the other times on the computer. I had previous experience on computers but it was very limited. In the past few weeks I learned how to scan images, how to edit the images, and to use programs like Corel Draw and Microsoft. So eventually maps come into play, but instead of working on them, I learned how to make them.

In reports, it helps to have images. It is not beneficial to have an entire map of an area, just detailed portion of it. The first step to do this is to trace the area you want on a map. Then you photocopy that trace (Photocopying helps if you want to magnify or reduce the image.). You scan the image onto the computer and from there, you use programs to add the things you want, or remove any images you do not want.



I also got my first look into a hydraulics lab. I was amazed by the size of the different projects. The lab itself was a warehouse filled with all sorts of machinery that mimic various flows of water. The engineers in the lab were studying the effects of different structures on water, from dams to fish ways.

Even though I did not have a project of my own, I have learnt so much over the past few weeks. Learning physics in a classroom is not the same as actually seeing it in action. I have a larger understanding of what civil engineers do and how they help people and the environment. The people here have been fantastic and my experience was definitely 'one in a life time'. I know that I will be using what I have learned to help me in the future. My thanks to Dr. Hicks, Kristi, Wendy, and WISEST for giving me this great opportunity. I feel truly fortunate that I was given this job and all the ideas, information, and fun that came with it. Too bad the summer was so short. Thanks again.

Diana Gee

Cardiology -- WISEST

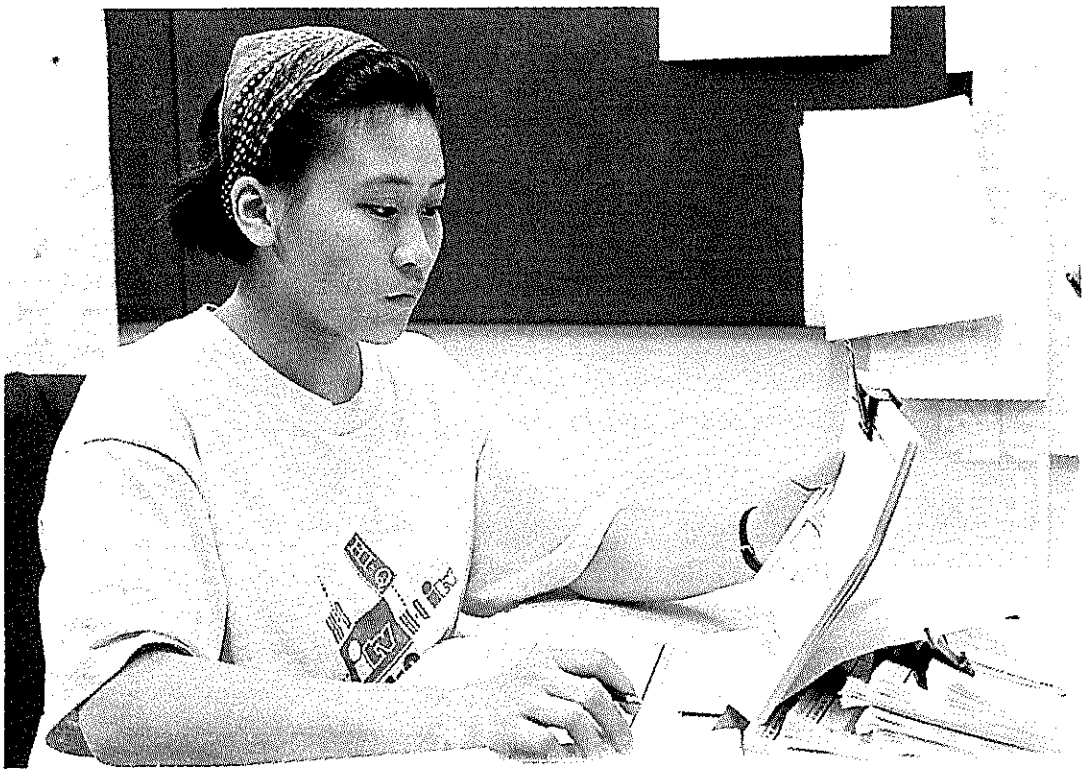
When I received the phone call congratulating me on my acceptance into WISEST, I knew that this summer would certainly be one to remember. For six weeks, I worked in the department of cardiology with my supervisor, Dr. Katherine Kavanagh, Kathy Jones, the lab technician and others who happened to drift in occasionally, such as Dave, 'the computer person' and Alifeyah, a first year university student. They are all wonderful people and made me feel welcome from day one.

Basically, my work consists of analyzing data on the heart which was obtained during an investigation carried out prior to my arrival. My supervisor studies cardioelectrophysiology, or in other words, the electrical aspects of the heart. In this particular investigation, she wants to determine the possible reasons why the heart will suddenly experience a loss of coordinated muscle contraction (ventricular fibrillation) or go into abnormal rhythms (ventricular tachycardia) and suspects it to be related to the pattern of how the heart muscle 'recharges' or repolarizes after contraction. The study involved the use of twelve hearts divided into two groups: the heart rate of one group was raised to 250 beats per minute while in the other group, the heart rate was left intact. All subjects had the same procedure performed on them to minimize the effects of other variables. The hearts in the experimental group were paced approximately ten to twelve days, or just until the heart was weakened or cardiomyopathic. Then cardiac mapping surgery was done on the hearts. This involves placing a specially-made electrode known as a clockface electrode on the surface of the heart and firing electrical impulses to determine the electrical activity of the heart muscle tissue and what changes to it have occurred as a result of pacing.

My task consisted of going through eleven stacks of paper, each stack of paper a series of EKGs from each heart which were taken at different times during the investigation. I needed to measure the length of the QT interval manually: this task consists of looking at the EKG and determining the beginning and the end of the electrical activity which precipitates ventricular contraction. If all goes well, there should be a significant difference in the length of this QT interval between the two groups, the cardiomyopathic group possessing a longer interval than the control group. This would mean that abnormally rapid pacing of the heart is detrimental to the heart, altering the muscle structure in unfavorable ways. The elongation of the QT interval in the diseased hearts means that the heart muscle takes longer to 'recharge' and this condition has been documented on many occasions to make a heart much more susceptible to heart rhythm abnomalities. In addition, in the myopathic hearts, we wanted to see exactly in what direction did the alteration of the muscle fibres occur. For this, the EKGs from different pacing sites on the same heart were compared and hopefully a time difference would emerge.

Before all the exciting, interesting work however, is always some 'dirty work' to be done beforehand and I, fortunately and unfortunately, was not spared from this. For the first two weeks in the lab, Dr. Kavanagh did not launch me into this project but rather make me take my shower before I jumped into the pool, metaphorically speaking. My first project was to research the subject of lab safety and lab hazards. I was required to look up as much information as possible about four potentially hazardous substances in the lab as well as be an inspector and actually *inspect* the lab for potential hazards which my supervisors had missed. The information I gathered I presented to them later in the first of a series of informal oral presentations. Next, I, of course, had to take a crash course on cardiology so that I would not be shocked and disoriented when my project was given to me. For about one week, I did that day in and day out, ending up with a notebook filled with at least thirty pages of notes on the heart and cardiac electrophysiology, lots of library experience and a little more comfortable with what I was about to work with. Dr. Kavanagh sat through the second and third of my little lectures and then was convinced that she could entrust me with my great ol' task.

For those who have actually bothered to read this far, this probably does not sound like your ideal WISEST experience. However fortunately, I was not condemned to sit at my workspace all the time--the



lab tech, Kathy brought me around to other professors' labs to witness what standard experimental procedures are performed in cardiac research. I saw what are termed to be 'hangings' or rather, perfusions. A heart is taken and attached to a contraption (a complicated one, might I add,) which mimics the body as much as possible and keeps the heart alive as long as possible so that the required investigation can be carried out. For me, actually witnessing a live, beating heart was an experience that was not wholly spectacular, yet it was one which inspired an awe of nature: it was utterly amazing how a small piece of muscle tissue could spontaneously, almost magically, command itself to move. I saw two perfusions, one was a normal perfusion, while the other one involved stopping the heart for thirty minutes and then attempting to revive it afterwards. I must say that the latter experience was the more interesting one, as there was always that suspense as to whether or not the heart would begin its pumping. I suppose the best feeling came when the still heart began wiggling and shaking, then actually revive and start pumping with coordination, growing stronger and stronger and then you let out your breath after holding it in anticipation. I was also slated to see another research group perform the actual surgical procedures that my professor had done before I came but due to unfortunate circumstances (no, no one in the other group died) their whole experiment failed and I was robbed of a great show.

Sitting in front of a computer and actually writing this summary of my experiences, truly drives home for me the fact that these six unforgettable weeks are very quickly drawing to a close. I consider myself to be one of a very select and very fortunate few who have had the good fortune to participate in a program as phenomenal as WISEST and I am certain that the experiences and skills I have acquired during this short period will stay with me throughout my life. I would like to thank my supervisor, Dr. Katherine Kavanagh for being a supervisor which guided and encouraged me to be independent and think on my own yet knew when to help me out when I needed it. She taught me what research truly is and gave me confidence and respect--I suppose that was one of the many important and invaluable lessons I learned this summer.

I have but one regret--there weren't enough guys. (just kidding!)

Good Luck everyone!

Janius Tsang
Cardiology

TREES HAVE DNA TOO

Caroline Bright

My six weeks of WISEST experience was spent in the Department of Genetics, where I had the pleasure of working with Dr. R.B Hodgetts and my supervisor Mark Hicks, a graduate student working towards a masters degree. This opportunity has opened my eyes to various important and interesting aspects of science, which I believe will help me set my career goals. The time I've spent in the Biological Sciences building has been very challenging both in scientific work and in learning how to find my way around without getting lost.

The project I was involved in deals with comparing the genetic diversity of uncut lodgepole pine trees to that of replanted lodgepole pines. Genetic diversity among forests is critical to their survival. For example if all trees were short and bushy, and a disease was to develop that attacked only short and bushy trees, entire forests could be wiped out. The whole point of this research is to ensure that when companies and /or governments replant a deforested area the trees they plant are as genetically diverse from one another as the original trees were. The study is being done on lodgepole pine because it is an important resource for the paper and lumber industry in Alberta. This project required many samples from uncut trees and samples from saplings to be used for replanting. I had the pleasure of sorting 1600 pine needle samples in the cold room and planting hundreds of seedlings, which are now growing in the controlled environment of a growing room. Needless to say that was the grunt work of the job. The more scientific aspect and the part I enjoyed the most was being able to do DNA extractions.

When I first read the protocol for the extractions I thought there is no way I'll ever be able to do this. But after many practices I eventually got the hang of it. The first step involved in the protocol was to use a homogenizer to grind chopped up needles with a solution of grinding buffer. Then a lysis buffer is added, which breaks open the cells in the needles so we can get at the DNA. After a period of incubation two organic extraction are performed, which separates the DNA from the cellular debris like the chlorophyll. Various salts and alcohols are added to cause the DNA to precipitate. Then a centrifuge is used to spin the DNA down into a pellet, where the aqueous solution (still containing some cellular garbage) can be drawn off and then the pellets are dried using a vacuum. Once the DNA is in its final pellet form it is resuspended in sterile water.

After the DNA has been extracted a genomic gel is run to see the condition and amount of DNA obtained. The gel is made from a solution of agarose and TAE, which is poured into a mold. After an hour or so the gel which contains small wells formed by a comb is ready to load the DNA. The DNA is mixed with a dye and pipeted into the wells. An electrical current is then applied which moves the DNA moves through the gel. A gel operates in such a way that the smaller a molecule is the further through the gel it moves, while the larger molecules such as DNA remain closer to the top of the gel, unless of course the DNA has been sheared and all cut up, which I managed to do on more than one occasion. With the help of UV light the various dyes in the DNA can be seen and a picture

is then taken. After my job is done Mark runs PCR reactions, in which the various DNA bands of samples are compared. If the bands are similar or the same as one another then there is little or no genetic diversity among the trees. However his findings so far have shown there to be lots of diversity among the DNA bands of replanted trees, but the study is far from over and this does not represent what the final results will be.

I would like to thank everyone in the lab for their patience and understanding. It cannot be easy hearing the same questions over and over again, but everyone was a big help, especially Mark and Sandra O'Keefe. I was lucky to work somewhere where breaking and dropping a few things is not the end of the world. I can't count the number of times I heard "Hey, it happens to everybody". I've learned so much in my time here, including the fact that scientific research is a long and sometimes frustrating process, especially when the results are not at all what you expected. It's been a great honour working in a real research lab and I will always value the experience I have gained from being able to spend my summer working here.

I think WISEST is a wonderful program because it provided me with an introduction to scientific research, I learned a lot about how the University works and I met a lot of other students I hope to see again. Thank you to the organizers and sponsers of the WISEST program.

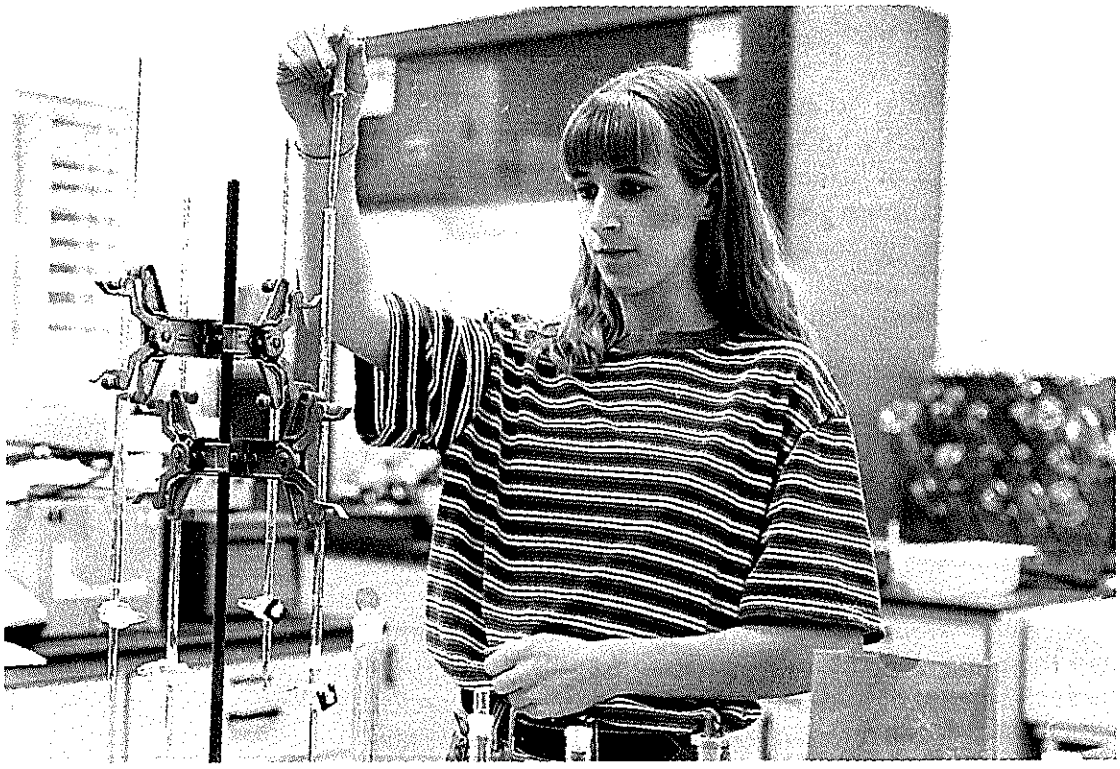
THE WISEST EXPERIENCE

(By Jerilyn Rapien)

When I was first accepted to the WISEST summer research program, I saw it as a great opportunity for new learning experiences, and a chance to meet some new people. My favourite subject in school is Chemistry, and I have been interested in science all my life, therefore I was happy to be working in the Chemistry department with Dr. Jordan and Dr. Jean Pearson.

My first week of the program came as a surprise to my supervisors, for they weren't expecting me for another week. Because of this, they weren't completely prepared to employ me. The first week was a great learning experience however, where I followed Dr. Jean Pearson around and saw numerous areas of Chemistry. Dr. Pearson works in the areas of synthetics and kinetics, which I found quite interesting. During this week I learned how to use an infrared light machine, a schlenk line, distillers, and how to use a trolley for gas cylinders. The schlenk lines were interesting because they help you to work in gases other than oxygen, with substances that are air sensitive. In synthetics this is used a lot, for many compounds are sensitive to oxygen. I also saw what a bomb is used for, no not a real bomb, but if you're not careful it could explode! A bomb is a very high pressured capsule that you can use to react substances under very high pressures. It's useful for compounds that cannot be made under standard conditions. I also learned how to use something called a glove box. This is a large, airtight container, that has large rubber gloves sticking out of it, that you use for very sensitive substances that cannot be exposed to oxygen. The container is very hot to work in, for there is no oxygen, and it's under a fairly high pressure. Everything that enters this box is sterilized and cleaned off in a nitrogen, vacuum area.

After my first week of exploration, I finally began my project. My project was in the area of kinetics. Kinetics is a branch of science that deals with the effects of forces upon the motions of material bodies and with changes in a physical or chemical system. My project was to study one specific reaction, between sodium chromate and ascorbic acid, which is vitamin C. First through a procedure involving the making of two solutions, using buirets, and titrating different amounts of the solutions into vials, I reacted the two substances to see if more or less of one or the other would give me a faster reaction. Once I discovered that with more sodium chromate, the reaction, I took the experiment one step further. Next, I began adding acids to my solutions to change the pH. I discovered then that this was a definite factor, for the solutions instantly changed colour. My next tests involved four buirets with sodium chromate, ascorbic acid, water and an acetic acid buffer. I then used a UV-visible recording spectrophotometer to get a type of rate constant for my reaction, and entered this data into a computer program which gave me a nice line graph of my data. I followed the same procedure for many experiments, and with each one I manipulated or varied a different variable. For example, change the amount of sodium chromate, change the sodium chromate concentration, change the amount of ascorbic acid, change it's concentration, etc. Through numerous experiments, I discovered that with this experiment, as the pH of the reaction is increased, the slower the reaction is. Also through this process, I discovered



that as more chromate is added to the reaction it slows down the rate, and as more ascorbic acid is added, it speeds up the reaction. Also, as the buffer's concentration lessens, the reaction slows down, and as it increases, the reaction speeds up. So far these are the discoveries on how this reaction rate changes with different aspects of the experiment varying. Still, some factors are not clear, because the reaction is actually doing the opposite of what the hypotheses were. We're not sure why this is happening, but further experiments will probably be done after I leave.

My experience with WISEST has been a good experience over all, for I met a lot of new people, and I've made sonte good friends. I believe that the get togethers on Wednesdays are good because they're a chance to make new friends and learn new things outside of the lab as well. Even though I hate oral presentations, because I get really nervous and I'm not a good public speaker, I still enjoyed the meetings. I hope that the WISEST program continues to grow larger each year, and continues to direct more women towards science. This has been a good experience, and I thank all those who made it possible. Hope to see all the future women of science from WISEST winning the nobel prize! Good luck everyone!

Jerilyn Dawn Rapien

3D RECONSTRUCTION OF A HUMAN FETUS

BY SHEENA ZACHARIAH
AND
MIRANDA MANNING

Our summer research program began under the guidance of Dr. G.H. Sperber and Dr. G. Machin who were kind enough to take us under their wings and introduce us to the world of science. We spent our time in the Oral Biology Department and discovered that there was much to learn. After numerous tutorials, we were finally ready to attempt success.

Our project involved the 3D reconstruction of a 49-day-old human fetus (received due to medical problems). The fetus had to go through a series of processes before we began to work with it. The fetus was immersed in paraffin wax and the wax was left to cool and harden. The fetus was sliced into tiny sections and placed on microscope slides. The sections were stained with special dyes that reveal the tissues and organs of the fetus. After the slides were completed we were all set to begin our project.

On our first day on the job, we were overwhelmed with computer knowledge, but as the days progressed we became more at ease with the computer world. We were then introduced to the Oral Pathology Lab where one of our co-workers, Colleen Murdoch, spent the entire day in the darkroom trying to explain to us how to take pictures and develop them. (The key word being "trying"!) Colleen taught us how to take pictures of the slides and what to do with the negatives after we had them. Then we entered the DARKROOM (ooh, ahhh)! Here is where we developed the negatives into actual photographs (I've got pictures!). After a few (actually a lot) of first attempt blunders we finally mastered the art of developing pictures, or at least we thought so.

Our darkroom days soon came to an end after about a week after which enlightenment followed. We then faced the task of photocopying the pictures onto transparency paper and outlining the different structures. We found it amazing to see the different structures develop into something that one could identify (and actually understand). Before the 3D process began we found it hard to understand how Dr. Sperber and Dr. Machin could tell that the itty-bitty, teeny-weeny, little spot really was a major artery (whoops!). After tracing out every detail, and having Dr. Sperber explain the same concept to us over and over again (no we are not idiots, it was a very complicated idea to grasp). After a few days it all began to sink in (we actually know what we're taking about now), and we started to understand the anatomy of the fetus' head.

After all the tracing and "best-fitting", we had to draw the outlined structures onto the computer (much to Sheena's displeasure). Since that point we have become very well acquainted with the computer and all the bugs it possesses. The structures were drawn at different elevations so that the slices would properly stack on top of each other to create a reasonable image. As soon as we thought all the structures were entered, we discovered otherwise. It so happened that we had forgotten a few minor details, for example, the ear, a few TINY pieces of cartilage that form the jaw, but other than that, nothing serious. After actually completing the inputting process, we moved onto M-fitting. M-fitting is a basic term for creating a mesh and putting it over top of the structures to give it a 3D appearance (or to try to give it a 3D look, but it didn't always work, or at least we didn't think so).

The last process we did to get a fantastic and totally stunning final product was the 3D Studio computer program. In the 3D Studio program we played with lights, shading and colors to produce a final image. The result was amazing and for the first time we felt like we had really accomplished something that was more than just a drawing. Our project was finally complete. (Shazam!)

We left the best for last, we would like to thank everyone who helped us this summer and taught us what we had to know. First we would like to thank Colleen for her time, patients and movie reviews in the darkroom that helped to pass the time. We like to give an extra special thank you to Dr. Sperber who always found the time to help us and point us in the right direction regardless of which way we were headed, even if it was to the bathroom before passing out. Thank you Dr. Machin for introducing us to a whole new type of anatomy at the morgue. Your time and patients will not be forgotten. Special thanks to Richie Rich (Richard Boehme) for his tolerance of us no matter how annoying we got with our "What does this button do?" questions. Thank you to Stevie Wonder (Steve Sperber) for his computer knowledge and his constantly creating something for us to clean up. Most of all we would like to thank WISEST for providing us with the opportunity to be a part of your program and a wonderful summer in the process.

WISEST and the Web

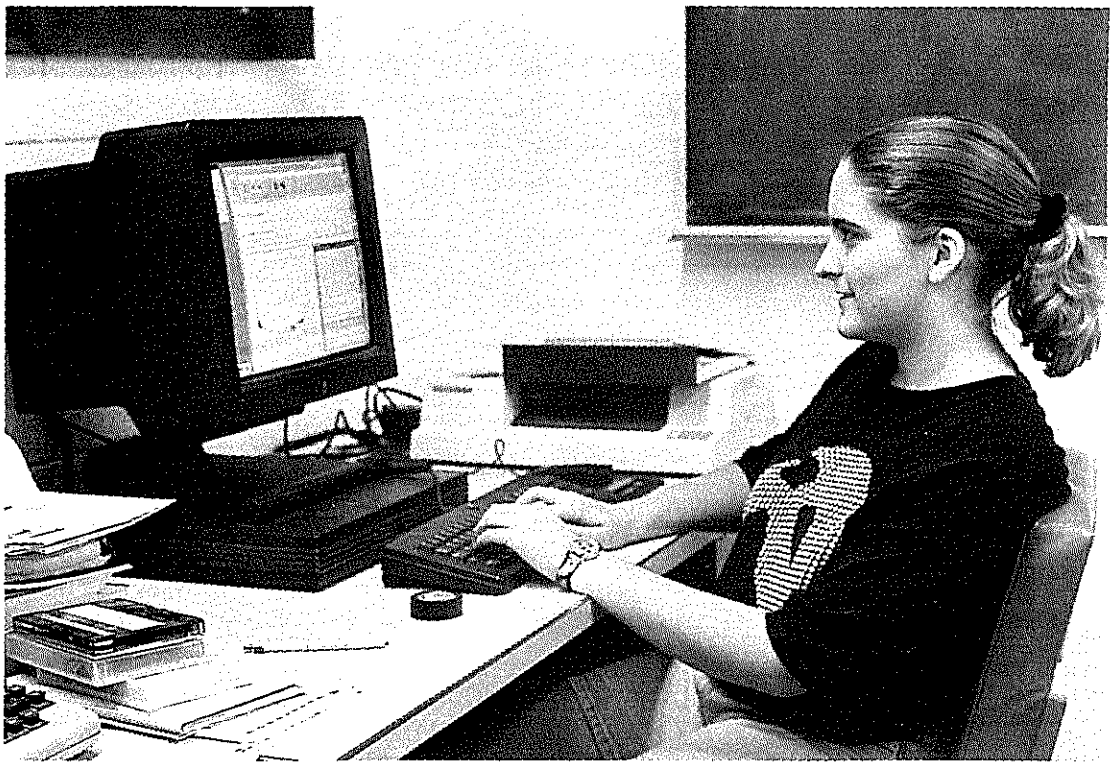
My WISEST summer has been the best summer ever! Before I heard about WISEST, my summer job prospects included babysitting or working at the A&W. So, when I heard that I could spend the whole summer working in science at the University, gaining valuable experience, I applied right away. Getting paid to do this was an added bonus. So were all the terrific people. This includes the WISEST group, as well as everyone else I have talked to over the past six weeks. Everyone is so friendly and helpful. I especially enjoyed the WISEST Wednesday afternoon meetings and socials. It was fantastic to get to know some girls whose interests were so similar to my own.

Despite being from out of town, I managed to find my way around campus quite well, after the first confusing days. I got lost many, many times. To me, the buildings all looked the same, which was very annoying. The tours we went on were a great help. Now I can actually get to different place around the University without spending half of my time looking at my map. (That map, by the way, came in VERY handy).

I really enjoyed doing my work. My supervisor for the past six weeks was Dr. Nyland. My task was to input, edit, and arrange information in the computer. My work will eventually be linked into the World Wide Web, which, before this summer, I had never heard of. It was rather overwhelming to be told that I was going to develop Web pages when I didn't have the first idea what the Web was. I learned. My first week was spent with Elizabeth Hay, Kirsten McLaughlin, and Tessa Normandeau (three other WISEST students) just getting familiar with the Web. We spent hours at a time just "surfing". That helped my computer-phobia and got me interested in the Web as well as the amount and diversity of the information available through it.

We also spent that week reading information about Fort Edmonton V, which is located under the present-day Legislature grounds. We read all about the history of the Fort, as well as the study currently being carried out. This study involves archaeologists and geophysicists working together to find the exact location and structure of the fort and its buildings. Since the archaeologists are unable to dig extensively on the grounds, a magnetic survey is being conducted by the geophysicists. Tessa, Kirsten, and Elizabeth are taking magnetic readings with a magnetometer over at the Legislature grounds. They come back to the University and enter their data into the computer, which generates graphs. Using the graphs, it is possible to detect nails, building supplies, trenches (from fences or palisades), fire pits, and many other magnetic objects.

My actual job was to form a coherent Web page using, among other things, the report from last year's WISEST group, the report from this year's WISEST group, graphs from the data collected by the WISEST groups, an archaeology report, historical and modern maps, and lots of pictures (which I scanned on the computer). This is harder than it sounds. I had to make all the information understandable to someone who knows absolutely nothing about the research or Fort Edmonton. I also had to overcome my fear of computers, which I think I did rather nicely. I am no longer computer illiterate, I can manage just fine (most of the time, anyway).



My summer with WISEST really made me think about possible career choices. Before the summer, I was thinking of taking a science program in University, but I wasn't really sure if that was what I wanted. I still don't know what I want to do, specifically, but now I'm sure it will be something to do with science. This summer has really opened my eyes to the amount of choices available, there are so many different options, even just within the field of Physics.

I would like to thank Dr. Nyland for working with me and being so patient while I tried to figure out what I was doing. As well, I would like to thank Kirsten, Tessa, and Elizabeth for providing me with someone to talk to, other than my computer.

A special thanks to all the WISEST co-ordinators for making this a summer I won't soon forget!

Christy Slater

Christy Slater
Department of Physics

My Summer In Edmonton

My involvement with Wisest came about very quickly. I was looking for something interesting to do during the summer when I found information about this program. Within a few days I sent my application and waited for news to see if I would be accepted. When I found out that I had indeed been accepted and that I would share a room with another girl at Lister Hall, I was at bit nervous about how things would turn out. Well, I had no reason to worry since everything turned out great!

During my six weeks in the Wisest Summer Research Program, I worked in Doctor Alexandra Lucus' lab in the department of medicine, division of cardiology. In collaboration with another lab, the researchers from the Lucus lab discovered a protein that inhibits the formation of plaque in blood vessels. This formation of plaque called restenosis is a frequently seen side effect of a treatment for atherosclerosis called angioplasty. While I was in the lab, the seven other workers tried to expand their knowledge about this protein by doing various experiments. I had the opportunity to get an overlook of most of these different projects including watching a pig surgery and an open-heart surgery on a rabbit. In addition, I learnt numerous techniques such as cutting sections of tissue to put on slides, making certain solutions and buffers, dissecting rats, using sterile methods and many more basic techniques. Although sometimes the work I did seemed rather meaningless, it allowed me to learn a great deal about working in a lab and being on the university campus. If I decide to attend university here after I graduate, I will feel much more comfortable knowing the surroundings.

Half way through the program I started my own little project which was to grow endothelial cells and maybe try to get knowledge on how these are connected with atherosclerosis and restenosis. It proved to be very intriguing. I learnt many tissue culturing techniques, what certain cells look like and what it is like to have a contamination in your culture. I realized that you must be very patient to work in research since you must always restart every experiment you do no matter what the result may be. Frustration can especially set in when you don't get any results or when your results are unclear. Despite all of this, research is still very interesting.

As a whole I found the Wisest Summer Research Program to be a great experience. It is certainly one I will never forget. It gave me the opportunity to live in a big city, to meet a lot of new people, and to

discover the realities of living away from home. Staying at Lister Hall with six other girls proved to be very exciting. I was glad to be able to get to know six people from across the province as well as I did. They actually became like sisters to me. I shall never forget them. The social events with the whole Wisest group were very informative and amusing. It gave me the chance to talk with others about their projects and to make new friends.

I am thankful for this great opportunity Wisest has given me and would do it all over again if I could. It is a very positive experience for girls in high school who might be interested in sciences and I would recommend it to anyone who might be interested. I was also very fortunate to be able to work with people who took the time to explain and show me how to do various things. To all of them I owe great thanks. I would also like to thank my teachers and my parents for all their great support. Without them this would not have been possible.

Sincerely,
Julie Monfette

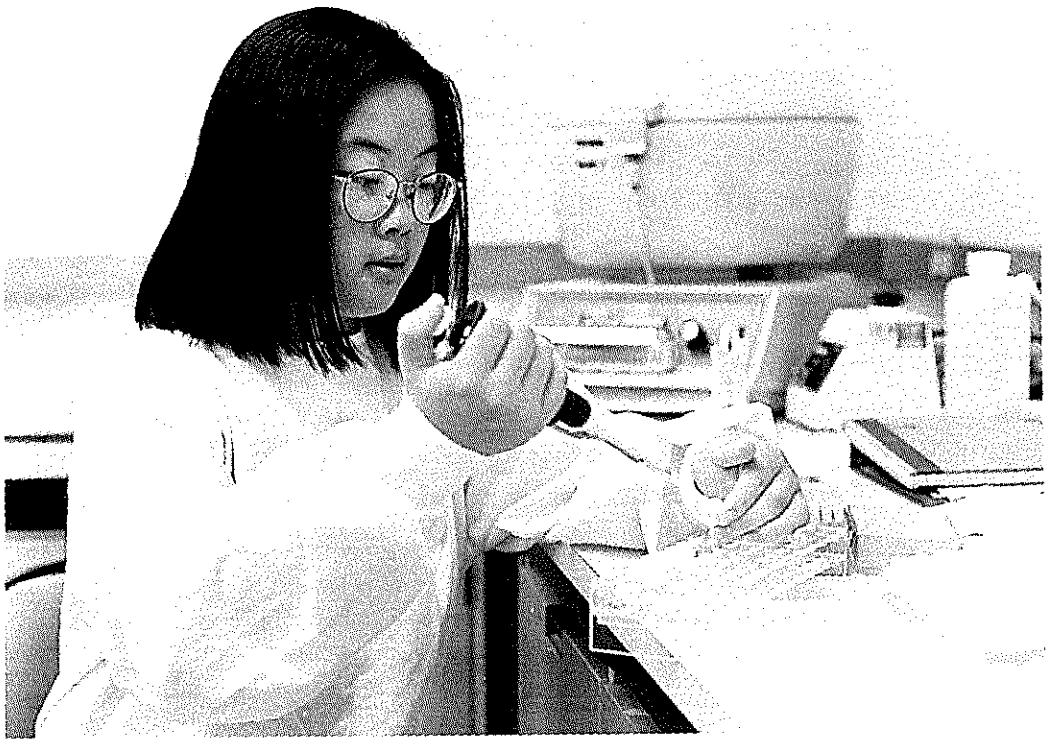
WISEST

Department of Laboratory Medicine and Pathology

After having worked five and a half weeks in the University of Alberta Hospital, I regret that the WISEST program is ending. The last month and a half has been a lot of fun and also a great learning experience. When I was first told that I had been chosen to participate in this program, I was looking forward to observing laboratory procedures and hoping that I would even be able to do some of the lab work. But once the program started, I was really surprised at how much responsibility and freedom I was given. The first couple of days were introductory. I was taken around the lab and shown where everything was kept, but soon after I started on my project. Once I was familiar with the lab and my project, I was left to work on my own and organise my own time.

For my project, I worked mainly in the DNA lab located in the department of laboratory medicine and pathology in the Walter C. Mackenzie Health Science Centre under Dr. Bamforth. The main focus of my project was to evaluate two different kits which determined twin zygocity, which is basically deciding if twins are either identical or fraternal. While working on my project, I got to mix up a lot of reagents and chemicals. This was by far a lot better than a regular chemistry class as I had to look around the lab and the reagent room to gather all the chemicals. I found that having to search around for all the chemicals and the equipment was a lot more interesting than having them all laid out for you like in chemistry class. The equipment in the lab was so high tech when compared to what we have to work with in a high school laboratory. There were these pipet aids which at the press of a button, you could pipet as little or as much as you wanted, instead of those impossible to use pipet bulbs we use in school. They even had these pipets that measured out microlitres. In the DNA lab, I was able to work with actual DNA samples when running the electrophoresis and the PCR technique. Both the PCR, Polymerase Chain Reaction, and the electrophoresis were part of my project of evaluating the two kits. For the PCR I worked with a DNA thermal cycler which, by using the PCR reactions, amplified DNA. When Dr. Bamforth explained how PCR worked, I was fascinated a how minute amounts of DNA could be duplicated millions of times over. Also, the electrophoresis was interesting in how the segments of DNA migrate and then are able to be seen. Although I didn't understand every single detail of how everything worked, my project was really fun to work on and I am thankful that I was chosen to work on this project.

Although the majority of my WISEST summer took place in the lab, my WISEST experience was not all work. In the lab while I was waiting for things to finish running such as the PCR, I was able to talk to the people who work in the same lab. The people there were really nice and always willing to answer my questions and help me find things. I learned a lot about the adjoining labs and how other tests and procedures were run. By about the second or third week, I realized that Michelle, another WISEST student worked in the same lab. This was really great as I now I had someone my age to eat lunch with and to talk to when I was waiting for things to finish in the lab.



Outside of the laboratory, the rest of the WISEST program was also really fun. Our field trips to the Alberta Research Council and to other laboratories on campus such as the Cross Cancer Institute allowed us to see the wide range of occupations in the fields of science. Also, I found the speeches from the people in non-traditional careers were very interesting but what I liked the most was the oral presentations from the WISEST students. The presentations were informal and we were not marked which made it quite easy to talk about what your own project is about. I really enjoyed hearing about what other people were doing because you hardly ever get to see them except at the Wednesday sessions. But by far one of the best things about the WISEST program was meeting all the other people who shared the basic interest in the sciences. I was surprised at how easily all of us got along but I regret not getting to know all the other people better.

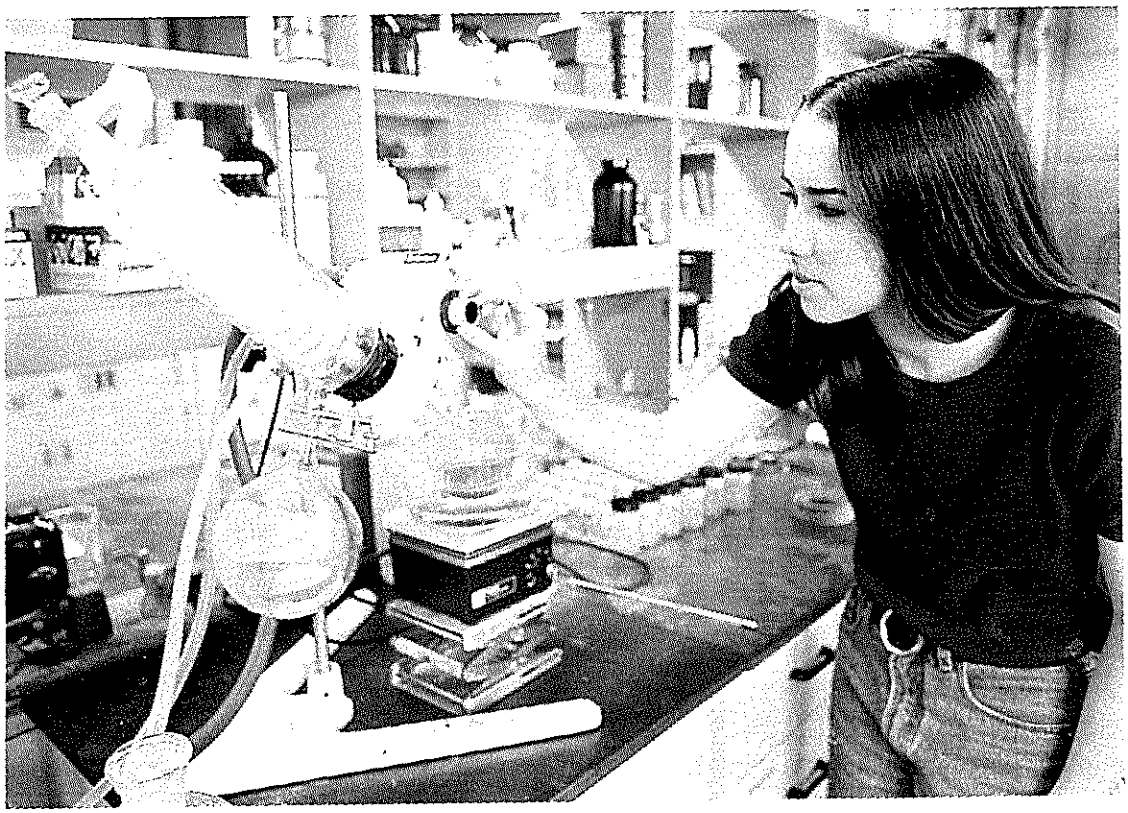
Like I said before, I regret that this program in ending for the summer. I really enjoyed meeting all these new people and getting to work in the hospital which, if it was not for the WISEST program, I would not have had the chance.

Also, the thousand dollars they give you is not bad either.

My WISEST Experience

This summer I have had the opportunity to work in Analytical Chemistry under the supervision of Dr. Kratochvil. My project concerns the PSD (Particle Size Distribution), in oil sands and clay. The purpose of the project is to determine if there is a difference in the elemental composition of particles of different sizes coming from the same sample. At first some things were over my head- like the book about neutron activation analysis in the geosciences- but everyone that I met was friendly and helpful, and after many questions and explanations I understood what was going on. For three weeks I went through dry screening, wet screening, and dry screening again to separate the particles from six different oil sand samples that had already had the bitumen removed. I used screens ranging in size from 45 microns to 250 microns. The next step was to prepare all of my samples to be taken to the SLOWPOKE (Safe LOW POwer Kritical Experiment) nuclear reactor facility to be analyzed. I put all 48 of my samples and three standards into small polyethylene vials and then heat sealed them to prevent the tops from coming off under the high pressure of the nuclear reactor. Inside the nuclear reactor, neutrons are absorbed by the nucleus of a substance and that substance becomes radioactive. As it decays, it emits high energy beta particles and gamma rays. By detecting the intensity and the number of these rays, the elemental composition of a substance can be determined quite precisely. I found a strong correlation between particles that were less than 45 microns in size and some of the elements that were in the sand, such as: Mn, Dy, K, Eu, Ti, Ba, and Sm. Unfortunately, I will not be able to finish my project, but the data that I have collected will be used in the future for research concerning the oil sands, and my project will continue without me.

During the six weeks that I have spent at WISEST I have learned that research takes time and endless patience. I now have an idea of what it might be like to be a university student and I actually know my way around campus, thanks to the tour that we took. The trips that I took to SYNCRUDE, The Edmonton Research Park, and a Pharmacology lab on campus were very interesting and gave



me some ideas to consider for future careers. Through the WISEST program, I was able to work with various machines and techniques that were totally new to me and I know the experience that I had will be beneficial to me in the future.

I would like to say thank you to Rob, Kingsley, and John, who patiently answered all of my questions, stayed calm when I broke something, and allowed me to invade their labs. Thanks also to Salima, Dr. Armour, and Dr. Tovell for organizing the WISEST program and by doing so, helping to promote women in science.

Karen Harker
Analytical Chemistry

My WISEST Experience

by

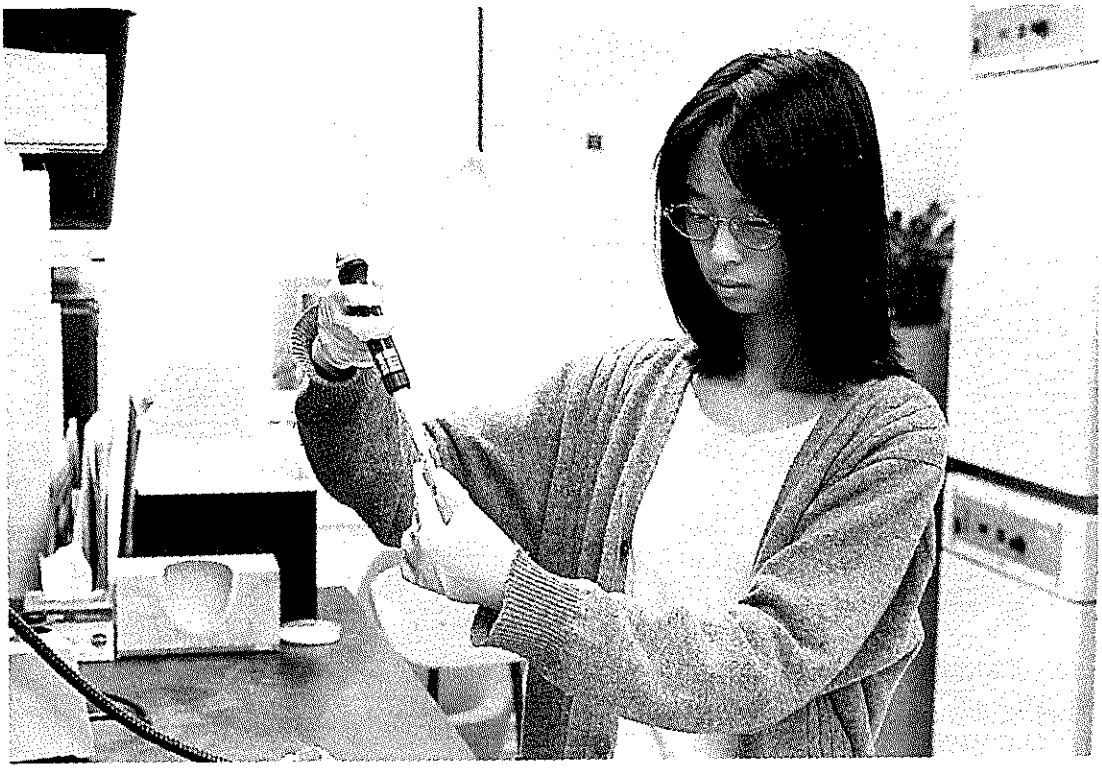
Yao Zheng

I worked in the department of Biochemistry, in Dr. Suzan Rosenberg's lab. It was quite large with about fifteen people including myself. The main research done in the lab is on Adaptive Mutations or Stressful Lifestyle Associated Mutations (SLAM) in Escherichia coli. This is believed to be a new kind of mutation, occurring in non-dividing cells. Mutations up to now have been believed to be completely random. Adaptive mutations, however, suggests otherwise and that mutations may be induced. These mutations only occur in the presence of selection for them and in the absence of all growth. Experiments have been done using the lac gene in E. coli to demonstrate this. E. coli cells, unable to utilize lactose due to a frameshift mutation (lac^-) were placed in a medium where lactose was the only carbon source. They cannot form colonies unless they mutate to lac^+. It was found that lac^+ colonies did arise, but with no net increase to the number of lac^- cells that generate the lac^+ ones. Recombination is also required for adaptive mutation to occur.

I was put under the supervision of Dr. Harold Bull. There were several projects that we worked on. One was to test the effects of transferring the F plasmid to different parts of the E. coli DNA, and checking for any correlation between this and adaptive mutation. Another project involved Mononucleotide Repeat Instability which is one of the causes of cancer. All the experiments were tide to the concept of adaptive mutation and its role in E. coli.

For the first few weeks, I helped my supervisor with what he was working on and learned my way around the lab. I soon found out that there was a lot of waiting involved with research. After becoming more familiar with what I was doing, I began doing reactions more independently. I also helped the others in the lab when I had spare time. Because of the nature of the research being done, I worked a lot with bacteria.

I found that the time I've spent working in the lab has been a great learning experience. By helping the others in the lab instead of just working on one experiment was also very beneficial. This way, I was introduced and was able to experience all aspects involved with working in a lab, from washing glassware and counting colonies to running gels and doing PCR's (Polymerase Chain Reactions).



Overall I found the experience to be very beneficial. I was able to get a feel of what working in a research lab would be like and also learn my way around a lab. I think this knowledge will be of great help in the future, both in university and in helping me to decide upon a career. One very important thing I learned about research, and science in general, is that patience is vital to success.

From "Largehole" to Living in the City

Over the last six weeks I have been working in the Department of Biological Sciences in the microbiology lab under the supervision of Dr. George Owttrim and Ian Le. My project involves molecular biology, gene cloning, DNA sequencing and genetic analysis. All of this may sound very technical and complicated but in actuality it is not. However I must admit, to begin with I understood very little. And thus, I come to that which I think should be stressed most about the WISEST summer research program: the fact that it is a tremendous learning experience.

It is a learning experience in many ways. One does not only learn general scientific knowledge but "knowledge" in every sense of the word. That is, one learns proper lab techniques, one becomes familiar with the campus, and most importantly, one learns a little bit more about life in the "real" world, at least, I did. I found this last lesson to be the most valuable as this was my first job excluding babysitting and occasional odd jobs and my first time living away from home. (I come from a small town which is commonly known as Largehole instead of Lodgepole.)

As you can probably tell, for me, it has been quite a transition from normal everyday life to living in the city. All that I have learned this summer will be of value to me for the rest of my life. To put it bluntly, my WISEST experience has been an eye-opener. It has made me appreciate and understand everything a little more, especially my parents.

Chantal Landry

WISEST REPORT

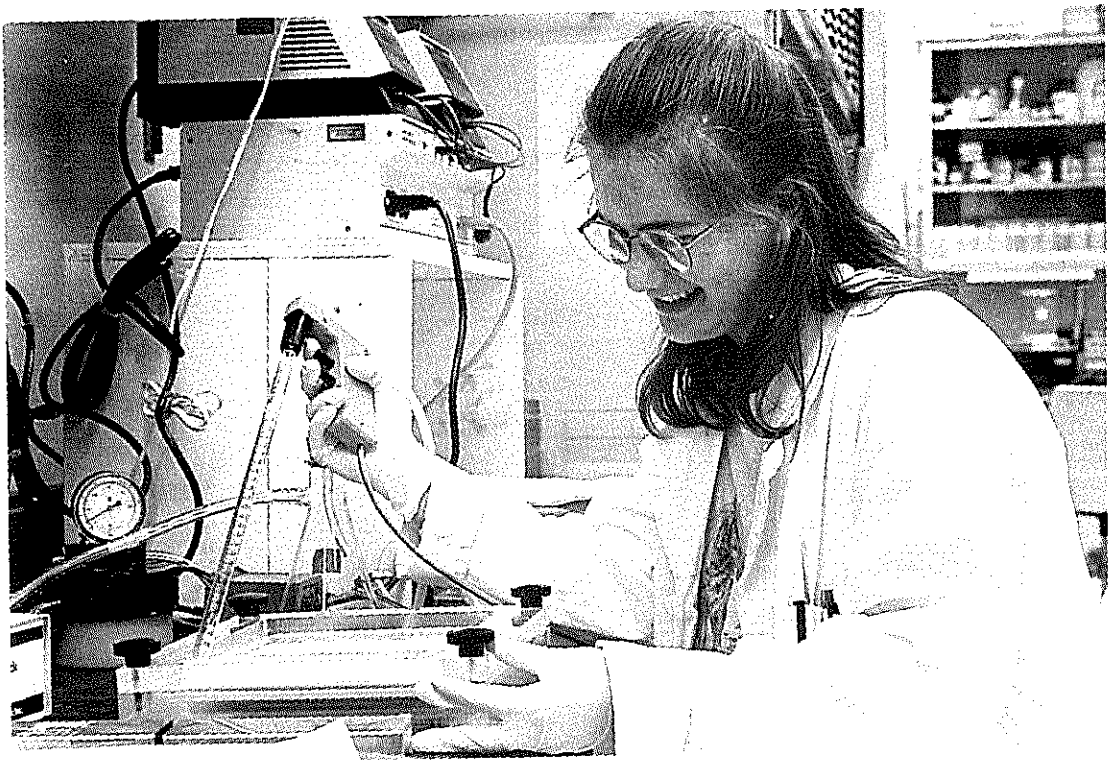
The summer of 1995 is not one I'll soon forget. My experience started in May when I received a phone call saying I'd been accepted into the WISEST summer research program. I had never heard of WISEST before I applied to the summer research program, so I didn't know what to expect when I moved to Edmonton and started work at the University of Alberta.

On Monday, July 10, I nervously walked into the room where we were to meet. I was flooded with relief when I was assured I was in the right place. In the afternoon I met the people I would work with for the next six weeks. Our supervisor Dr. Robertson took us out for frozen yoghurt and we got acquainted. I found out I would be working on Christine's project.

Our job was to locate the gene that determines tetracycline resistance in Ureaplasma urealyticum. Ureaplasmas are the smallest free-living organisms known, and some of them are resistant to the antibiotic tetracycline.

We cut the DNA of the resistant ureaplasmas with restriction enzymes and put it in a pulse-field gel electrophoresis apparatus to separate the pieces of DNA according to their size. Next, we located the gene for tetracycline resistance on one of the fragments. We continued to break the DNA into smaller pieces to narrow down where the gene could be.

All the people I worked with were wonderful. Christine (who is a university student) took a lot of her time to help me understand what I was doing. I wasn't put down because "I'm only



a high school student" while the others in my lab had much more education than I do. I quickly felt at ease, and had a great environment to work in.

The WISEST meetings were also fun. I got to meet other girls who were like me, and interested in science. It was nice to meet new people, and form new friendships.

I learned many things this summer that will help me later in life (especially when I go to university in a few years). Not only did I learn about research and microbiology, (which I learned a lot about), but I learned how to live in the city (I have never even lived in a town before), and I figured out how to get around the university campus (which will definitely come in handy when I go to university and all the other first year students are lost).

My WISEST summer was a wonderful experience, and I would do it again next year if I could.

Cheryl Strydhorst

WISEST - The Experience

When my chemistry teacher brought me the form with the WISEST letterhead and suggested I apply, I jumped at the chance to obtain a worthwhile summer job. Having given extra time to thoughts about my future, I was now ready to get some help in making my decisions by accepting the challenge of some fulfilling work experience.

From the many people who had heard that I was working at the U of A, the question I was most commonly asked was if it was what I expected. What could I say? I worked on the university farm with the poultry department. I looked forward to increased responsibility, and coming from a farm, some good hard farm labor could only diminish a country girl's homesickness. I was eager to get into the hands-on work and be part of an important experiment by observing and recording results. In the beginning, every day was filled with learning new procedures and routines. I learned quickly and it was a great feeling to sense that I was becoming part of a team as we made certain that all the jobs went faster by working together.

However, with all I was anticipating, I also made many positive realizations during the course of my employment. My coworkers were friendly, accessible people who took an interest in my purpose and my questions. Although I was just a high school student, I marveled at their willingness to assist me in my duties and finally, treat me as an equal. From these people, I learned the value of being able to ask the right questions. Some days, during the seemingly endless cycle of menial work (e.g. things like feeding, egg collections, and cleaning!), I had to keep reminding myself that all these duties played a huge role in making each particular experiment successful.

There was a lot I was looking forward to from the day I learned I was accepted. I couldn't wait to experience the life and vitality of the city, and I expected to interact with all the people from so many different places who still had at least one thing in common with me - the WISEST program. I also felt I needed a realistic view about deciding which route my future would take from people who had experience and knew what I would probably be up against.

I consider myself very fortunate to have been selected to take part in such a rewarding summer program. It has given me invaluable insight into what my rapidly approaching future could hold for me. I would like to thank all the people involved in planning this year's program, including those in the selection process, activity organizers, professors, supervisors and graduate students that were involved directly with the WISEST participants.

Victoria Sikur
Animal Sciences

My WISEST Experience in Cyberspace

While some students spent their summer surfing the waves off beautiful beaches around the world. I spent my summer surfing the internet connecting to information available to people all around the world.

I spent my summer working in the department of Computing Science under the supervision of Carol Smith. The project I was given involved creating World Wide Web pages for the Computer Operations Group.

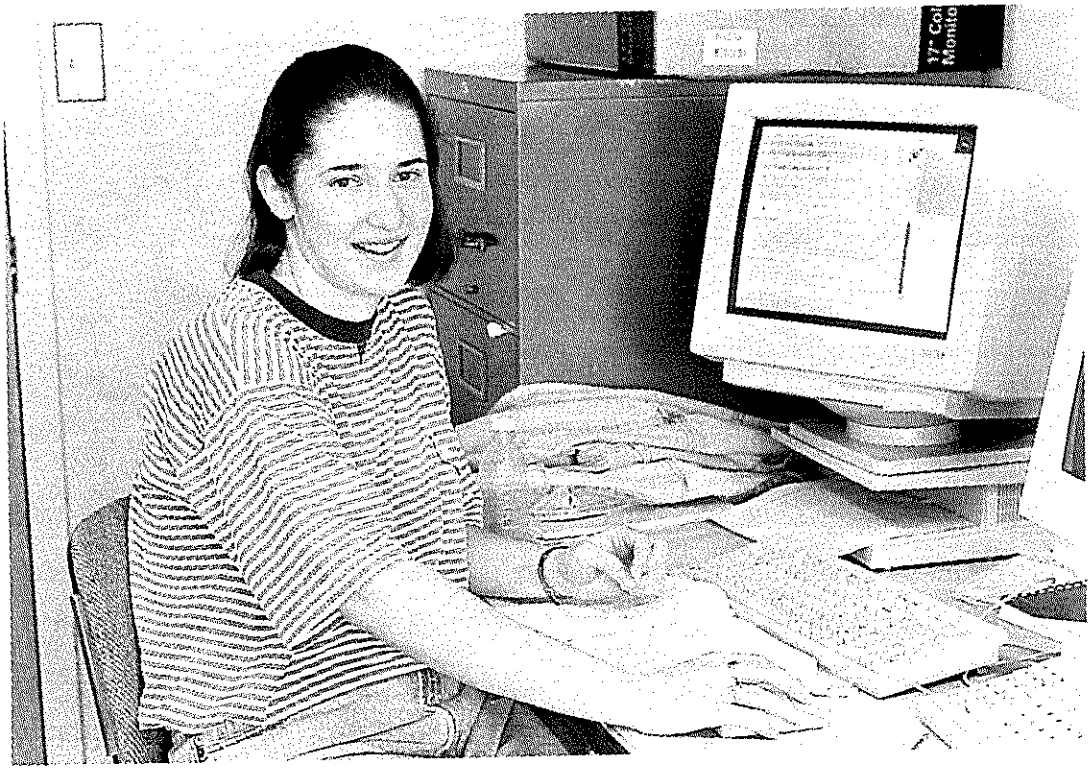
When I arrived at my office I was given several manuals and a couple of weeks to become familiar with Unix and Mosaic. Once I was familiar with Mosaic, Carol and I sat down and discussed how we wanted to present the Computer Operations Group homepage, and then I went to work. After more then a week of trial and error (what science is all about) I finally completed the homepage (URL-http://web.cs.ualberta.ca/Support/operations.html -If you can connect to the internet and you want to have a look at the new homepage, that is the address). I have also been busy documenting the group's software.

A special highlight to our weeks of work were the Wednesday afternoons, which I truly enjoyed. My favourite Wednesday activities were the tour of the Alberta Research Council, and the on campus lab tour. I enjoyed the tour of the Alberta Research Council because it exposed us to a different research environment compared to research at the university. The picnic afterwards was a great way to talk to and get to know the other WISEST students.

Visiting other labs, and hearing about other departments has taught me that my future in science is filled with endless options.

I would like to thank Carol Smith for her patience, and for allowing me to work with her and the other members of the Computer Operations Group.

I would also like to thank Jackie Pfefferle for being so patient with me and helping me work on the title for the homepage, Jim Easton for sharing his office and his stories, Art Mulder for answering any of my "dumb" questions, and everyone else in the Computing Science department for making me feel so welcomed.



I am honoured to have been chosen to participate in something as challenging and educational as WISEST. I appreciate the special opportunity that WISEST has given me. Thank you WISEST for making this summer an experience that I will never forget.

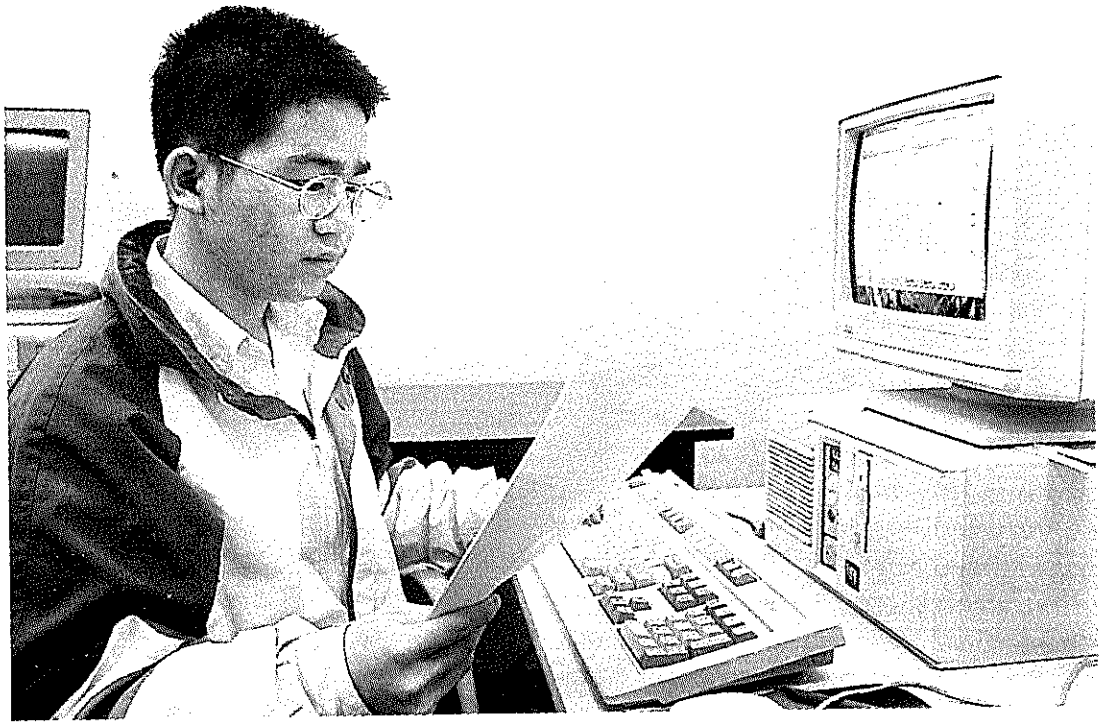
Celina Northill

Six Weeks of Memories

Wow! It's almost over. I can't believe how fast my six weeks with the WISEST summer program have disappeared. It seems like only yesterday that I walked into a room with over forty girls and no guys for the first (but certainly not the last) time. It must be said that that experience was very intimidating, especially when all the girls looked at me as if I got in the wrong room. In these six weeks, I have learned a great deal about what a nurse does as well as various aspects of the university community that I have never thought about before.

During the six weeks, I have worked on various projects for Dr. Janet Ross Kerr and Dianne Godkin, whom I must thank for their generous donation of time and effort. One of the projects that I have worked on is a survey of seniors to find out more about what factors affect seniors' health. The aim of this research is to discover the factors that have positive and negative effects on seniors' health and design a health promotion program to help seniors to have a better health. Through this project, I have learned not only communication and data processing skills, but also gained a glimpse into what nursing researches are like. Before the WISEST program, I did not even realize that nurses do conduct researches of different kinds. Another project that I am engaged in is the design of a home page and related pages for the Faculty of Nursing for Internet. These pages are comparable to the information desk in real life. In designing these pages for the Faculty of Nursing, I got my first chance to "surf the 'Net." Through these and various other projects, I have gained a better appreciation and purged many misconceptions of what nursing is all about.

Since Herman, the other student working in the Faculty of Nursing for the WISEST program, and I are not trained to work in a clinical setting, our jobs are mainly clerical. However, to give us an opportunity to see what nurses do, our supervisors planned several tours for us. Among the many tours that we went on in the six weeks, the most interesting one is the tour of the perinatal research centre. We had an chance to see an on-going experiment involving measuring the lung capacity and the amount of fluid in laboratory rats. At the end of the tour, we ended up with dissecting a rat of our own, one freshly killed for us, at Herman's request (it's Herman's idea. Really, I swear!). Another interesting tour is the one of a research on whether it is better to use anaesthetic on babies when they are being circumcised. We, of course, did



not get to see the operation, but we were lucky (or unlucky as some may view it) to see video recording of the procedure. Fortunately, the baby we saw had anaesthetic.

Herman and I also had the opportunity to see the signing of a memorandum of understanding between the Faculty of Nursing of University of Alberta and a Japanese University. Before this, I never realize that nurses do anything such things. Besides attending the ceremony, Herman and I also had the chance to meet several Japanese students and to learn about what nursing is like in Japan.

There were also many activities that WISEST have planned for us. There were visits to the Alberta Research Council, numerous labs in the University of Alberta. We also had a chance to meet various researchers in non-traditional fields. Through this program, I made many new friends and learned a lot about nursing and the University of Alberta in general. I hope that more students will have a chance to participate in the WISEST program and gain as a wonderful experience as I have, an experience that I will remember forever.

Peter Guo
Old Scona Academic

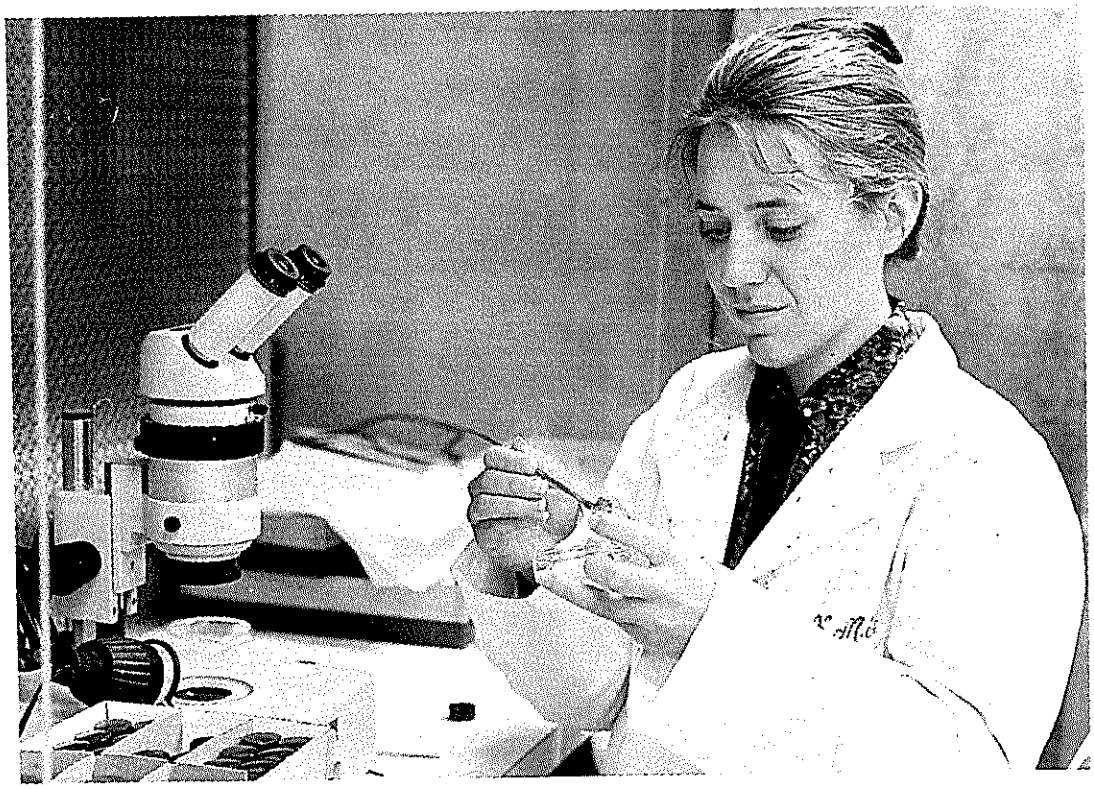
The WISEST program has definitely helped me realize all that is involved in science and research. At first, everything was new and different, but it was amazing how fast I got to know everyone and to feel comfortable with the program. As it turned out, I was to work under the supervision of Dr. Keith Bagnall in the department of Anatomy and Cell Biology. The first day we went over to his lab and he introduced me to all the people that were working there. There were five of them, and all were males! Talk about intimidating! Here I am: young, uneducated, a WISEST student, the only female.

My project consisted of examining chicken embryos that were about nine days old to see if their vertebrae were abnormal or not. A somite (somites being the building blocks of the vertebral column), had been removed from some of the embryos, and I was to check the effect on the development of the vertebral column. If I spotted any abnormalities, I was to cut the vertebrae apart and draw them from the top, ventral, and dorsal views. It was very exacting work because the vertebrae were small and one tiny move could totally thrash the vertebrae that I was working on. It was also very tedious. During the time that I worked for Dr. Bagnall I examined 232 embryos; embryo after embryo all day long for three weeks.

My first week there I went with two of the guys in the lab down to the bottom of Heritage Medical Research Building were the animals are kept. There I helped radiograph the spinal columns of some chickens. I had to wear gloves, a mask, a hairnet, a lab coat, and plastic boots, and all of this only to pick up some chickens. One of the things that struck me when I was down in Heritage was the tight security of the animals. Another thing was how well they were kept and cared for. In the room were I worked, baby chicks were hatching all the time. They were kept in cages in the lab until they were big enough to go downstairs. The little chicks were cute, but they could become very annoying. They would cheep and scratch and peck until I just about went crazy. Watching all those chickens made me realize that I don't think I'll ever be hungry for chicken. Actually, nobody in our lab is hungry for chicken anymore!

Besides the tour, few things happened to break the monotony of the days. Most of the time I sat looking at my embryos in silence. Nobody else said anything, and I felt like I shouldn't say anything for fear of breaking their concentration. Also, I didn't know if they would appreciate my questions or comments. For three weeks I sat and quietly dissected quicken embryos. It was very tedious, and I vowed that I would never go into research. One thing that I did realize, however, is that Biology takes more brains then I ever thought. I always had the idea that the "dumb" ones go into Biology. However, it uses a whole different way of thinking than I am used to. It really does take brains! You have to be able to think in three dimensions and try to comprehend what is going on in tiny embryos, with no formulas to help you figure out the answers. Then you have to take this information and extend it to answer questions such as what causes abnormalities and how can they be cured?

At the end of three weeks most of the people in the lab left for holidays, so I found myself in a new lab. At first I did not want to move, because I was just starting to feel comfortable working with the people in my old lab and getting to know them. I didn't want to start the getting aquainted process all over again. But there was a surprise in store for me. After the first day I felt like I knew the people



in my new lab just as well as I did the people in my old lab after three weeks. I could ask anyone questions any time I wanted to and they gladly answered them in a surprisingly clear way which made it easy to understand. Now, as there is only three more days of working with WISEST, I find myself wishing that I could work longer. I am really enjoying myself.

In my new lab I am doing a little work for Gene, who is working on his Ph.D. My job is to make up solutions with varying amounts of protein in them and see how much is needed in order for the protein to be visible when ran on a protein gel. However, I have not done much work and it seems like I'm sort of playing, biding my time until the six weeks are up. I sit around a lot, watch what the other people are doing, and ask lots of questions. I find that the knowledge that I need to learn is quite challenging, but nevertheless conquerable. At the beginning of the summer I took this job because it was the only one available. I was dreading having to work inside a lab all day. I was also keenly disappointed that I was put into the department of Anatomy and Cell Biology because it was my third choice and I was not interested in it at all. But I have thoroughly enjoyed my time as a WISEST student, and believe that this is the best thing that I could have done this summer. I have learned an incredible amount of information in a relatively short time. It has given me many great experiences. However, I still don't know if I want to go into science!

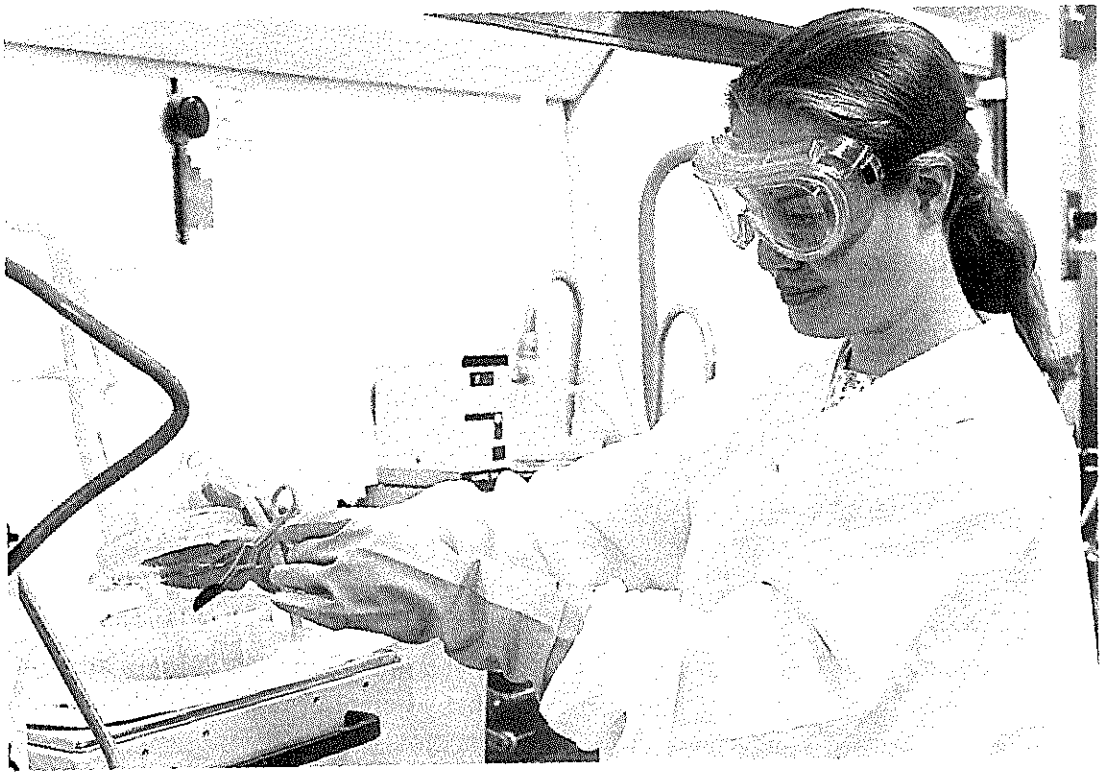
Rosalie Zinner: Anatomy and Cell Biology

At the AMC

Before the summer of 1995, I was unsure of what to do after high school. Go to University, travel? I had always been good at Math and Physics, but unsure if I should pursue a career in related areas. Now, thanks to the WISEST Summer Research Program (WSRP), I have an idea of the type of career path that I would like to follow. I enjoyed the type of work that I did and saw going on around me and can picture myself with this type of career in the future.

For six weeks over the summer of 1995, I worked with Ken Westra and Lianne Lester at the Alberta Microelectronics Centre (AMC). At the AMC, along with many other things, silicon wafers are etched. The silicon wafers are then sent across the world to other companies who had ordered them. In turn, these companies use these etched wafers for a variety of different functions.

My specific project was to help experiment with factors which effect the smoothness of silicon wafers while being etched. It took the entire six weeks and work at some times was tedious. I broke my share of wafers, became a silicon crushing expert, and became familiar with the internet when things got slow.



I learned a great deal over the six weeks of my research. It was definitely worth taking the summer off to do. It helped me get an idea of what I might like to do with my future. It was a great experience and I am thankful to live in a province with such great opportunities.

Kim Quinton

A Summer of Science

By Dayle Strachan

WISEST has been a real learning experience for me. I've grown in both knowledge and person throughout the past six weeks. From the trip to the medical examiner's laboratory to working with rats on diabetic research, I've enjoyed one hundred percent of my WISEST experience.

My summer has been spent working in the area of medicine and physiology, or, to be more precise, in the area of metabolism and endocrinology at the Heritage Medical Research Center. Endocrinology is the study of the glands that regulate body functions by releasing chemical messengers or hormones into the blood stream. The endocrine gland I deal with is the pancreas: the long, tongue - shaped organ located below the stomach. Although it is both an endocrine and an exocrine gland, I deal with its endocrine functions, specifically, with the release of the hormone insulin. Insulin is produced by the beta cells and is secreted by the islets of Langerhans, but what is the function of insulin? Insulin acts to stimulate the cellular uptake of plasma or blood glucose after a meal.

Now what all this has got to do with me, rats, and diabetic research I will attempt to explain. A basic tenet of glucose homeostasis is that when plasma glucose rises insulin is secreted by the islets of Langerhans and acts to accelerate the return of glucose to its basal or normal level. However, observations thus far in Dr. Finegood's lab, concerning normal white rats, suggest that the acute insulin response to a glucose bolus or injection, has no effect on glucose disappearance. Although long exposure to exaggerated amounts of insulin will indeed affect glucose disappearance, this is not physiological. This observation is strange as insulin accounts for 50% to 60% of glucose disappearance in dogs and likewise in humans. Our objective through experimentation is to resolve these observations and perhaps explain the specific role of insulin in glucose homeostasis in rats.

Presently Dr. Finegood's lab is on its third experiment attempting to explain these results. However, prior to any experimentation, surgery is performed on the rats. Surgery includes the cannulation of the left carotid artery, which extends into the aortic arch, and the juggler vein. A cannula is a small tube for insertion into a vessel, and this is exactly what we do. We cannulate the juggler vein to infuse tracer or radiolabelled glucose and we cannulate the carotid artery to take frequent blood samples throughout the experiment. Overnight, we fast the rats to remove any excess or above basal level glucose in the body. In the morning, after experiment preparations are completed, a radiolabelled glucose bolus is injected into the carotid cannula, and the carotid line is then attached to a pump calibrated for a constant rate of tracer glucose infusion. We use 3 hydrogen as a tracer which means that titrated hydrogen is attached to three carbons on the glucose molecule. We use radioactive or tracer glucose so we may better understand the physiological role of insulin on glucose. Frequent samples of blood are then taken from the carotid artery so that tracer glucose levels can be calculated from the blood plasma. We do this through a process called an assay. It is a procedure that allows the

levels of tracer glucose to be calculated by a machine called a B - counter. All of this is done in hopes that a steady state or constant glucose level may be reached - and it is reached, at about 100 minutes.

Now, although I will be gone before the next important step in this experiment will be performed, I will describe it to you briefly. At 100 minutes, a bolus or an injection of unlabelled or nonradioactive glucose will be given to the rats. If our observations hold true, that is that insulin seems to have no effect on cellular glucose uptake in rats, glucose levels may rise slightly. If, however, in contrast to our observations insulin does accelerate the return of glucose to its basal or normal levels, glucose will fall after the bolus. We hope that glucose levels will remain at a steady state or rise slightly consistent with our observations. This is the part of the experiment I would have thoroughly enjoyed, but I cannot imagine I will ever regret the learning experience I have been granted. I have learned so much about the role of insulin in the metabolism of both the human body and that of the rat. I hope that many more discoveries may be made by Dr. Finegood's lab in the future.

Not all of my WISEST experiences have taken place in the laboratory or include the mandatory usage of gloves! I've gone to the medical examiner's laboratory and the Alberta Research Council, where I have learned about both the death of man and the birth of discovery and invention. The WISEST students have also had many opportunities to talk to others about science, careers, and education. Such opportunities were presented when we met with people in non - traditional careers, and when we assembled to hear each other's project reports. We've also had a lot of fun at outings such as Shakespeare in the Park and the trip to the Space and Science Center.

My WISEST experience will be remembered for the rest of my life. It was wonderful to discover new and different things and to be given the opportunity to expand my horizons. Thank you WISEST for an awesome summer.

In this WISEST Summer Research Program, my work was in the faculty of nursing. I worked with two professors. Dr. Valentine, one of the professors, does research concerning feminism. One of the problems she sees is that women still only gets paid seventy percent of men's wages. I also worked with Dr. Hibberd, who is also a professor. Her field of research is on nurses' unions, which tries to preserve the history of nurses. With both professors, my main work was in the different libraries on the university campus. I would find books and journals, and then print out bibliographies using the computer. I do on line searches on the different databases and also Pro-cite some articles. Other than that, I would occasionally do some work in accounting and run some errands.

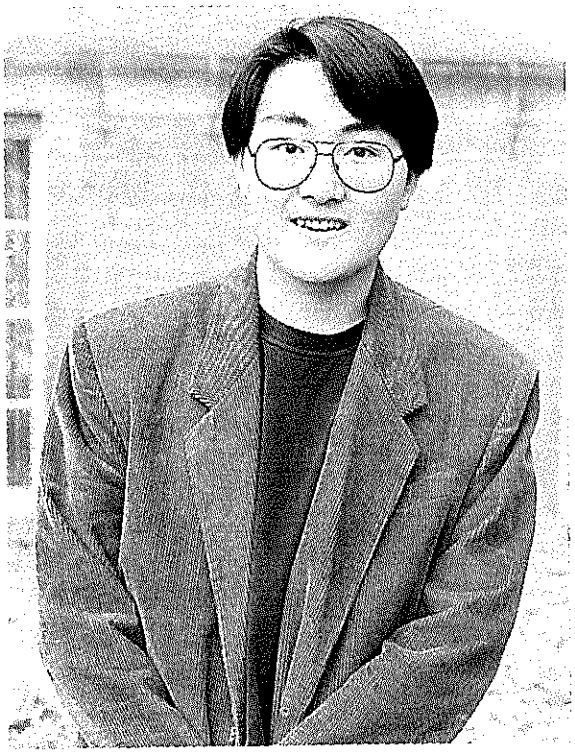
In addition to this research, many tours were set up for us. We went to the Perinatal Research laboratory to see research being carried out on rats. They wanted to know if oxygen saturation and different medications have any effect on their lungs and how this corresponds to babies's lungs. In this laboratory, we also got the chance to disect a rat to find out more about it's inner organs.

We also went to the Neonatal unit to learn more about premature babies. They had needles all over their body to maintain a constant temperature, a precise amount of food they are getting, oxygen levels, and so on. Then we discussed how babies can have brain damage, blindness, and other disabilities occur to them.

We went to a haemodialysis unit where people have kidney problems. The patients go to the unit three times a week to get their blood filtered. Then we got a chance to go to the transplant unit to visit more patients who had liver problems, gall bladder removed, heart transplant, and so on. At the intensive care unit, we saw someone having a heart surgery performed on. They were checking go see if any arteries or veins were blocked, thus resisting adequate blood flow.

Later, we hiked across campus to the Cross Cancer Institute to see the research they do. The nurse showed us around the building, visiting patients and doctors. We saw the different types of treatment and were explained to about the side effects of each treatment.

As well, I had a chance to go visit the home care centre. We went to different homes to see what the nurses do there. We saw an amputee with a leg amputated due to a tack and his diabetes. Then we saw a woman with part of her bowel removed and thus part of her intestine was placed outside her tummy. Then we visited two women with heart problems in which one was ninety-six years old. It was quite interesting to see what the nurses had to do.



Lastly, we saw a formal agreement being signed. The University of Alberta and the University of Hokkaido, situated in Japan, signed an agreement stating that they will share all information discovered. Hokkaido is known to be the twin city with Edmonton. Half the people there were Canadian and half Japanese. It was quite interesting since most of the Japanese people could not understand what we were saying, and vice versa.

Before, I thought that nurses were only an assistant to a doctor. However, now I know that they do more than that, such as research, teach, visit patients, and so on. This was quite a unique, and meaningful experience. For one thing, it will definitely be beneficial to known all the libraries really well.

Herman Chow,
Holy Trinity High School.

I was assigned to the University of Alberta Devonian Botanic Gardens to do my WISEST research project. I had no idea of what I would be doing, and had never even had the chance to visit the gardens. Luckily, all the staff and volunteers are the greatest and it has been a really fun experience so far.

My project is mainly dealing with the Butterfly House, which is a tropical greenhouse home to many species of tropical butterflies. These are butterflies that one would never get the chance to see without travelling down to the rainforests in South America or Southeast Asia. Although the Botanic Gardens have been around for many years, the butterfly house is only in it's third year. People are constantly asking what the purpose of the butterfly house is, and I can't say that there is one single purpose. Obviously it has become a tourist attraction, and part of my job is touring people around the greenhouse and answering any questions they might have about the butterflies or plants. However, more than just showing off the butterflies, the Devonian Gardens wishes to educate people about the importance of insects in the ecosystem, dispel any myths about butterflies, and try to get people to understand nature a little bit better.

I work with two university students. Brent is in charge of the whole place and is responsible for ordering the butterfly pupae from the tropics, and is studying entomology. Roseanne is a biological sciences student, and knows a bit more about the tropical plants than anyone else. Both are really fun and although I'm getting paid, it doesn't seem like a job.

When I first got there I didn't know very much about butterflies. I remembered learning about the life cycle in school, but that was pretty much it. There is usually about fifteen species of butterflies in the house, and it seemed like some of the names were kind of hard to remember, like the Grecian Shoemaker or the Golden Helicon. Besides the names, each individual species has its own habits, favorite plant, and breeding habits. After a week of answering questions, it felt like I had always known the stuff. If I didn't know the answer to the question, Brent or Roseanne were always around.

Every second Tuesday, we get a new shipment of butterfly pupae in from the tropics. Butterfly farms are a big business in the tropics, and agriculture Canada always has new rules regarding bringing foreign animals into the country. For each species of butterfly, a permit is required, and the pupae are inspected at customs. When we finally get them into the house, it is really important that we get them into the incubator so that they have the correct humidity and temperature to emerge properly and become healthy adults. Some of the pupae must be hanging up in order to emerge properly, and some must be laying down. It depends on how the caterpillar attaches itself to the tree before pupating. One species, the White Tree Nymph, has to be in the dark to emerge. Since there is no guarantee given to us by the butterfly breeders, it is up to us to make sure that as many butterflies emerge as possible.

The plants in the Butterfly House are very important as well, and I get as many questions about the plants as I do about the butterflies themselves. It is important to have the right species of flowering plants as a food source, since butterflies feed on the nectar of flowers. In addition, there are numerous big trees, a waterfall, and a fishpond. All the plants require a specific temperature and humidity level, which we maintain all year round. Every single day all the plants in the house must be watered thoroughly. It takes about two full hours to water them, but it usually takes longer because people are always coming through and asking questions.

One thing I had no idea about before I started working with butterflies is how delicate and complicated they are. The common attitude people have with insects is that they are easy to take care of and don't require much to survive. This is totally not true. If one variable is wrong in the house the butterflies feel it immediately, and we have to fix it. With breeding especially, the butterflies are very picky. Each species has its own host plant. Without the host plant present, the butterflies won't lay eggs anywhere else. This can become tricky when dealing with very exotic host plants that wouldn't normally be sold in greenhouses. The long term goal of the staff is to obtain all of the host plants and have all of the butterflies breeding successfully. Right now there are only three species breeding, the Postmen, the Zebras, and the Mormons.

I feel that in the short time I have worked at the Devonian Botanic Gardens, I have learned a great deal not only about butterflies, but plants and the interaction between plants and animals, producing an ecosystem.

Joey Archibald

As the Centrifuge Spins...

Hi, my name is Wynne, and I work in the Cross Cancer Institute in the department of Experimental Oncology with Dr. Linda Pilarski. And as I write this report, I'm once again waiting for the centrifuge to stop spinning. If you get the impression that I do this often, you're right. But let me explain why it's worth waiting for.

My project involves studying a form of cancer called Myeloma. It's a cancer of the immune system (specifically B cells) that eats away at the patients' bone marrows. The problem with Myeloma is that it's resistant to chemotherapy, the main treatment for this disease. As a result, the average lifespan of patients post-diagnosis is about three years. It was discovered that the malignant cells are resistant to the drugs because of a structure on the cell surface called a P-glycoprotein pump (PGP). This pump apparently spits out any drugs that are absorbed into the cell, thus they have no effect on the cells.

Other drugs were found to block the pump to varying degrees. But it was discovered that non-malignant cells also have the pump. So if drugs were used to block the pumps of the malignant cells, they would also block the pumps of any normal cells the patient had left. Dr. Pilarski's theory is that the pumps of the myeloma cells and the pumps of the normal cells act differently so a drug might be found that would block the malignant pumps, but not the normal ones.

My job is to test the blocking capabilities of different concentrations of different drugs on normal and cancerous cells. Then compare them to see if any drugs are more effective on the myeloma cells.

So, back to the centrifuge. The procedure for my experiment is quite lengthy and involves a lot of "washing". That's when you suspend the cells in one solution, spin them to the bottom of a test tube in the centrifuge, suck off the solution, and resuspend the cells in another solution. The centrifuge has to spin for a certain amount of time each time I wash, so it really adds up. I could safely say that some days, this thing is the bane of my existence.

Well okay, sometimes it's not that bad. Thanks to the centrifuge, I have a lot of time to poke about the lab and find out what everyone else is doing. The cool thing is that there are a lot of people in my lab, and while all these projects are supposed to have something in common, I can't figure out what it is. So I've been able to learn a lot of things that don't relate at all to my project. I learned how the PCR (polymerase chain reaction) machine works, how to run a gel, how the cell sorter works, how to purify a thymus, make solutions in great quantities, fill pipet tip trays, dispose of biohazardous waste, how to get ice (and dodge that really nasty guy on the third floor), and all sorts of other details about running a lab.

But when the centrifuge is done spinning, it's back to work for me. I have no hope that I'll stumble onto the cure for myeloma or even a drug that works like Dr. Pilarski hopes. Even if I did, I wouldn't know it because a lot more work will have to be done to prove it. I'm just glad WISEST gave me six weeks, and the opportunity to contribute to this important research.

Wynne Leung
WISEST Summer Research Program 1995

ADHESIVE CELLS

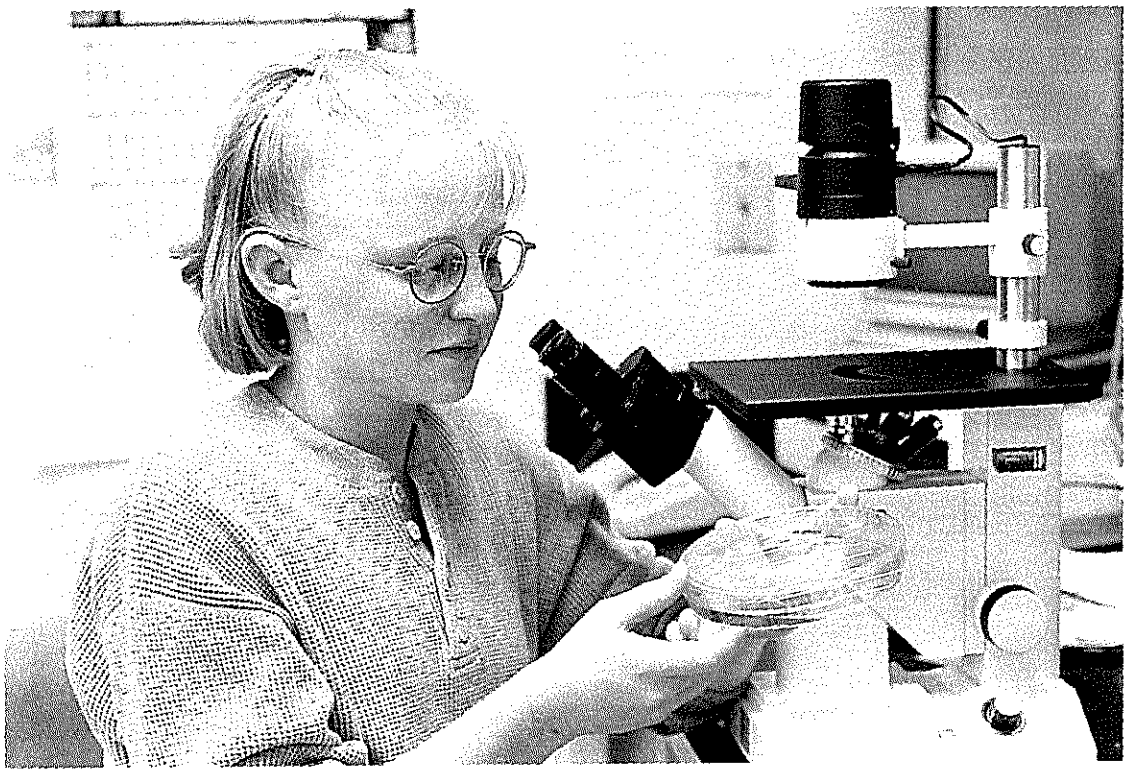
During the six weeks with the WISEST program I had the opportunity to work with Dr. Manijeh Pasdar in the department of Anatomy and Cell Biology. In between disturbing everyone and breaking everything I was also learning a lot about cells and their functions.

In the lab I was working with epithelial cells because they have very strong adhesive proteins and are an easy attainable specimen. Epithelial cells are cells that cover the external body surface, and form the lining of the bodies cavities eg. the skin, and the stomach lining. Cell adhesion in epithelial cells is brought on by three main junctions localized on the lateral surfaces of cells,. the tight junction, which fastens the top of two adjacent cells together, adherens junction, and desmosomes. My specific research involved desmosomes, and their functions.

Desmosomes are complex structures located at the lateral surfaces of each cell which is matched with the identical structures at the surface of adjacent cells. Each desmosome consists of two plaques located on adjacent cells, a membrane core which covers the area between the two plaques, and cytokeratin intermediary filaments which are attached to the plaques and exit into the cytoplasm. Desmosomes provide an especially firm adhesion from one cell to the next acting like a snap fastner.

To view the cells a number of methods were used, but the one I was most involved with was called immunofluorescence. This process involves the use of one antibody developed against specific desmosomal proteins. After fixation and permeabilization of cells, the antibodies were used to detect specific desmosomal proteins. The binding of the antibodies to the proteins were subsequently detected by using a fluoresent antibody conjugated to a secondary antibody which was bonded to the first. When these antibodies attach to a protein the flouescent markers show up under a special microscope as a red or green light allowing you to view a specific protein in the cell.

The significance of studying desmosomes is to help understand behaviors regulating cell - cell adhesion. Thus, allowing the identification of abnormalities resulting from the disruption of cellular adhesion such as a blistering disease of the skin or tumor invasion and metastasis. For epithelial cells to function normally cell - cell adhesion has to be present. An example where cell - cell adhesion has not taken place would be in the metastasis of cancer cells. When desmosomes do not adhere to each other then a single cell is set free from the tumor allowing the tumor to spread to different parts of the body. Another example is pemphigoids vulgaris, a skin disease in which cell - cell adhesion is disrupted resulting in the blistering of the skin. By looking at desmosomes and finding out what is causing this separation in cell - cell adhesion we may be able to cure these diseases in the future.



By being involved with the WISEST program I was able to get a better look at where cell biology research was headed for the future. I was able to work with Dr. Pasdar in areas of skin cancer and medical research. I learned more about cells and how the normal function of even the tiniest protein really does matter. I found that by being involved with research I have become more interested in the happenings of life. I am very happy that I had the opportunity to be involved with the WISEST program and I would recommend it to any girl that has an interest in science.

by Nicole Bedard

My WISEST Experience

by Jennifer Kostiuk

During my 6 weeks of the WISEST Summer Research Program, I have worked in the Space Physics Lab, met new people whose interests are similar to mine, and constantly questioned myself and others about possible career choices.

Working in the Space Physics Lab under the supervision of Dr. Samson and one of his graduate students, Frances Fenrich, I analyzed SuperDARN (Dual Auroral Radar Network) data. SuperDARN has set up radar stations in Saskatoon, Kapuskasing, Goosebay and Iceland to record the flow velocities of protons and electrons in the Earth's ionosphere. I used this data which is recorded on tapes to look for field line resonances. A field line resonance generates an oscillation in the ionospheric flow velocity at a certain frequency. When looking for a resonance, I look for a frequency component that generates a lot of power, lasts for almost an hour, has a 180° phase change through it and is seen on at least 4 out of the 15 beams of the radar. Once I've found what I believe to be a resonance, I record the spatial location, the power rating , the frequency and the time when the resonance reached its maximum power. Throughout my 6 weeks, I worked on finding resonances so that a possible explanation could be provided for why the resonances occur only at certain frequencies. I found a couple of good resonances, which means that there was a definite pattern in time and power, the frequency remained constant, it was seen on most of the beams and there was the proper phase change through it. Currently, I am interested in days where there might be a resonance that occurred near local midnight. One of the theories is that these resonances may be responsible for the appearance of the Northern Lights, but no one knows for sure.

The WISEST program provided me with the opportunity to gain valuable information that will enable me to choose a career that is best suited to my interests and abilities. When I applied for the program, I knew that I wanted to go into either science or engineering, but I didn't know which area. Talking with different people in the lab I work in and some of the other WISEST students has given me a better idea of the career I want to pursue. I still don't know which area I want to major in when I start university, but I don't have to decide that right now. I also learned that maybe research isn't for me. I really enjoyed the work because it was interesting and the more work I did, the closer I got to answering my questions. Research is interesting, but there is a downside to it because jobs aren't always available, and it is becoming increasingly difficult to

obtain grants to fund research. People have to see the need and the use of the research before they will fund it. Space physics is an area that is especially hard hit because not all people see the need to understand the why's of the Aurora Borealis or the Northern Lights. People want a cure for AIDS and cancer, not an explanation of a phenomenon that is taking place hundreds of miles from the Earth's surface. It's unfortunate that people don't see the need for space physics because there is a lot more to it than most people know. A discovery that is made could prevent astronauts from being exposed to harmful doses of radiation from the sun or be able to predict when the Northern Lights are going to appear which may cause communication disturbances or possible black outs.

Overall, I was very pleased with my WISEST experience. You get a taste for what a real job is like while you learn about an area in science or engineering that you are interested in. You get to meet new people, both in the lab you work in as well as the other WISEST students. It's a great way to spend the summer!

The Wonderful World of *E. coli*

Our summer job was to play God -- we created and destroyed bacteria, working hard to bring science to the people. Under Dr. Linda Reha-Krantz, and with the help of Alfred. E. Newman, we developed an exciting and insightful week-long unit for high school students that demonstrates the lethal and mutagenic effects of UV radiation.

On the first day, we were both overwhelmed by talk of polymerases, xeroderma pigmentosum, and excision repair. However, thanks to the eloquent teaching of all the people in our lab, we were soon relatively fluent in the language of genetics (relatively being the operative word). We were quickly filled in on the details of our project.

Our project sounds easy in theory; unfortunately, high school labs don't have a whole lot to work with, so equipment available to us was pretty limited. Hence our project turned out to be fairly challenging. We began by doing a series of "sunlight experiments" -- in other words, we relaxed in the sun in the name of science. In our subsequent experiments (and there were many) we usually used a UV lamp instead of the sun. These tests were done to find the rate at which UV light killed our two strains of bacteria, and to find out the relationship between the length of UV exposure and the number of mutant cells. The first is done by putting a known amount of cells onto a plate, then exposing the plates for varying amounts of time, and counting how many survived. The latter is basically the same, except to count mutant cells we needed a mutation marker. For this, we used an antibiotic called rifampicin (Rif for short), which was deadly to wild type bacteria. Therefore, any colonies that grew on the plates were mutant colonies. All of our experiments were done with two strains of bacteria -- one that acted as a wild type, because it had normal DNA repair function, so when we zapped it, it could fix itself (at least to a certain extent), and another that was hypersensitive to UV light because it couldn't repair its DNA. The first strain, because it was wild type, was analogous to normal human skin cells, and the second was analogous to the skin cells of humans with XP. XP is a disease in which patients' cells cannot repair damaged DNA, and people with the disorder are therefore very susceptible to skin cancer.

But working in our lab involved a lot more than just our project. We became pretty skilled at pouring plates, cleaning test tubes, and filling pipette-tip boxes. On Science Day we gave an oral presentation about our project. And countless times we were "students", being taught about the pros and cons of RNA sequencing, running up and down hallways watching other people do their experiments, sitting in front of a blackboard while various models for recombination of DNA are explained. In the lab we made a lot of great friends and had some rather peculiar

conversations about naked people, communism, the Simpsons, cultural dancing, and why no one's project ever works. I guess that's science eh?

The WISEST Summer Research Program was a fantastic experience that will stay with us always. Thanks to everyone in our lab -- Dr. Linda Reha-Krantz for taking us in and giving us our own project, Shelli for keeping us on track, all those great ideas, and the concert, Wassim for the entertainment and massages, Patrick T. for more entertainment, Rosanna for showing us the sequencing (and the cows), the other Patrick for motivation, Chris for the history and breakdancing lessons, Randy for his computer expertise, Bill for sharing his lab with us, Suvidha and Troy for their advice on *schooling, Zerrin for her patience and feasts, Sin for being* a mentor (and a lot of fun), for Sylvia, the bus driver who woke her up, for Tessa, the Lister girls for being so wonderful, and everyone else who taught us something or maybe just laughed with us over the course of the summer. It's been great, thanks so much.

Tessa McWatt and Sylvia Illingworth

SCIENCE, MUSIC AND MACKENZIE HALL
MY SUMMER '95 WISEST EXPERIENCE

I HAVE TRIED AND TRIED TO THINK OF AN ORIGINAL WAY TO START THIS WRITTEN REPORT. SOMETHING THAT MIGHT ENTERTAIN PEOPLE AND ACTUALLY MAKE THEM WANT TO READ WHAT I HAVE TO SAY ABOUT PHYSICS, BUT ALAS, MY MIND HAS BEEN GIVEN AN EXTENSIVE WORKOUT OVER THE PAST FEW WEEKS, LEAVING NOTHING BUT A FEW FRAZZLED AND SPARKING BRAIN CELLS LEFT, WHICH I NEED TO PREFORM BASIC FUNCTIONS (LIKE EATING AND BREATHING), SORRY BUT THOSE ARE KIND OF IMPORTANT.

ANYWAY, MY PROJECT THIS SUMMER WAS TO FIND OUT IF CRYOGENIC TEMPERATURES (TEMPERATURES CLOSE TO ABSOLUTE ZERO) HAVE ANY EFFECT ON BRASS MUSICAL INSTRUMENTS. A COMPANY IN THE UNITED STATES CLAIMS THAT COOLING BRASS INSTRUMENTS DOWN TO LIQUID HELIUM TEMPERATURE (ABOUT 4 DEGREES KELVIN) AND THEN WARMING THEM UP AGAIN CAUSES A MOLECULAR "AGING" EFFECT IN THE INSTRUMENTS, WHICH THEY SAY PRODUCES A BETTER SOUND. THERE IS MUCH SKEPTICISM AS TO WHETHER OR NOT THIS PROCEDURE WORKS, SO IT HAS BEEN MY JOB OVER THE PAST FEW WEEKS TO TRY TO DETERMINE WHETHER OR NOT THERE IS ANY CHANGE IN A TRUMPET'S SOUND AFTER FREEZING IT.

TO FIND THE SOUND QUALITY OF AN INSTRUMENT YOU MUST DETERMINE THE Q FACTOR (THE Q, ODDLY ENOUGH, STANDS FOR QUALITY). TO DO THIS YOU NEED TO KNOW THE VOLTAGE OF THE AMPLITUDE FOR A SERIES OF FREQUENCIES THAT THE TRUMPET IS OSCILLATING AT. FIRST, I HAD TO FIND A WAY TO DETECT THE TINY VIBRATIONS (OSCILLATIONS) IN THE TRUMPET WHEN IT RESONATED. I TRIED MANY THINGS; TRANSDUCERS, SOLENOIDS AND ELECTROMAGNETS, A LASER AND CIRCUIT BOARD, AND EVENTUALLY DECIDED ON AN OPTICAL DETECTOR AND A LASER. I ALSO HAD TO FIND A WAY TO DRIVE THE TRUMPET (MAKE THE TRUMPET OSCILLATE AT A CONSTANT RATE). I TRIED USING A SPEAKER AND AMPLIFIER, BUT FOUND THAT THE MOST CLEAR WAY WAS BY USING A SOLENOID AND ELECTROMAGNET. AFTER DETERMINING THAT THESE WERE THE BEST WAYS TO DRIVE THE TRUMPET AND DETECT THE VIBRATIONS I DID TESTS TO SEE WHETHER OR NOT THEY WOULD WORK CONSISTENTLY. FOR EXAMPLE, I HAD TO DETERMINE WHETHER OR NOT THE PLACEMENT OF THE MAGNET HAD ANY EFFECT ON THE RESONANT FREQUENCY OR Q FACTOR OF THE TRUMPET AND I HAD TO TEST THE SAME TRUMPET OVER AND OVER TO SEE IF THE REPRODUCIBILITY WAS GOOD.

NEXT I HAD TO FIND THE Q VALUES OF THE TRUMPETS. TO DO THIS I HAD TO KNOW THE AMPLITUDE OF THE TRUMPET'S OSCILLATIONS AT AND AROUND ITS MAIN RESONANT FREQUENCY. TO FIND THIS I HAD TO DRIVE THE TRUMPET WITH A DIGITAL SIGNAL GENERATOR AND MEASURE THE VOLTAGE WITH A VOLTMETER RECEIVING THE OUTPUT OF THE OPTICAL DETECTOR. AFTER I HAD RECORDED THE FREQUENCIES AND AMPLITUDES, I COULD CALCULATE THE Q FACTOR.

I DON'T KNOW, AT THIS POINT, IF I WILL BE ABLE TO COMPLETE THIS RESEARCH PROJECT, I HAVEN'T YET HAD A CHANCE TO FREEZE THE TRUMPETS AND TIME IS RUNNING A LITTLE SHORT. BUT EVEN IF I DON'T FIND OUT THE EVENTUAL OUTCOME, I HAVE LEARNED AN INCREDIBLE AMOUNT THIS SUMMER, WHICH HAS FUELED MY DESIRE TO ENTER INTO THE FIELD OF PHYSICS, HOPEFULLY DOING RESEARCH. MY EXPERIENCES IN THE LAB HAVE TAUGHT ME MOSTLY TO HAVE PATIENCE, BUT ALSO TO TAKE INITIATIVE, TO TRY NEW THINGS, TO ALMOST ALWAYS EXPECT SOMETHING TO GO WRONG, AND DID I MENTION TO HAVE PATIENCE?!!

LIVING IN MACKENZIE HALL WAS AN EXPERIENCE IN ITSELF. LIVING ON MY OWN, GROCERY SHOPPING, AND HAVING NO ONE TO TELL ME TO GO TO BED (EVEN THOUGH I WENT TO BED BY MIDNIGHT ON WORK NIGHTS) ALL GAVE ME A GOOD INDICATION OF WHAT LIVING WILL BE LIKE IN THE NEXT COUPLE OF YEARS. I ALSO HAD THE OPPORTUNITY TO REALLY GET TO KNOW THE SIX OTHER INCREDIBLE PEOPLE WHO LIVED WITH ME THERE; KATHRYN (MY ROOMIE), TESSA (THE GRAND EXALTED BABE AND OUR VERY OWN PRINCESS LEIA), STEPHANIE (THE B#$%@&%), KIRSTEN (WITH THE RED-BUT-NOT-BLOOD-RED-MORE-OF-A-BURGUNDY-PASSIONATE-RED AURA), JULIE (OUR FRENCHIE) AND HEATHER (PORKY'S GIRL). ALSO I WILL NEVER FORGET RENATE, OUR "BIG SISTER" AND HER BOYFRIEND CHRIS FOR PROVIDING US WITH HOURS OF ENTERTAINMENT. WE HAD MANY COOL AND UNUSUAL EXPERIENCES TOGETHER

like puddle jumping, smartie basketball, playing leap frog, getting to know (and love, for some of us) "The Lads," Tessa's tango lessons, walking through the DQ drive-through, meals at Duke's, 3 A.M. foosball, riding the envelope, pillow fights, going to the pool hall, having that delicious ice cream at Banana Planet, and the "Lois and Clark" marathon with Steph. My summer has been unforgettable, thanks guys!!!

I would also like to thank a few other people who have made my summer both enjoyable and a wonderful learning experience. First off, I'd like to thank my supervisor, Dr. John Beamish for his guidance and for taking the time to train me and answer my many questions. Also thanks to Mark Paetkau and Ying Xie, the Grad students, for introducing me to "The Blues" and "Devil's music," for keeping me very well entertained, and for helping me out whenever I needed it. Finally, thanks to Dorothy Tovell, Margaret-Ann Armour and Salima Hajee-Chateur for taking the time to organize this program, your efforts do not go unnoticed or unappreciated.

My WISEST experience has been incredible, even better than I had anticipated. I have made many new friends, met some remarkable people, and have had a chance to get some awesome experience at something I love. I will never forget this summer, thanks everyone!!!

Kim Peacock
Department of Physics

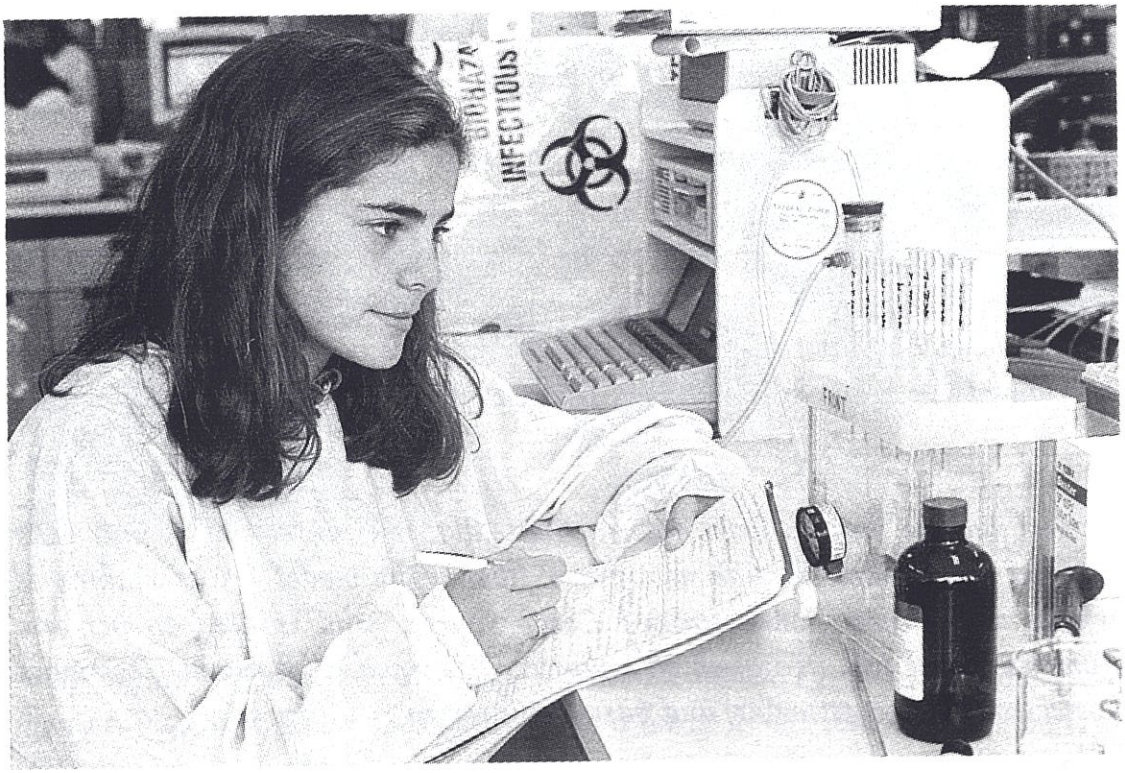
THE SUMMER I WAS "WISEST"

My name is Michelle Lobkowicz and my WISEST summer research project was spent in the department of Laboratory Medicine and Pathology under the supervision of Dr. Val Dias. The main project that I worked on was the development of an assay or method in which to extract and isolate tricyclics from your blood and then quantitate them by HPLC. Tricyclics are antidepressant drugs and the following ones were the focus of the project: Trimipramine, Desmethyltrimipramine, Clomipramine, Desmethylclomipramine, Protriptyline, Maprotyline and Amitriptyline, which was used as an internal standard. The development of this assay is important because it allows a doctor to see how much drug is in a patient and to determine which concentrations will be therapeutic or toxic for that patient.

There were two techniques that were involved in the method: solid phase adsorption and high pressure liquid chromatography(HPLC). Both systems use a column. In the first, as the sample is passed through the column, the drug binds to it and then is later eluted off and collected. The collected samples are then run on the HPLC. The sample is injected on to the column and as each drug is washed off the column, a peak is formed. Each peak corresponds to a different drug and so, each drug has a different retention time on the column. The HPLC identifies each peak as a specific drug (according to its retention time) and will give the concentration of that drug in the sample.

For the first few weeks, I extracted and ran controls with low, medium and high concentrations of the various drugs. We (Dr. Dias and I) had to fool around with different variables such wavelength, flow rate, injection volume and amount of internal standard to add, until we were satisfied with the peak heights, peak separation and the quantitation we were getting. Once our method was established, we began running patient samples (whose drug levels were already known) to test its reproducibility. So far the results are fairly consistent and the method seems to be a good one.

Over the summer I also helped in the final stages of another project involving the testing of immunosuppressive drugs, using rabbits. It was very interesting and I got to work hands on and help feed, weigh, dose and bleed the rabbits, and even watched a transplant of one rabbit heart into the neck of another rabbit. However, explaining this project would take another two pages so I won't go into any detail.



My summer was a very interesting and educational one. I did alot of pipeting, problem-solving and fiddling around with big machines, and definitely experienced what it is like working in a big lab and doing research. The WISEST Wednesday get-togethers were a great idea and lots of fun, and it was really interesting meeting the other students and hearing about their projects. I would like to thank everyone at WISEST, Ada my lab bud, Naveen and Justin, and especially Dr. Dias for his great supervision and everything he taught me. This will definitely be a summer to remember!

Michelle

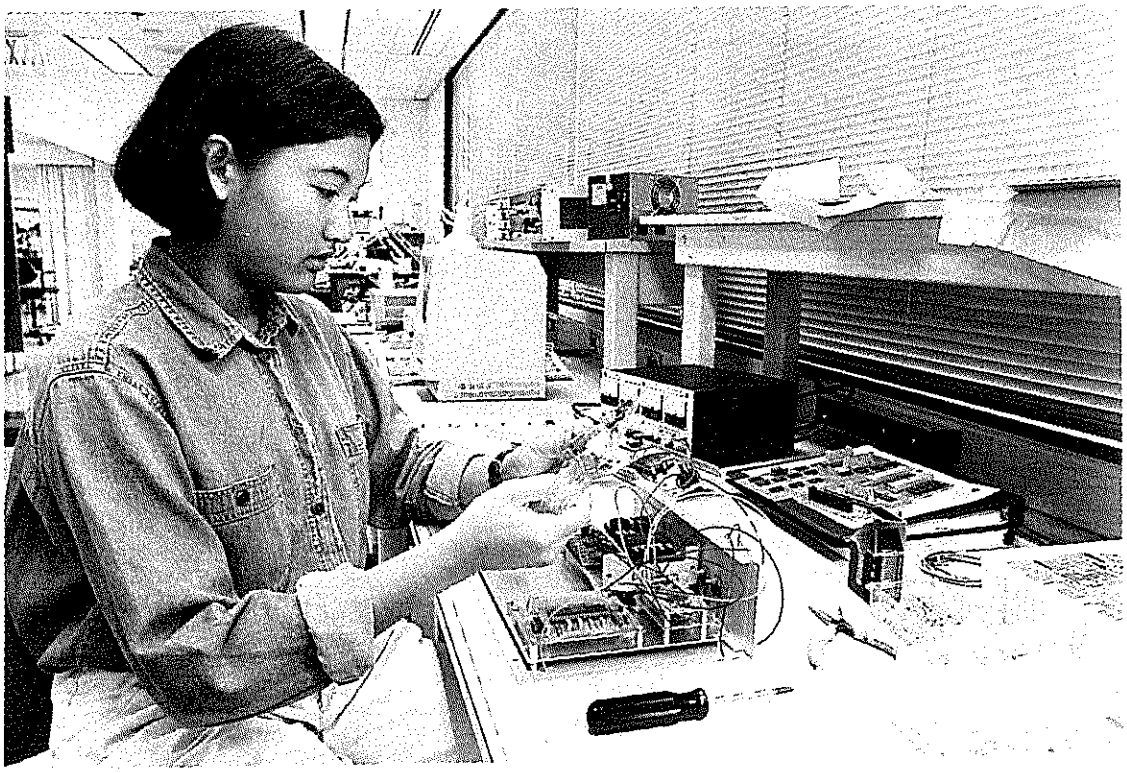
The WISEST Experience

This summer I had the opportunity to work with the WISEST program. I heard about the program through my school; and when I talked to students who had previously worked with the program, they recommended it. When I applied, I indicated my interest in math and physics. Thus, I was assigned to work at TRLabs (Telecommunications Research Laboratories) where my job involved such subjects.

During my first few days at TRLabs, it was quite intimidating. All the equipment in the lab seemed foreign to me. Fortunately, the people at TRLabs were very friendly. They made me feel comfortable and they helped me get acquainted with the lab. (They even taught me a few neat computer tricks.) Once I figured out what exactly I was doing, it was pretty much downhill from there.

My project was to build a laser driver. Basically, it is an electrical unit that emits a red laser beam through an optical fiber. The model I was making is known as a "p670nm Connectorized Laser Source," and is used to perform experiments in the lab. Through this project, I learned a lot about electronics (microelectronics, in particular) and basic engineering.

The first thing I had to do was to populate (solder resistors, capacitors, fuses, etc. on) electrical circuit boards. Next, I was required to research the purpose of each circuit board and how each one operates. Then using this information, I had to devise a way of testing the boards. Once it was confirmed that all the boards were functioning properly, it was time to construct the outside of the laser driver. I made labels by exposing film and transparencies to UV light. These labels were then pasted onto metallic boards which had pre-drilled holes in them. This was to be the box of the laser driver. Now came the more puzzling part of the project: to place the electrical parts inside and wire them together. Things got pretty complicated as there were at least 40 different wires that had to be connected to the right terminals. The final task was troubleshooting. Although there were quite a few problems, I eventually fixed them all. Most of the time, it was just soldering trouble that was causing short-circuiting. Once all of that was completed, there were a few other details to take care of and the laser to install. Then . . .voila! I had made my first laser driver.



Working at TRLabs was a unique experience which I really enjoyed. I learned many things, and I had the chance to do a lot of hands-on work. As well, I had the opportunity to talk to many undergraduates and newly graduated students who told me about their projects and studies. This has become really useful for me, as I am still unsure about the courses I am going to take in university.

The WISEST experience is more than just a summer job. It gives you great experience for future employment. As well, there are informative lectures and tours to other research laboratories which can assist you in your career planning. And something that a lot of students don't expect is the social aspect of the program. There are Wednesday afternoon sessions and several evening social events where you can meet new people or reunite with past friends: I met an old pen pal. Although there are a few drawbacks, such as getting up early, they are greatly outweighed by the benefits. The WISEST program is an excellent opportunity that shouldn't be missed!

Tam Paredes

My WISEST Experience

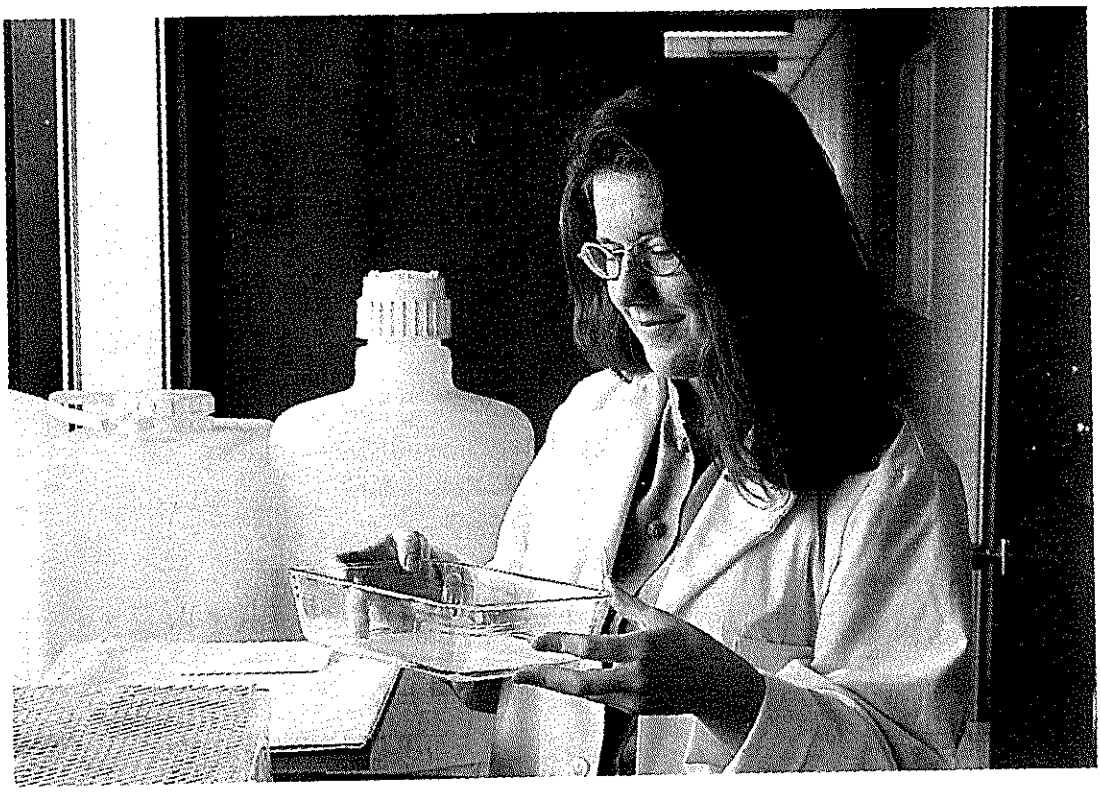
By Amy Davis

My summer has been very different from all others I have had. I worked in the department of Medical Microbiology and Immunology with Dr. Hanne Ostergaard for six weeks. Various projects and odd jobs were given to me to do in the lab. It has given me the opportunity to discover many new things about a field I have been interested in for quite some time. The summer has also allowed me to meet some unique individuals and become confident in finding my way around the university campus.

The main project which I worked on involved testing calcium levels within cells which were stimulated with different antibodies. Receptors are found on the cellular membrane of T-cells(important to the immune system), which allow these cells to send signals to other cells. Many of these signals are used to tell "good" cells to search out and destroy invaders of the body. These signals are activated by foreign antigens within the body. The antigens join with the T-cell receptor which in turn activates the CD-3 and CD-45 receptors. Activation of these receptors causes a series of enzymatic activities to occur, finally causing T-cell activation. One of the first visible signs of T-cell activation is a rise in the calcium levels in the cell's cytoplasm. My research involved artificially stimulating the receptor sites to attempt to produce a signal, which should be shown by a rise in the cytoplasmic calcium levels. The larger the signal produced, the more calcium which should be released. I stimulated both receptors separately as well as together to determine which produced the largest signal.

WISEST is not all work and no play however. Great fun can be had in a lab when you have enough zany people (Nancy, Chris, Olivia, Paulina, and Liz) stuck in the same room for an entire day. As a matter of fact, just today we shared "urban legend" stories. (Those modern ghost stories you used to tell at slumber parties.) One day we had a chair race down the hallway, which sparked the idea of "LAB OLYMPICS". These competitive games between the Immunology labs on our floor would include activities such as pipetting while running down the hall (without spilling a drop).

Group sessions with WISEST were always enjoyable. Trips to places such as the Alberta Research Council proved to be both



educational and fun. The visiting of other labs gave me an even broader view of university life. It shows that there are so many different types of research, even when they are in related fields. Socials were kept interesting by spending the evening at the Edmonton Space and Science Center. The sports exhibit and Imax theater are places I always love to visit

All in all my summer was well spent. It may not have seemed as enjoyable as some people's vacations in far off countries but it will definitely benefit me in the future. I have made connections in the university which many people do not make until their first year here. My newfound knowledge of the campus will prevent me from wondering aimlessly (that's "Amylessly" for Chris) through buildings on the first day of classes. Also, insight has been gained on a field I have been looking into as a career. Us WISEST students will be far ahead of the rest, and I for one feel privileged to be given this opportunity.

WISEST SUMMER REPORT

Trying to summarize what I have learned and experienced over the past six weeks in the WISEST program is not an easy task. I was assigned to work in Medical Microbiology and Immunology. Six weeks ago that title made me a little weary and confused, medical microbiology seemed like a strange idea, I thought that I would be practicing my bed side manner on a couple of fungi, bacteria and viruses. Rest assured after about a week in the lab my project was crystal clear, I think. The project that I was assigned to was to assist in the research of the possible correlation between people with Kaposi's sarcoma and mycoplasma penetrans. Kaposi's sarcoma is a disease where people will develop red - purple lesions on the skin. Most people will identify this disease with AIDS patients because about 15% of them have this disease. Mycoplasma penetrans are simply a type of bacteria which are thought to drill into the red blood cells and drain out the hemoglobin, when enough of the red blood cells are destroyed a lesion is formed.

Through research it has been proven that 37% of male homosexuals with AIDS showed antibodies to mycoplasma penetrans, meaning that these patients have seen this bacteria. On the other hand people without AIDS and were HIV negative had a low percentage of existing antibodies to m.penetrans. The project I was involved in tried to form a trend of people with antibodies to m. penetrans. I tested the sera from people who were HIV+, HIV-, and people who led high risk lifestyles but were HIV-. I used a polyacrylamide gel electrophoresis, which is a gel that through electric current spreads proteins throughout it based on their molecular weight to start my experiment. Then I did a process called Western Blotting to blot or transfer the protein onto a membrane. After I completed that process I exposed the membrane to the sera samples. If the sera contained the antibody to m. penetrans, it would stick to the gel, then I magnified this effect by adding a second antibody that would hook onto the first. If the sera samples contained the antibody, a green band would be produced after the membrane was developed.

The results were few and a trend has yet to be developed but I am not discouraged because the research done on AIDS and HIV is little so there isn't much to base our results on. I would compare my research to charting undiscovered land, it takes a long time to develop an adequate map.

I really appreciated the freedom and independence that I was given in the lab to learn and investigate on my own. The help that I received from the girls in the lab was unforgettable. I couldn't have made it through the summer without the patience of Heather (when I spilled the TEMED twice), the cheerfulness of Christine, the new perspective from Mila, the guidance of Dr. Robertson and the friendship of Cherl, a fellow WISEST student. I hope everyone in the lab had as much fun as I did. I would also like to thank the WISEST program for expanding my knowledge of science, the opportunity to meet 45 great girls and for such a worthwhile and rewarding summer.

Kenna Graham

Adventures in Chemistry

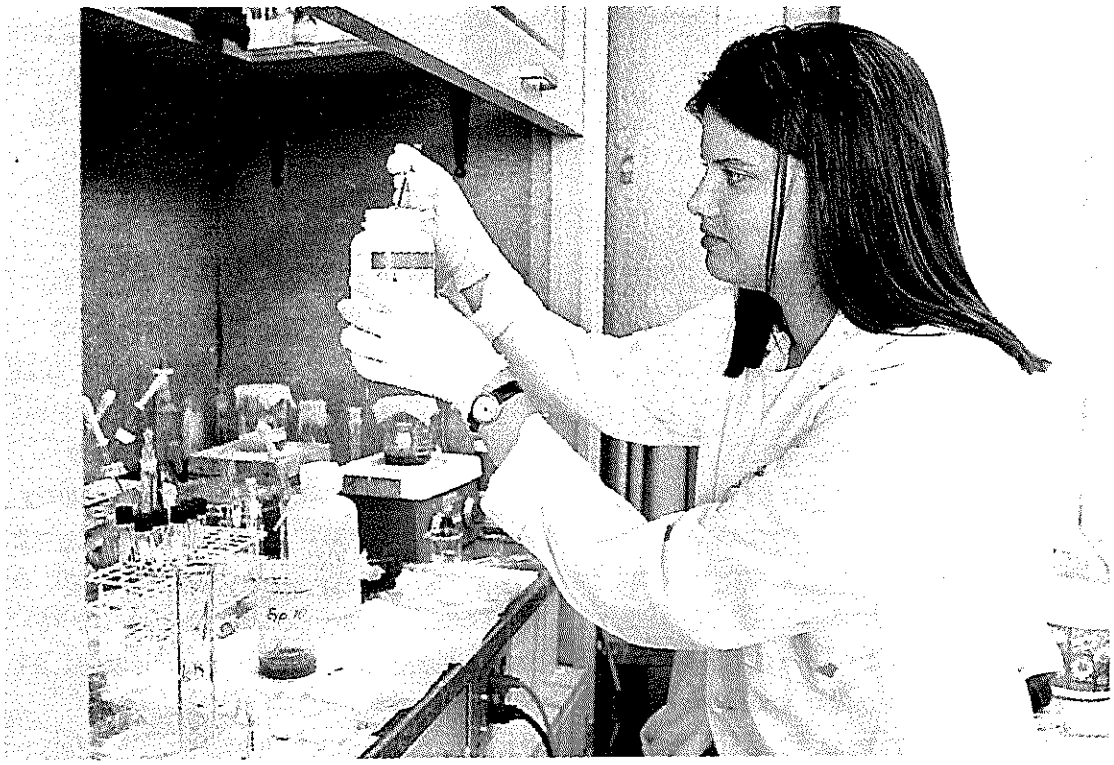
By Carolyn Johanson

This summer I worked in the Department of Chemistry for Dr. Margaret-Ann Armour. Our project was to find ways of breaking down hazardous chemicals into more benign substances which can be poured down the drain. The methods are being designed for people who have small amounts of waste to get rid of, but aren't interested in sending it away to a disposal facility. For example, my project was with the chemical hydroquinone, which is a photographic developer. So, now all those amateur photographers with darkrooms in their basements can save a few bucks by using my procedure.

In order to find degradation methods for hydroquinone, we did research in the library. As it was my second week on the job, they did not feel that I was qualified to handle the research alone, so my job was to hunt down the books that we needed. I even went so far as to open them to the right page, but stopped short of actually reading anything. After a week and a half of running up and down the stairs to Cameron Library (where all of the journals are kept) we finally had enough information to start lab work. We ran eight different experiments with three oxidizing agents - persulfate, periodate and permanganate - with varying degrees of success. I prepared samples to be run on the GC (gas chromatograph), which identifies the components of a solution. So far, persulfate seems to be the big winner, although we are having some trouble replicating it. While in the lab, I learned some new things - how to do liquid - liquid extractions, use a rotary evaporator, and, of course, wash beakers. It's amazing how many beakers a person can get dirty during a single experiment.

My best experience is a tie: either the morning I saw two Flying Elvises on the LRT, or the times when thick, dark green foam came spilling out of the top of a beaker and stained everything it touched. Yes, I did say times. (The second time wasn't my fault. Honestly.) Of course, Tuesday lunches were also a blast, especially when more than ten people showed up.

All in all, this was a great summer. It might have been nice to goof off for six weeks, but when you weigh that slight wish for more freedom against the joys of wearing a lab coat and safety goggles all day, well there's just no comparison.



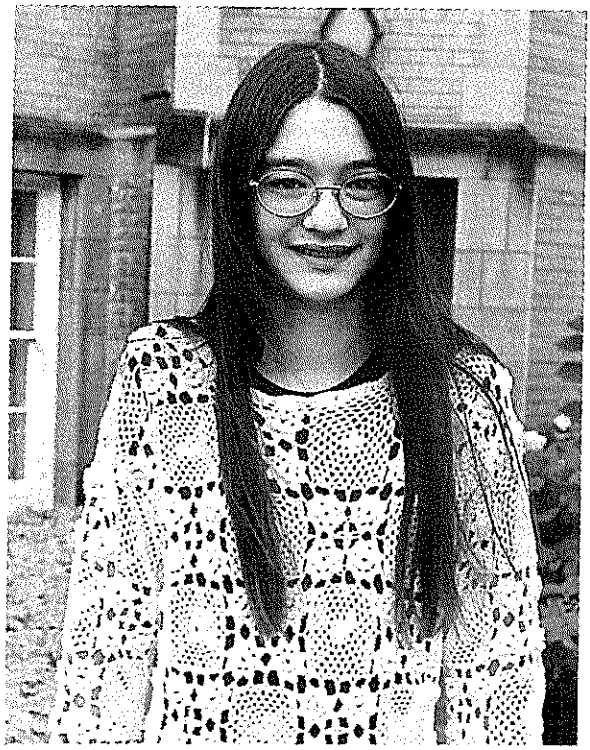
I would like to thank Jenny, Sara, and especially Asya for all their patience, and Dr. Armour for taking the time to make sure I understood what was going on. And all you WISEST students - it's been fun! (We should do it again sometime...)

MY WISEST EXPERIENCE - Sherri Dixon

Participating in the WISEST Research Program this summer has been a memorable and rewarding experience. Not only did I gain valuable experience in the lab, I also learned a lot about field work. I enjoyed meeting new people and making new friends.

I was one of three students that had the opportunity to work at the Meanook Biological Research Station under the supervision of Dr. Ellie Prepas. Most of the time I worked with one of her graduate students, Sandy Cooke, on a project dealing with the analysis of water quality in different streams. We sampled 5 streams that ran in and around Baptiste Lake near Athabasca. These streams were selected because they caught run-off from different types of land around it, usually forest or livestock operations. If it didn't rain we would go out 3 or 4 times a week to collect the samples taken by the machines at the sites and also to collect grab, alkalinity, and nitrogen samples. But when it did rain we had to go out a couple times a day to take samples and it would take us a while to catch up on the lab work. We also collected data dealing with stream temperature, velocity, colour, volume, discharge, and depth. Then we would drive back to the lab and analyze the samples for phosphorus concentration. Generally we found that phosphorus levels were higher at the sites downstream of livestock operations. This is probably the result of increased soil erosion and the manure released into the stream. This area of research will be important in the future because the effect of human activities on natural resources, such as lakes and streams, is becoming an important issue.

It was interesting to work with and learn about some of the projects that other graduate students were working on at Meanook. They included studying fish, birds, bugs, lakes, and other wildlife. The different lakes and surrounding country at Meanook were also nice to visit in the evening. Usually a few of us would get together and watch a movie or go for a walk. While we did miss some of the Wednesday afternoon group activities



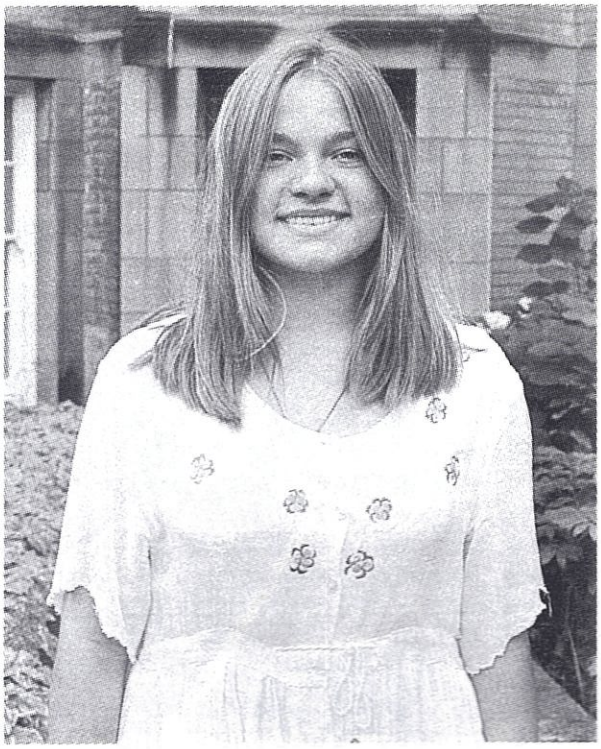
on campus, talking with everyone at Meanook certainly made up for it. It was also interesting to see that most of the students at Meanook were women.

The six weeks that I spent in the WISEST Research Program gave me a chance to gain hands-on experience in both the lab and in the field. It has greatly increased my interest in science and has made me aware of all the different possible areas of study. I'd like to thank everyone at Meanook and all those involved in the WISEST Program for making this summer so enjoyable.

MY MEANOOK EXPERIENCE - Agnes Choluj

I have but to thank the people who work to support the WISEST Summer Research Program. My experience near Athabasca at the Meanook Biological Research Station this summer was wonderful. Working a ten day on, four day off, shift I spent most of my six working weeks at the Meanook Station. The station is situated amongst the lovely and largely undisturbed forested areas, meadows, lakes, and farms that characterize most of northern Alberta. Surrounded by nature and purer air, I was drawn outside in the evenings to bike or walk and learn much, not only about the effects of population size of small minnows on reproduction, survival of young fish and the invertebrate food base, as was the nature of my work, but of various wildlife and natural ecosystems. Encounters with very large farm dogs, coyotes, cows, horses, various beautiful birds, deer, black bears, muskrats, and beavers made my summer more memorable and very enjoyable.

The work that I did was also quite delightful as I was able to spend the majority of my days outside sampling. I worked alongside my supervisor Mariola Janowicz helping her sample in the field, enter data, work in the Meanook laboratories and pick benthos. Mariola, who was doing her second field season for the completion of her masters degree, proposed to examine the hypothesis that fish regulate zooplankton community structure, phytoplankton biomass, macrophytes, and aspects of water quality. The objectives of the study are to determine the effect of fathead minnow density: on food resources, biomass, species composition and size of zooplankton, size and species-specific preference of different size and sex classes of fatheads, to construct food webs in ponds with different fathead minnow densities, and to examine the indirect effects of fish density on water quality. She is hoping that her study will answer the question whether altering the density of fish enhances water quality and should explain if mechanisms of density-dependent trophic interactions can be used as a biological lake management tool rather than a chemical one in dealing with algal blooms in Alberta lakes. Together, Mariola and I conducted bi-weekly samplings to measure water temperature, dissolved oxygen concentration, pH, and conductivity as well as collecting water samples for nitrogen, phosphorus, and chlorophyll@ and samples of zooplankton, phytoplankton and fathead minnows. These samplings were conducted in two natural ponds, Beaver Pond and Meanook Pond as well as two experimental ponds. The experimental ponds were divided with a curtain to seperate high density adult fish populations and low density adult fathead minnows. Unfortunately, Mariola was left with only one of these ponds intact at the end of the summer due to the continuous rain in the second week of August that flooded the curtain and allowed the fish to get across. As well as these samplings, we periodically caught fathead minnows from the ponds in order to count and measure them. I also cared for the indoor fish tanks that Mariola had set up with fathead minnows in an experiment that would later allow her to construct a food web using the nitrogen signatures in the muscle tissue of the fish. Doing this I



handled more fish, both dead and alive, and killed more fish than I ever have or will. Helping Mariola with her project was very enjoyable, as she was good company, and was also a sobering experience for me in regard to my view of the types of research conducted at the University of Alberta.

I was very fortunate to have worked at the Meanook Research Station this summer, as I not only worked with Mariola but with other graduate students who studied various birds, water quality and benthos. Thanks to Mariola I was also able to run two small experiments on my own involving spawning behavior and feeding patterns exibited by the fathead minnow. The variety of the work that I did at the Station and the amount that I was exposed to in the biological sciences field will aid me greatly in choosing a career for the future. Again, thank you to all who made this experience possible for me and to my supervisor who serviced me greatly.

THE LIFE AND TIMES AT MEANOOK

By Agnes Yuen

My six weeks in the WISEST program were spent at the Meanook Biological Research Station. There are about 30 people there at a time, including graduate and undergraduate students. I have been asked about WISEST by many of them; some say that they would like to have been in a program such as this when they were in high school. I feel very fortunate to be a WISEST student, and to be at Meanook. At the station, not only do I get to participate in research, I meet lots of interesting people, and I get to spend time in the natural environment.

I remember one experience I had...I was walking along outside when I noticed a squirrel sitting on a branch. I stepped up to it and it didn't move. It sat there less than two feet from my head. It was staring intently at me and I stared back. Here I was thinking I was developing some kind of a bond with the squirrel, when all of a sudden it began to urinate! I felt pretty foolish standing there watching a squirrel empty its bladder. Of course, nature isn't always that way. I've had "clean" encounters with frogs and beavers and a porcupine.

There are even more amazing experiences out in the field. But before I talk about that, a little background on what I do is needed. I'm actually involved in two projects. I help a Masters student, Beverly Gingras, on her study of common loons. Her study includes eight ponds (this year). We observe the behaviour of the loons in terms of dive times, feeding, and interactions between parents and chicks. Sometimes, we sample; this includes sweep-netting for invertebrates plus setting and collecting minnow traps. In the lab, we pick the invertebrates live from the samples and preserve them in ethanol. I also do a lot of data entering on the computer. From all this, Bev will write her thesis on the behaviour of common loons, focusing on the relationships between lake environment, resource base, behaviour of loons and their reproductive success. More specifically, she is examining foraging patterns relative to lake depth, aquatic plant density, and the type, abundance, and distribution of prey. The other person I'm working for is Paul Klatt with his Ph.D. project on red-neck grebes. He is studying three lakes this year, or twenty-five pairs of grebes. In some ways, the work is similar to Bev's. But he uses a different sweep-net technique, and he measures the invertebrates (not just the fish) found in the minnow traps. He also uses a Secchi disc to measure depth and visibility in the water. The samples are frozen; thus the invertebrates are picked dead. (Except one time the sample was frozen for one night and surprisingly most of the invertebrates were still alive.) Paul observes the birds differently; he does a few pairs at a time and records their activities at five-minute intervals. His project pertains to territory size regulation of red-neck grebes. The two main parts of the project are documentation and manipulation. In documentation, he uses the observation data to plot points on a map and hence to determine territory size. In manipulation, he influences territory size by either changing the food supply (with minnow enclosures) or changing the density of grebes on a lake (by moving and clipping the birds).

The first time I went sampling with Paul was the worst time. I fell through the bog that surrounds the lake four times. But that wasn't the bad part. (Falling through is actually quite a thrill, because one second I'm standing on the surface and the next I've be swallowed by the ground up to the top of my legs.) The rain was what made it a terrible day. I was in the canoe for about five hours and it rained the whole time. It didn't stop till late next day. Just when we thought the rain could not possibly fall harder, it did! What's more, I had to restrain my bladder for the last couple of hours. And that's not easy when I'm shivering and there's water all around me. But luckily, the weather was increasingly more pleasant from then on. By the last day, it was warm and sunny, with few clouds in the sky and a light breeze. Paul, the bird expert, identified all the birds we could see or hear. Among others, we saw a red-tail hawk, a double-crested cormorant, and a western grebe.

I learned a great deal about scientific research from my experiences in the WISEST program. I learned that field work takes commitment, endurance, and a lot of time. And the work may be tedious or tiresome at times, as invertebrate-picking showed me. However, most of the time the research is fascinating, and there are always new things to discover.

A "PLANT"IFUL WISEST SUMMER

During our summer with the WISEST research program, we hit PAYDIRT! We worked in Botany at the Biological Sciences building, under the supervision of Dr. Mark Dale.

We spent our first two weeks at the university harvesting plants, and let's just say that this project involved a lot of digging and a lot of dirt! It was started by another WISEST student last year, and our job was to continue her work by removing the plants she had already cultivated. While trying to do this we had to collect as much as the plant as possible, without causing any damage. It was a bit of a challenge, but we were able to get through 30 pots in just two weeks. The plants that we were working with for the research were known as Chamaerhodes. They are a type of plant commonly found in the Yukon.

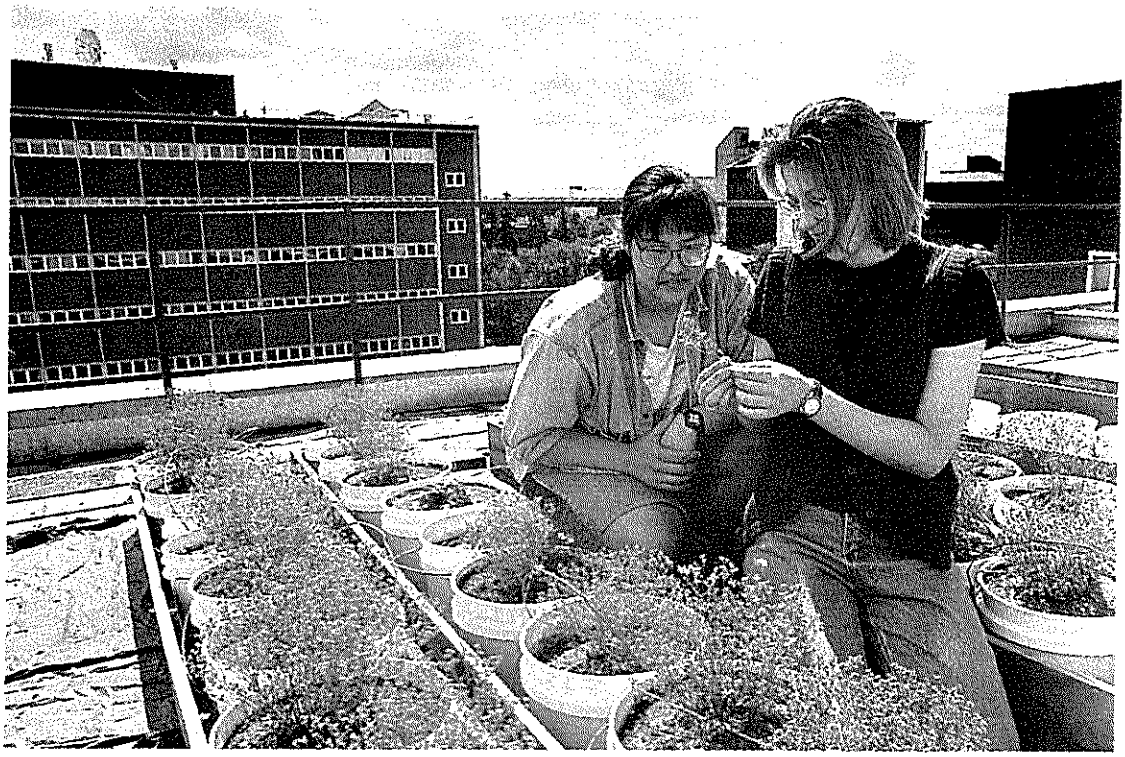
The second part of our job involved calculating and recording the biomass of each plant extracted. Biomass basically refers to the plant's DRY mass, so to get this we had to place the plants in large drying ovens overnight.

After we had collected this data, Dr. Dale was going to use this information to help define his research on spatial intra specific competition. Spatial intra specific competition deals with how plants, within the SAME species (intra specific) compete for similar resources, such as light, water, and minerals (competition). It also has to do with how a species interacts. Using various patterns of plant growth (spatial), we were trying to figure out how such factors would be affected. For example: how does a neighboring plant affect another or how is a neighboring plant influenced by its own nearby neighbor? By establishing each plant's biomass, we knew that a bigger mass would = more success in competition. For example, if one of the plants was found to have a larger mass than any of the others it was planted with, it would give evidence that the plant was more prosperous, and therefore more likely to ensure genetic continuation.

Unfortunately we weren't able to find any results with this research project, because leading into the third week we discovered that the plants had been infested by an insect referred to as false cinch. These can be rather deadly to plants, because they drill in to the bottom of the stem and remove the phloem which carries vital nutrients necessary for the plant's growth. We had to cancel this project and deal with the problem by spraying the plants with chemical. In doing this we were no longer able to handle the plants.

Also in our first week, we attended a field botany class for second and third year university students. Needless to say it was somewhat advanced for our level of comprehension, but we were able to pick up a few interesting things about plant structure and identification. It was quite an experience!

Our final project involved the chance to actually work out in the field, at the Wagner Natural Area, just outside of Edmonton. This was quite an amazing place to work, because of its extreme diversity. Wagner includes 60 different types of mosses and lichens, 16 species of orchids, and 300 types of vascular plants, a wide range of wildlife, and many varying insect



populations spread over 400 acres of land!

Our job at Wagner was to sample the quadrats in the meadow area where Dr. Dale has about 50 plots mapped out. This research project has been followed up on every summer for five years, in order to determine the area's rate of secondary succession. Secondary succession is the orderly replacement of species throughout time, in a location that has had previous biotic (life) influence in its soil. Secondary succession is an ecological sequence of species.

At Wagner, we had to identify plants, mostly grasses, so we could record the kinds of plants in the area as well as what strata each one was found in, according to their height. Many of the grasses we worked with included Bromus (Brome), Festuca (Fescue), Trifolium (Clover), and Equisetum (Horsetail).

This study will take many more years to complete, so we were unable to see any developments, but just being a part of it was exciting.

During our program we worked with another student, Elaine, who had just successfully defended her Master's thesis. She was not only a great person to work with but also to learn from, especially on those quick side trips to Dairy Queen after a hard day of work.

In conclusion to a great summer with new experiences, new people, and new places, we would have to say that this is a wonderful opportunity to open the doors of science to young women, and we were very glad that we were able to spend our summer with WISEST!!

Stephenie Litvak
and
Rachael McMullen

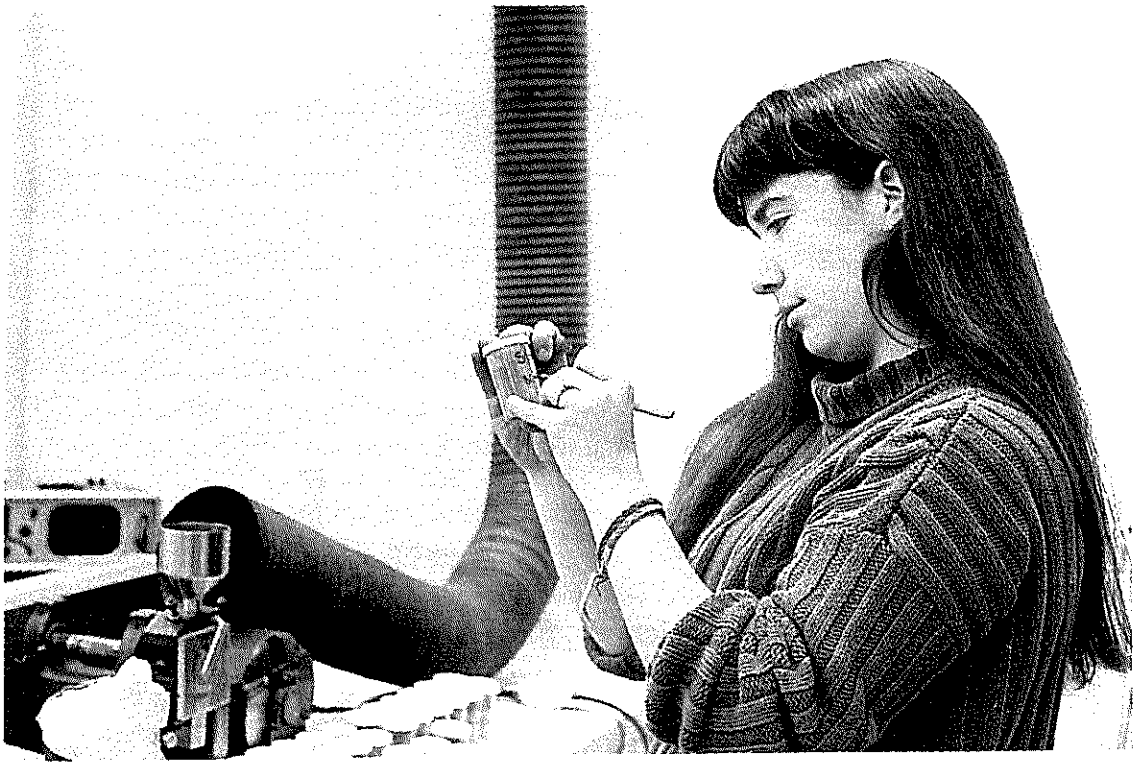
Blood, Sweat & Tears

Seventeen is a very difficult age. You are expected to have chosen your life's path and to know what you want to do for at least the next several years. If we were given the chance to experience what there is for us it would allow us to at least make an informed decision. Thanks, WISEST, for giving some of us that chance.

I was placed in the Department of Renewable Resources under Dr. Anne Naeth, and rather than being given a project of my own, I was to assist on a number of grad student projects. They dealt with problems such as determining the seed mix that provides the best ground cover and seeing how soil and vegetation react to different treatments and grazing intensities. We measured things like soil moisture, plant heights, vegetation density, soil resistance, ground cover, and we even counted the plants themselves. I spent most of my time out in the field, usually at the Lacombe Research Station and at the Ellerslie Station. I also got to go out to the Sundance Plant near Highvale, Mundare, and also Calgary. Because our field work is so "hands on" I always came home covered in grass stains, dust or mud, and more than once, soaking wet. The front desk at Lister Hall (where I lived) had a lot of fun when I walked in the door.

As you can tell, I spent a lot of time traveling. We usually took the "sub"(Suburban), also known as #196, and I don't think that that vehicle has ever made it out of Edmonton without stopping at Tim Horton's. The coffee drinkers fulfilled their required daily intake and those of us who were still asleep picked up a heavy dose of sugar.

I admit now, I hated having to drag my suffering self out of bed at 5:30 or 6:00 in the morning to face a day in the mud and cold, wet weeds, leaving my darling roommate snoring in a warm bed, but who could honestly claim to enjoy that? What I did fall in love with was the feeling at the end of a thirteen hour day when we finished what had seemed like an impossible task earlier. Everyone I worked with made even the most hellish day tolerable and many days were actually almost fun. Although we had our share of problems (RAIN!, broken trucks - **I didn't do it!**, forgotten quadrats, soaked data sheets, self-destructing probes and dancing cows; for example) everybody was always so positive and still managed to be cheerful at the end of a long day. They all had patience with me, my lack of knowledge, and my mistakes. I always felt welcome and liked, which I think is one of the biggest reasons why this has been the best summer of my life. Thank you, Kelly, for making sure that I was kept busy and for taking so much time to teach me everything. And thank you to everyone (Pola - we'll always have Calgary, Robin, Craig - you're right, it's much better than MacD's, Femke - I'll never forget that first lunch with you, Dennis, Jeff - kinda worker, kinda data, Bill - I'll <u>never</u> forget you, Dana, Debra, Alfred, Suzanne, and especially Anne), I owe you the most valuable experience of my life.



The other side of my WISEST experience was living in Lister Hall with six other freaks of nature. We all had so much in common and I can't believe how many nights we stayed up late discussing that exact topic. I have so many memories of everything; all our "walks", dinners, bus trips and pizza devourings, and of course, of all of them. I think, though, that what we'll all remember is the coming together of cultures (in more ways than one) and I know a few of us will definitely remember more than others (you know who you are.) I'm going to miss everyone, but especially my cellmate Steph, who put up with my alarm clock at 5:30 AM and was just the best person anyone could get to live with. Julie and I had a common English experience that allowed us to get to know each other better and for being French, she's one of the kindest, sweetest people I know. Heather and Tessa were always so friendly and enthusiastic about everything, they could even get me motivated after a long day in the dirt. Kim and Kathryn were awesome to talk to - we always had "discussions" on the way things should be and why they weren't. Don't ever try to argue with them - they have this tendency to floor you. But all six have this great talent, they all <u>listen</u> and understand, and I know that that is what will allow them to go far in life. I wish them all my love and they'll understand when I say "there'll be tears."

Kirsten Gregorwich

Detecting the Past

The first week of our WISEST project was interesting. We read intellectually stimulating reports on projects relating to our upcoming assignment. We also spent time surfing the internet with Christy Slater, another WISEST student working with Dr. Nyland. By the next week, we were happy to be out of the physics building and into the great outdoors at the Legislature grounds (Christy continued her work in the physics building). Once at the Legislature, we began the real work -- that is, a magnetic field survey of the remains of Fort Edmonton V.

Some of the reading we did in that first week was about the history of Fort Edmonton. The first four Forts were built in various locations and then abandoned over a period of 35 years because of depleting resources, competition, and flooding. The fifth and final Fort was built on higher ground on what is now the Alberta Legislature grounds.

The Fort was first named Fort Sanspareil , French for 'without equal'. Some people objected to this name, so they changed it to Fort Edmonton V. There were no complete and detailed plans of the Fort, since it was constantly being rebuilt and repaired. For example, the palisades (the tall, protective fences around the Fort) would occasionally blow down during storms. When rebuilt, the lines would often move. Later, during the 1880s, the palisades were replaced altogether by smaller, solid fences. Other structures such as stables and houses were constantly being built, repaired, and torn down.

By the early 1900s the Fort had outlived its usefulness. In 1915 it was torn down, despite some protests. The area it had occupied for 85 years was flattened and landscaped to become the South Legislature grounds.

Our assignment was to use a magnetometer to find archaeological remains of the Fort and determine the approximate structure of the buildings within it. We were to do this because not all areas on the grounds can be excavated, and this method of surveying is non-intrusive. We used a meter by meter grid extending from the grid that last year's team used. We conducted the survey as far as 16 metres north of the bowling green and skating rink which were the basis for last year's survey. The survey extended farther east and west than last year's area including the area west of the lawn bowling club house and the area south of the skating rink that was excavated by the 1995 archaeological team. We overlapped our survey into last year's area in order for the graphs to connect and match up.

We used the same instruments as were used by last year's team. The main tool was a total field magnetic gradiometer, or magnetometer, which, as is depicted in our picture, is two tall poles attached together. One pole is 0.65 metres taller than the other. Each pole has a cylinder of kerosene on the top, which are attached by cords to the reading units -- heavy boxes that we would carry in harnesses. When we pressed a button on the instrument box a charge would be sent to the cylinder. This charge would send the protons into a spinning motion

similar to that of a spinning top. For a spinning top gravity affects its motion and causes it to waver from its original course. In the kerosene, the magnetic field of the area acts on the protons like gravity on the spinning top. The rate at which the proton wobbles around the earth's magnetic field direction is proportional to the strength of the magnetic field. All the protons are spinning in unison if there are no interfering magnetic objects in the vicinity. The magnetometer measures the rate of the protons' wobble and therefore the strength of the earth's magnetic field. The reading comes up as a five digit decimal number on the instrument box. This number is measured in gammas. We measured the strength of the earth's field to at least 4 and usually 5 significant figures.

After collecting all of our readings, we had to type them into a computer. Dr. Nyland then used a programme to create 3-D graphs and contour maps of the area surveyed. These results showed us some interesting trends, some of which connected to last year's results and which could be considered for future archaeological excavation sites.

Things which create problems as far as obtaining accurate and steady readings are usually strongly magnetic objects. These objects interfere by causing the protons on one side of the cylinder to spin at a different rate than the protons on the other side. This causes an inconsistent reading on the magnetometer. Some examples of magnetic objects which we have encountered include trucks, lightpoles, sidewalks, underground power lines, metal poles used to hold up tree saplings, change in pockets, benches, nails, and underground tunnels.

Another natural occurrence which could have affected our readings is a magnetic storm. Although we encountered thunder storms but not magnetic storms we realize how much these could affect our readings. The scientific explanation of a magnetic storm is as follows: Magnetic storms arise from when the sun faces the earth in such a way that sunspots affect the earth's magnetic field and thus interfere with our readings. Examples of a magnetic storm which are visible to the human eye are the aurora borealis and the aurora australius; the northern and southern lights.

We have met many very interesting people, and we have had some very unique experiences during this project. Some annoying experiences are the people who walk by and give us strange looks. It's like they think that we are a strange species of aliens trying to take over a small plot of the legislature grounds. We're starting to learn how to return the looks, but it's hard for us, being such sweet, kind, and humble people. Worse yet is when they are wearing steel-toed boots, braces, hair clips, ride 'em cowboy belt buckles, walkmans, rings and jewelry, change, glasses, watches, metal plates in their heads (which explains the stupid looks they give), cow bells, tubas and other metal instruments, garbage cans, bikes, lawn mowers, cars, airplanes, bridges, lightpoles, water lines, underground tunnels, sidewalks... As you can probably tell, we have a very challenging job -- especially after having been in the sun waayyy too long.

But, getting back to the lawn mowers, the men who cut the grass along with the other grounds keepers and security guards at the legislature are very pleasant. One of them once asked us why we kept on taking readings of the same spot over and over and over again. When we tried to explain that we weren't, we realized how futile it was, because it felt like we really were

taking readings of the same spot over and over and over again. Anyway, we would like to thank all the lawn mowers and their drivers for putting up with us and their patience while we would desperately rush to get out of their way.

We had many other memorable experiences through the WISEST Summer Research Programme. We would like to thank the co-ordinators and everyone else who made this possible, such as Dr. Nyland, Dr. Pyszczyk from the Provincial Museum of Alberta, and Christy Slater.

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Thanks for a unique summer!

Tessa Normandeau

Kirsten McLaughlin

Elizabeth Hay

Elizabeth Hay,
Kirsten McLaughlin, &
Tessa Normandeau