

DISPLAY
ONLY

WISEST *STUDENT REPORTS*



1994



WISEST

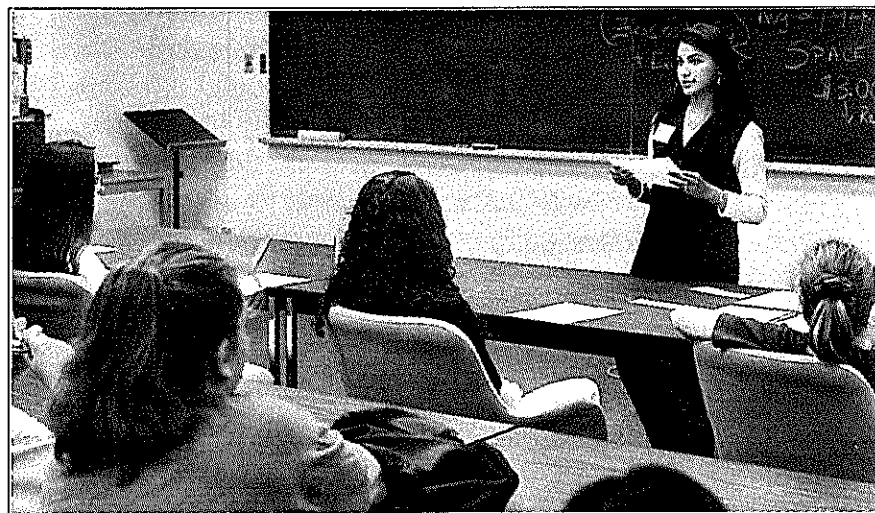
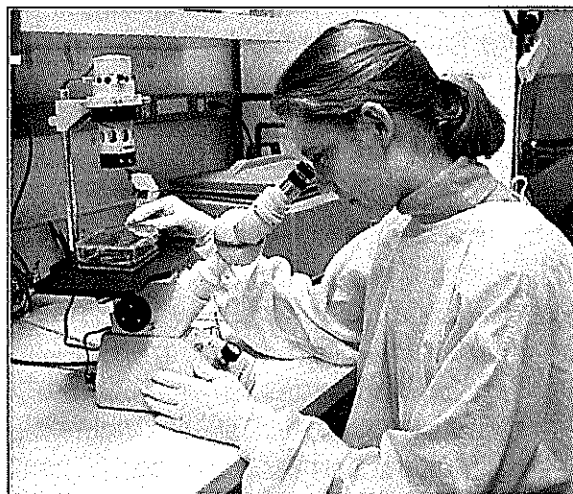
Summer Research Program

1994

Student Reports



"This summer I learned what research is all about. I received some great advice and also some insight into possible career paths."



"My personal experiences in the program have been educational, inspirational and interesting."



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 the Faculties of Science, Engineering, Agriculture and Medicine with the boys working in the Faculties of Human Ecology and Nursing. From their response 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 choices of courses which they will take at university and of careers which they may pursue. About 400 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 for a second 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 Armour
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 1994, 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.

This year, although I wasn't able to hear the student reports, 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 female-dominated fields of nursing or medical laboratory sciences. We were happy to have 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, undergraduate 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 the financial contributions of our many supporters. In 1994, funding was received from the SE/ED (Summer Employment/Experience Development) program of Canada Employment and Immigration, The STEP (Summer Temporary Employment) program of Alberta Career Development and Employment, the Edmonton Catholic School District, the Alberta Heritage Foundation for Medical Research, the Glenora Rotary Club, Weyerhaeuser Canada Ltd., 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's efficiency and commitment to the program were once again exemplary. Linda Vaudan also made significant contributions to the program as a whole, while taking the major responsibility for the research project of which the 1994 Summer Program was a part.

I very much enjoyed working with all of you.

Dorothy Tovell
WISEST Co-ordinator



Every year WISEST produces a booklet of Student Reports. The booklet contains reports as written by the students at the end of the six weeks in the 1994 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 TR labs, 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 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.

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 at Hawrelak Park and an evening at the Edmonton Space and Science Centre. The students also met every Tuesday for an informal "brown bag" lunch in the Student's Union Building.

Each student report is accompanied by a photograph of the student, at work in most cases. 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 Nasiruddin Ali Khan 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. I would also like to thank Linda Vaudan for all her help and moral support. To the participants of the WISEST Summer Program 1994 - Thank you for a memorable summer.

Salima Hajee
WISEST Administrator

The First Day of the Rest of My Summer

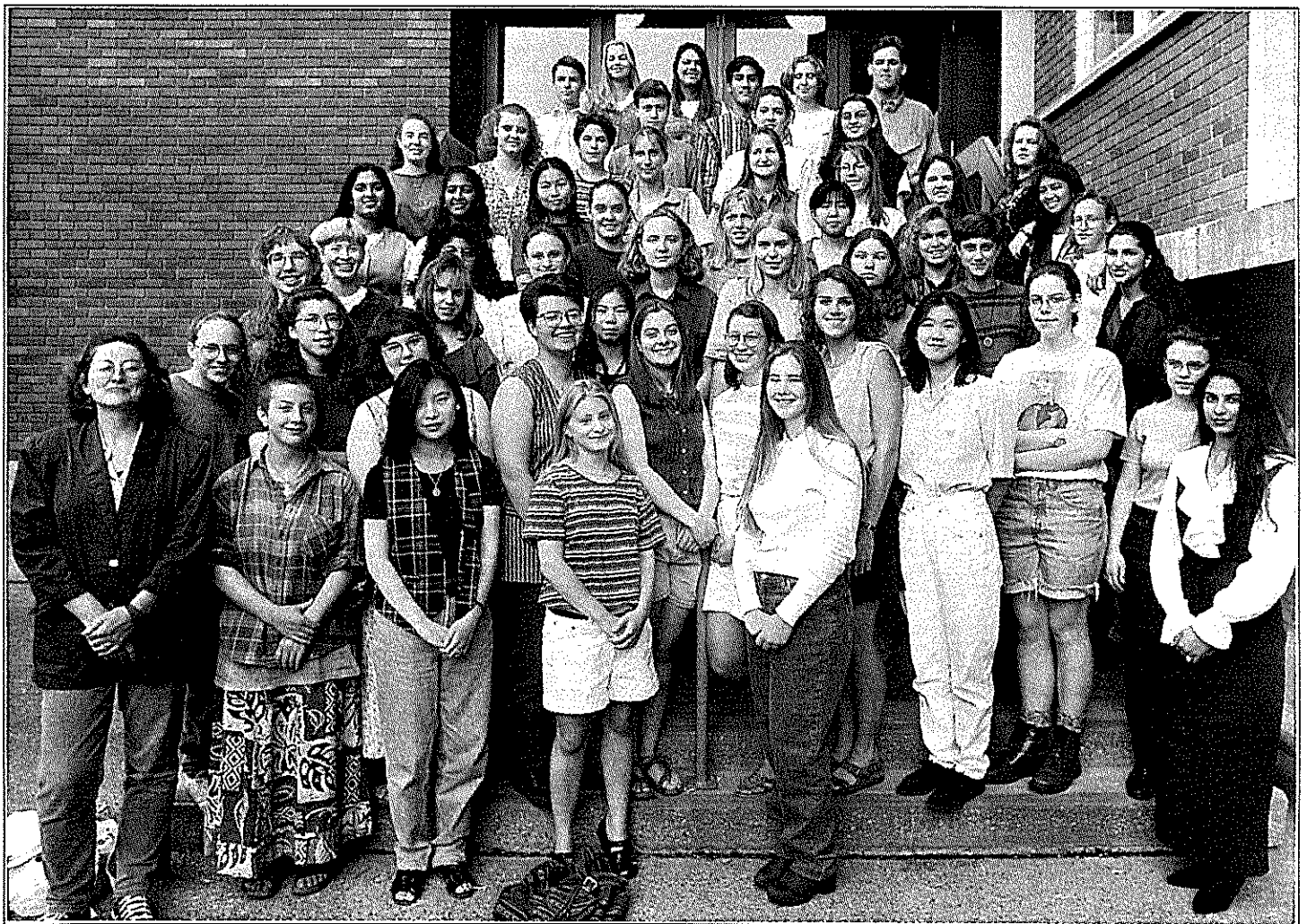
I had waited in anticipation for weeks, pacing the sidewalks of suburbia, for my WJSEST Summer Research Project to begin. Then... (oh Joy, oh bliss, oh rapture) without warning, I suddenly found myself in a room with fifty other people, filling out official looking forms.

Salima gave us the lowdown on the next six weeks of our lives, and we got a pop quiz on corrosive/combustible potentially lethal chemicals, such as table salt. Then, after extensive quizzing, we finally met our supervisors and were led away to meet our dooms and/or projects.

I went to the Genetics Department, where I met a few really smiley people whose names I have already forgotten, and got a whirlwind tour of the labs. All the intimate details of my project were revealed to me. Right now my project sounds like about two million pages of gibberish. I was also given my very own textbooks and a table to study/drink coffee at.

I for one, am excited. As I write, my little colonies of E. Coli are growing, and I get one step closer to becoming a mad scientist. I can just feel my hair frizzing a la Einstein and my eyes bugging out, hee hee hee. This, my friends, is going to be a great summer.

Sinead Collins



Grand Campus Tour

Our first Wednesday meeting consisted of a grand tour of the campus. I must confess that the tour was rather interesting, since I got to see parts of the campus I had not yet explored.

The first place we saw was the Medical Sciences Building. The hallways there were huge! They must have been at least three times wider than the halls in the Chemical/Mineral Engineering Building (where I work). The library there was also incredibly huge.

Our tour guide also did a good job in talking about being a university student. In one case, she showed us two different classrooms in the Henry Marshall Tory Building. The first one was a classroom for around 30 people; the second was a lecture theatre that held 495 students. The size was just incredible!

Near the end however, I felt like I was being dragged to numerous buildings and shown thousands of things. I was glad it was over since my feet were so sore! However, I was disappointed in only one thing: She never took us to the Chemical/Mineral Engineering Building.

Cheryl Steer

Romeo and Juliet (Tuesday, July 12, 1994)

For those of you who decided not to come and share this experience with the rest of us, I would like to say that you missed out on the time of your life. What did you do, stay at home and watch TV? And yes, it was a blast. If you were one of the fortunate ones, like me, to go sliding down the hill, then you really had a blast. Although the excruciating pain two days later was not.

For those of you who did not come, here is a little summary of what different people thought of the play. First of all, this play is definitely not what you would expect. It was not a traditional kind of play. The actors were wearing modern everyday clothing and the language was changed to suit the modern audience (that is, they changed the language so you could understand what is happening). Some of us who do not like reading Shakespeare in class enjoyed the play very much. Other that were expecting sixteenth century clothing (Juliet in shorts = unexpected) and that expected the actors to act like people did back then, were disappointed, but nevertheless after a while enjoyed watching the play too. All in all it was fun. I would like to thank Salima, Dorothy, Linda, and Dr. Armour for taking the time to take us to the play.

Nikolina Previsic

Meeting With People in Non-Traditional Careers

I'm sure many of the WISEST students were looking forward to seeing other people in non-traditional careers, particularly the women in science, so that we could receive some valuable insight into what life would be like in those careers. Our group consisted of a nurse, a physiologist, a physicist and a soil scientist. It was wonderful to hear each of these people talk about their careers and their lives. They all seemed to enjoy what they were doing. One thing which was surprising was that each one of them had switched their career goals at least once and had pursued an entirely different or related career. I suppose that means that we should not fear trying out different courses, but in fact, keep our numerous options open. Another thing which we learned was that it is possible to have "a life" outside of school. This means perhaps raising a family, or just participating in all the things that we enjoy. It was an inspiring talk on how we should be able to find a career we enjoy and excel at, and have other pursuits in life, and the possibility of having our cake and eating it too.

Freda Lo

Our Trip to TR Labs

July 20th, 1994. It was a hot and muggy day. The sun shone brightly as a troop of WJSEST foot soldiers marched over the High Level Bridge to a destination unknown. Actually, by that time Salima had made it known that we were headed for TR Labs, our mystery field trip location.

Upon arrival, we were whisked up to the air conditioned offices of TR Labs, A University of Alberta based company specializing in telecommunications research. We learned a little about the company, and were then taken on a tour. The tour took us through some labs which were very different, and much cleaner, than the labs in which I toil daily. Science and technology are advancing at unbelievable speeds, and I think that is what most of us learned from the tour, as the explanations of the various projects were somewhat baffling to those of us who have just mastered the lingo of our own labs. Even though a lot of what our tour guide told me was beyond me, I did get a sense of how much he enjoyed and was excited by the work he was doing.

I had never thought of research as being something that could be a commercial success on its own, although I realized that research and development departments are found in many major companies. And once again, we talked to the people who worked there and found out about that kind of training is required in order to get a job at a company such as this. Although I did notice that the females were out numbered by the males.

All in all, I was very impressed by the labs, as I had never considered an office building as a place that could have anything but desks and filing cabinets, women in high heels and men in boring suits and tight ties. Despite the fact that a lot of the tour unfortunately went over my head, which is filled up with things like NMR means nuclear magnetic resonance and TLC is thin layer chromatography, the whole experience made me think of research in a different light, and besides, Sinead says that after you thought about it a while, it had a certain Star Trek type appeal.

Marika Warren



The Great Mystery Field Trip Part II: Food

After what could only be described as a thrilling tone of the Star Trek-like TR Labs, we ventured out into the warm summer day and had a picnic. The food was wonderful, but most people were in the middle of an extremely large waterfight, and so probably didn't fully appreciate the Oreos. It is truly amazing how 51 people chosen at least partially on the basis of their mental capabilities can be reduced to a bunch of giggling, waterfighting, hyperactive wierdoes after walking around in 30°C heat.

After eating and getting thoroughly drenched, we walked back to the University in smaller groups. For those of us who managed not to get run over by the extremely aggressive Edmonton Bikers on the way home, it was great fun, fun paralleled only by things like taming wild giraffes or working in our labs. May I suggest water guns and camouflage wear for next year?

Sinead Collins

A Trip to the Medical Examiner's Office

On Wednesday July 27, we were broken up into small groups and sent to different labs across campus. My group visited the Medical Examiner's Office just off campus.

The Edmonton office is focussed mainly on toxicology. They analyze blood and tissue, to determine levels of alcohol and drugs within the body. Many different methods were used to obtain these results (i.e. Gas Chromatography, Mass Spectrometry etc.)

They also receive bodies that have died of suspicious or unknown causes. Autopsies are preformed to determine the cause of death. Although there were no bodies present when we arrived we did see the autopsy room and the body storage room.

It was a very interesting visit and our guide told us lots of interesting things.

Lauri Wischoff

Oral Presentations

Last Wednesday afternoon was a time of relaxed sharing: The Oral Presentations. Once again, we were separated into smaller groups, and shuffled off to our respective rooms. Janet Couch from the Physics Department, acted as our moderator. Each person or pair simply volunteered when they felt the courage (or needed to use the slide projector), crept to the front, breathed deeply, and began.

There were students in our group from diverse departments such as nursing, chemistry, physics, agriculture and entomology. It was exciting to hear about all the other work that has been going on in the various labs and research sites, thanks to WISEST. Everyone was comfortable and competent in describing their work. Luckily, no one seemed to have had a completely mind-numbing experience, and many of us actually enjoyed our work, and are regretting that there is only one week remaining. Our feeling that came up was that rather than narrowing down possible career choices, this summer has shown us the limitless possibilities in scientific research. There will forever be new questions to explore.

Camille Lipford

PETS and Pions

The purpose of the Wednesday afternoon sessions is not solely to bring fellow researchers (that's us!) together, but also to enrich our views with respect to the opportunities and discovery awaiting us.

This being the fourth week of our WISEST experience, we have all had the honor of visiting numerous laboratories on and off campus, as well as meeting with professors of those disciplines in which we hope to excel one day. At each session we have grown wiser (Oops!) and become more optimistic. Perhaps the most exciting tour for me (and for Sinead, I'm sure), was that of the Subatomic Research Building, right here on campus. For those of you who haven't been there, it's not as intimidating as it sounds! I enjoy physics a great deal and that is why I had so much fun on the tour. However, I think that even those who are not physics fans would have had a great time. Our tour guide's enthusiasm while teaching us about quarks and pions really impressed me. It is amazing the technology and power that is available to man. Hearing about the pion treatment of cancer from television is exciting, but to talk to someone who is actually involved in the research is unbelievably thrilling. For me, to work on treating tumors, especially brain and prostate cancers, detecting illegal explosives, creating radioisotopes for medical diagnosis or creating software for PET brain scanners, would be the ultimate satisfaction.

The tour was highly advantageous because it reassured me of the fact that there exists fields of research that are challenging, while being exciting at the same time.

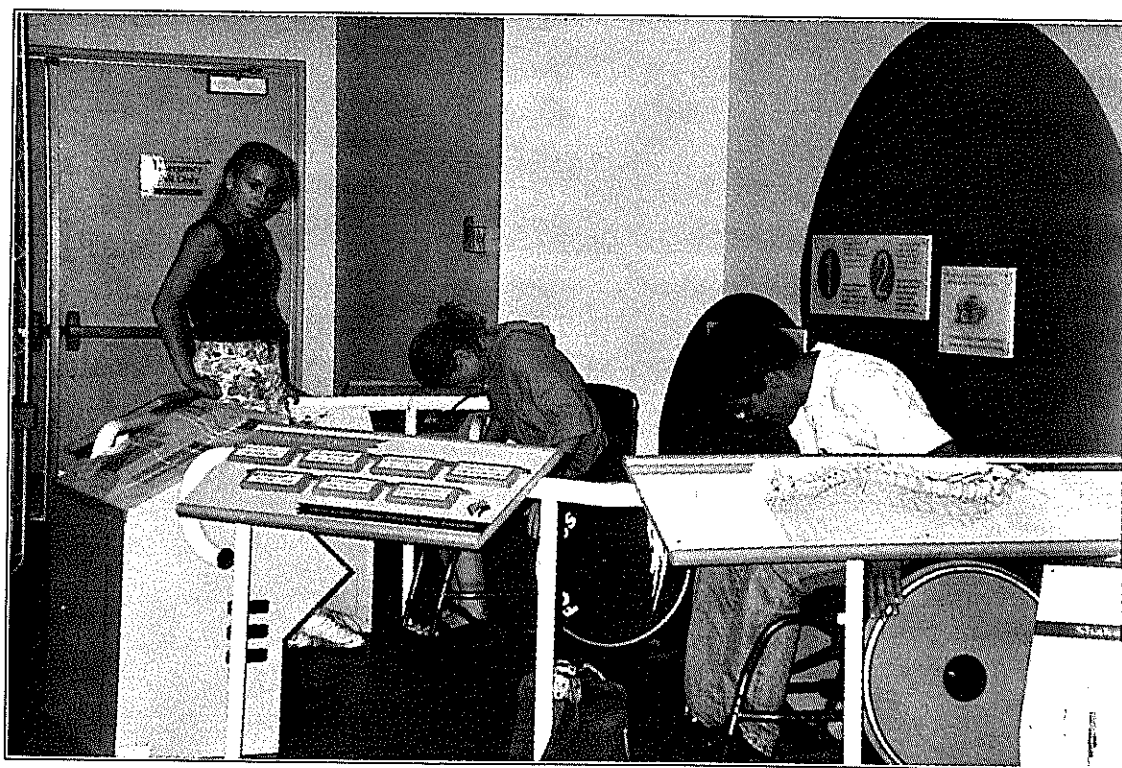
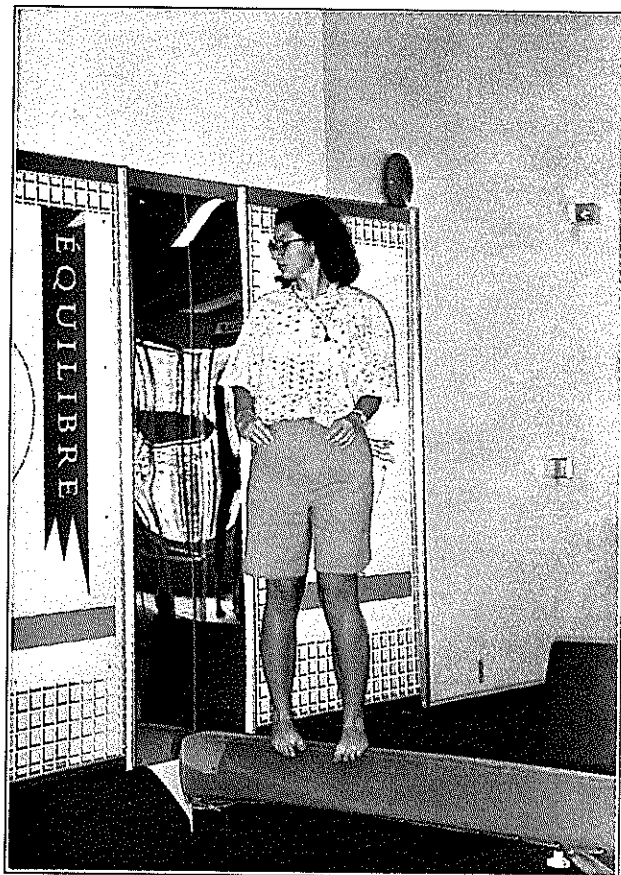
Juliana Uto

WISEST Evening Social The Edmonton Space Science Centre

On Tuesday August 2, 1994 we the participants of the WISEST Summer Research Program went on our second, and last evening social. This evening of fun and activities took place at The Edmonton Space & Science Centre. We watched the stunning documentary "Fires of Kuwait" at the Imax Theatre and the group was invited to stay for a Country Music Laser Light Show.

We also viewed many exhibits and participated in hands-on activities. We found out what we weighed on Pluto and other planets at the Space Exhibits. We observed the dangerous effects of arteriosclerosis (clogged arteries). At the Sports Medicine Exhibits we had the opportunity to participate in computer surveys and quizzes on safety. We also had the chance to view a short video on arthroscopic surgery (knee surgery through a small hole) and another video on the experiments conducted by engineers to design safer gymnastic mats. This WISEST evening social was fun and educational.

Allison Lane



A Loud “Alarming” Lunch Hour



The last WJSEST lunch get-together started with zeal. Our weekly ritual was interrupted by a fire drill at SUB. Luckily, this did not stop us dedicated wisettes (wisester, of course) from attending the lunch meeting. We courageously re-entered the building, in search of the other members of our group. We found them sitting casually in the Alumni Room at a long string of tables. Sitting down and attempting to eat my quadruple layered sandwich, I strained to hear the latest WJSEST news. We also shared our thoughts about our recent oral presentations. This was a good chance to get

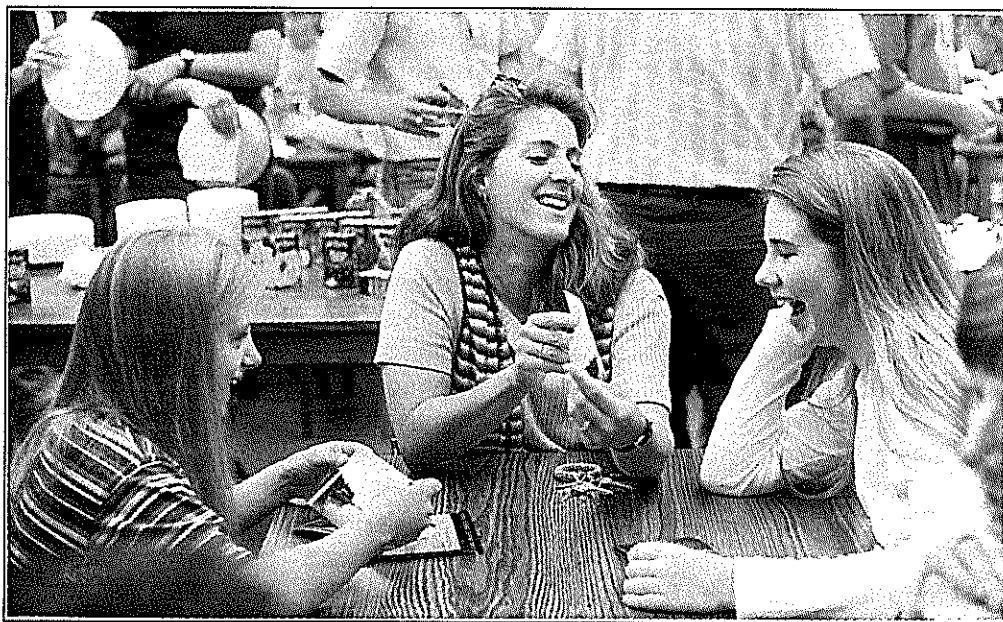
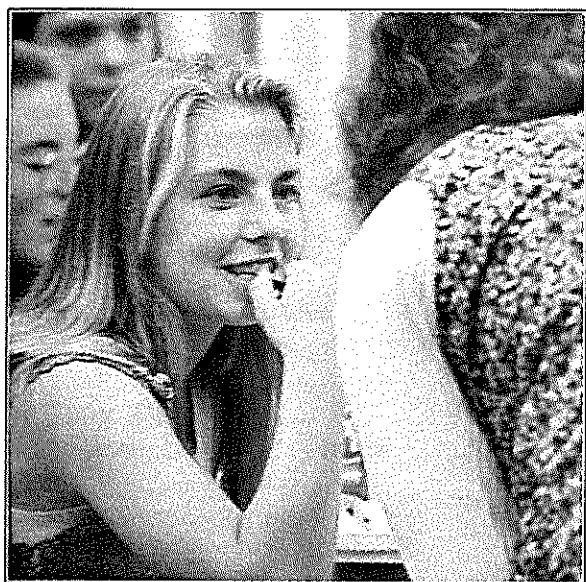
feedback about how others felt in regards to the oral presentations. Unfortunately, a band was practicing loudly in the background and one could only hear parts of the shared thoughts. Nevertheless, I was still able to hear enough and was happy that we could have a chance to, not only express our own opinions but also to hear about the opinions of others.

Through the WJSEST lunch-hour meetings I was able to talk to other people in the program more casually and really get to know them. It was a great opportunity and a wonderful experience. Thanks WJSEST.

Winnie Lieu

WISEST Luncheon

Wrapping up a Summer of Exciting Experiences



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Jeena Oommen Tempo School	David Cass Botany	50
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Jennifer Mueller Beaverlodge Regional - Elmworth	James Hoover - Joe Culberson Computing Science	54
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Carbon Rings and Funnier Things

First things first, I should probably explain the project I worked on. Together with Lisa Sotaert I worked for Dr. Karl Kopecky (pronounced Co pet ski) in Organic Chemistry. The project involved the synthesis of cyclic carbon compounds that have a highly reactive ring structure that would react with ozone and luminesce. These luminescent compounds could be used in DNA sequencing. My part in this experiment was a series of six reactions which would create one of these ringed compounds. I used NMR, TLC, a rotary evaporator and many other pieces of equipment that I did not know existed before to analyze and purify my product. So that's my project in a nutshell, as simple as I can make it. Now on to the good part....

Second things second, I would like to clear something up. Some people are under the mistaken impression that lab coats are sexy. They're not. The ones in our lab were encrusted with over ninety-seven years of chemicals. It's the latex gloves that are sexy.

But about the actual work I did while wearing the aforementioned sexy gloves: it involved chemicals. My mission was to deplete all the supplies of 4-nitrobenzaldehyde in the chemistry building. This was due to the fact that although I only made it through two of my six reactions, I had to try two reaction methods for each reaction. I used up copious amounts of expensive chemicals trying to get this right. But I feel no guilt, because one of the things I learned is that even though you do everything right, your reaction can still go wrong.

I learned that research involves a lot of dedication, disappointment, and a passion for your work. I do not have the required fondness for smelly solvents that is needed to devote your life to organic chemistry, and this was also an important lesson.



My six weeks were in no way wasted here. I enjoyed working in the lab with Lisa, our undergraduate summer research student Sarah, and Paul who is working on his Ph.D. I was an endless source of entertainment for them. You know that you've been sniffing some funny chemicals when you start laughing at people's NMR results. Just hanging around the university campus has been exciting, although of all the career options I've been exposed to, I think that I like Linda's job the best.

I'd like to thank every one in E5-26, Dr. Kopecky for being very very patient, and Lisa for putting up with my Midnight Oil and Spirit of the West, for exposing me to the fantastichness of country music and CISN 104 (NOTE: There's nothing wrong with country. It's just not me. I don't want to be judgmental like Lisa and label everything I don't appreciate fully as crap), and for letting me have the chair that rolls.

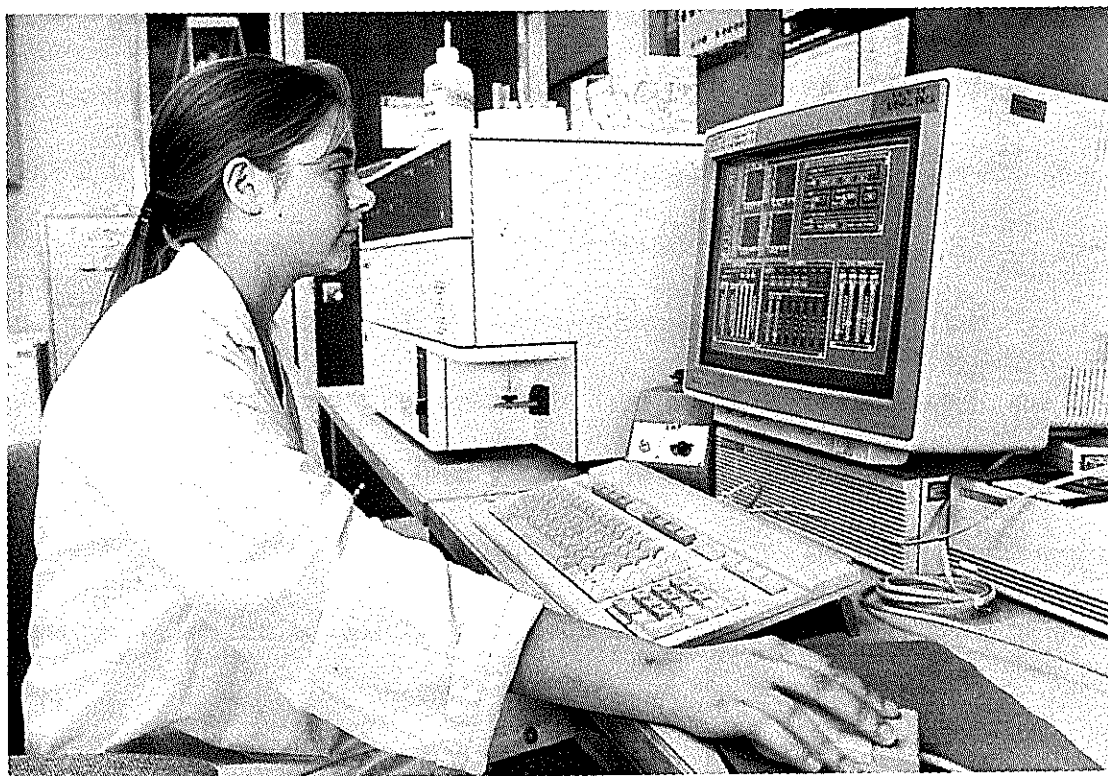
I hope that the god of glassware has been appeased by Lisa's sacrifices to it- two Erlenmeyer flasks, one round bottom flask, and one test tube. Her reactions went much better than mine- I only sacrificed a small glass stopcock and a 50 mL Erlenmeyer. I offer humble thanks to the god of rotary evaporators for allowing me to survive three lab explosions. For the record, my repair lasted the longest. And my eternal devotion goes to the god which allowed me to create $O_2NC_6H_4CHOHCCl_3$, my product. The only thing that went right in six whole weeks.

I have learned that there are higher powers than we understand which control the reactions I performed. I thank these powers that be for my summer. I would say that my summer has been analogous to a Mini Wheat. As Mr. Mini Wheat is both nutritious and delicious, so was my summer educational and fun. And no, that isn't an oxymoron. Thanks Everyone! Held og lykke til alle jer fremover! (I will certainly enjoy my trip back to Denmark which this job is helping to finance.)

Marika Warren

White Blood Cells Are Our Friends!

This summer, I had the pleasure of working under Dr. Linda Pilarski in the Department of Immunology. My project involved studying the motility of lymphocytes, and the antigens on the cell surface responsible for promoting this. White blood cells (wbc's) move like an inchworm crawling upon a leaf- they first bind to receptors on other cells, form "arms" which reach out and adhere to receptors on different cells, relocate the cell body, detach themselves from the receptors, and repeat the process. The study of wbc motility is important to certain diseases like stroke and atherosclerosis. In stroke, it is actually the inflammation caused by the excess lymphocytes migrating to the brain that damages the nerve cells, and causes the irreversible damage. In sclerosis, the locomotion and adherence of wbc's to the damaged blood vessel forms a build-up of plaque, which can eventually block the vessel, causing a heart attack. By preventing lymphocyte migration to these sites therefore, the damage caused by their presence could be prevented.



It has been shown that two antigens, CD44 and RHAMM (receptor for hyaluron-mediated mobility), play a role in cell locomotion, and are expressed in higher quantities after a cell has been activated by exposure to antigen. Both CD44 and RHAMM adhere to hyaluronan (HA), a component of the extra-cellular matrix (ECM) found between the cells of the body. I looked at the expression of RHAMM and CD44 on B-Cells from samples of normal blood, from patients with Waldstrom's Disease, and from patients undergoing heart catheterization. To identify and isolate B-Cells with RHAMM and CD44, IF (immunofluorescence) was used. IF involves the use of antibodies specific to a desired antigen (ex. CD44 or CD20, which is found exclusively on B-Cells.). Attached to the antibody is a dye; I stained for RHAMM and CD44 with FITC (green), and for CD20 with PE (red). The dyes fluoresce at a known wavelength, so that when the samples are run on a FACScan, the proportion of cells with red dye vs. the proportion of cells with green dye can be counted and analyzed.

I found that on normal blood B (CD20+) cells, there was a low level of HAFITC binding, and that this binding could be blocked only by an antibody to CD44. Therefore, on the normal B-Cells, CD44 was the only antigen binding HA (even in small amounts), indicating that these B-Cells had not been activated by exposure to antigen. On Waldstrom's patients, the B-Cells bound HAFITC in higher quantities, producing a brighter fluorescence. Both antibodies to CD44 and RHAMM blocked the binding somewhat, indicating that these cells are in a state of activation. This is consistent with the theory that more wbc's are activated in a diseased person, giving the cells a higher invasive potential. In the heart catheterization patients (patients with atherosclerosis) a lesser degree of HAFITC binding was observed. This binding was not blocked by anti-RHAMM, but only by anti-CD44, indicating that on B-Cells from these patients, CD44 was binding HA. By discovering the antigens participating in HA mediated motility, effective antibodies can be produced to stop lymphocyte locomotion when warranted.

I would like to thank Dr. Pilarski and everyone in the lab for making this an enjoyable summer in which I not only learned "proper" lab conduct, but was introduced to the world of research and the excitement connected with it.

Nadia Giannakopoulos

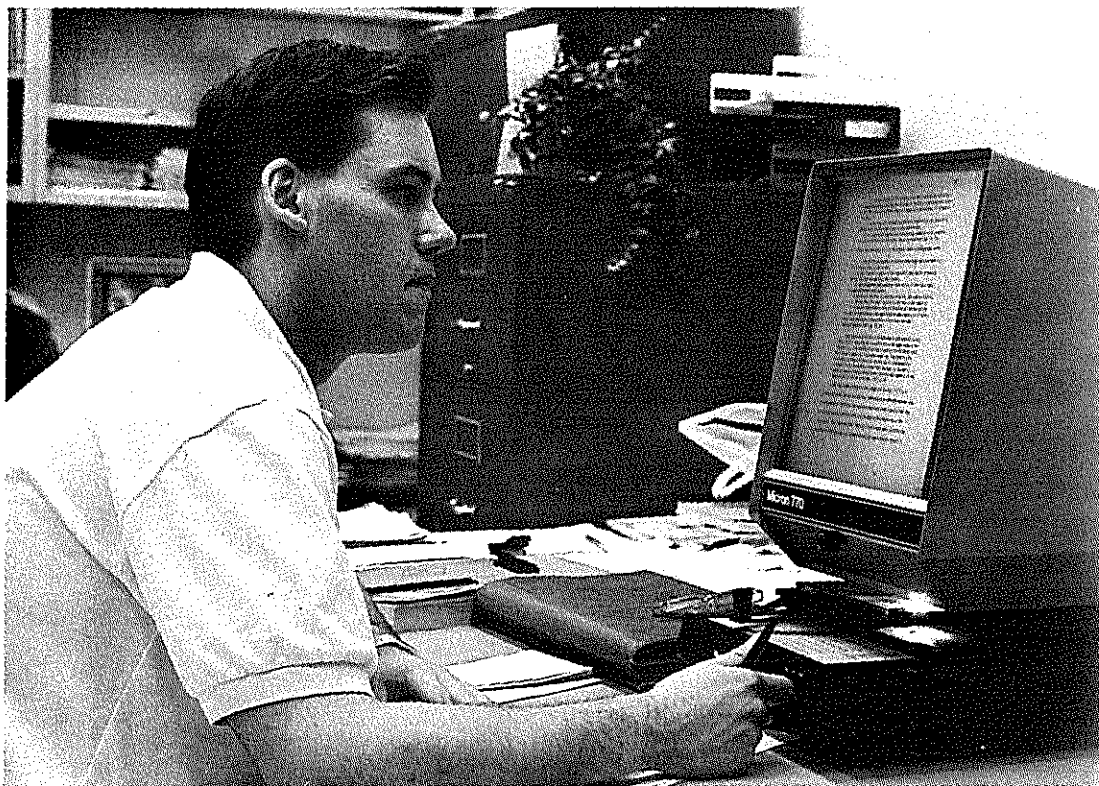
WHAT YOU SHOULD KNOW

The first couple of days seemed to be the longest of my life. The first week seemed very demanding with all the new criteria to learn but I did it! My supervisors expectations of the research program was high. During the 6 weeks, I worked in the Faculty of Nursing under the supervision of Dr. Janet C. Ross Kerr and Dianne Godkin. I think they needed a WISEST student like myself to keep them in line!

During the past 3 years our research group was examining Adult Day Programs. This research is to be completed within the month of August of 1994. Adult Day Programs are a place where people (clients) who are isolated or dependant on a caregiver because of a variety of reasons such as sickness, diseases etc. can come together and interact with other people their ages and receive medical assessment if needed. Another reason for these programs is to give the caregiver a break from his\her dependencies. This is known to us as RESPITE. The study is to find if the programs are of benefit physically, socially and mentally to the clients and the caregivers and yet to introduce recommendations on how these programs could be improved.

In the Adult Day Program there was 2 divided groups of clients. One group of clients attended the Day Hospital programs and the other program known as the Day Support Program had a different purpose along with a different clientele. The Geriatric Day Hospitals provided a more medically based environment and the Day Support Programs were more socially based. This research program that I was working on was analyzing these 2 groups and seeing if these groups were beneficial to the community.

Through the 6 weeks of this program, I worked in many areas of research and I also worked as several different task masters. A couple of days a week I retrieved articles from several libraries and bookstores. You know it is getting pretty bad when the librarian calls you by the first name! A couple of hours a week were reserved for time out and for visiting several community based organizations. The most exciting times were these "field trips" to these organizations. I toured Adult Day Programs throughout Edmonton. This was exciting because helping elders was a hard based experience. I soon discovered that elderly people are young at heart and are fighting not to grow old. I worked a couple of days on evaluating how pain control is being used rather than medication on infants. Several "field trips" were examining the roles of nurses and doctors. I toured as well clinics such as the Transplant Clinic, the Charles Camshell Clinic(former hospital)(viewed 3 eye surgeries) and the Anatomy LAB along with pathology(seen parts of a human body and examined the diseases of the human body). I spent time in areas of the University Hospital

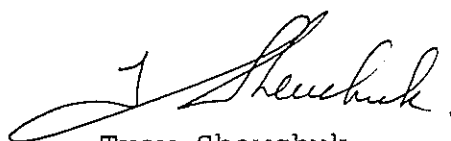


talking to researchers about their roles in medicine and nursing. There is so much more which I have visited but there is too much to mention.

One trip which is prudent in my mind was the visit to the Dickinsfield Amity House. We learned by first hand experience how poverty stricken people live and due to further cutbacks by the government, how life for them and for more will be worse.

Not only did I have fun but I also learned much about research. Not only is research TEDIOUS but it is also rewarding in many cases. I spoke to a lot of researchers who said they would be lost without research. I had always thought that research was a minor role in science but I have learned that it is the building blocks of what we know science to be! I was not only involved in research but I also experienced Campus Life. At times my program seemed boring, but I survived! I made the best of the given situations. I always knew that work was never done and Dianne always had more for me to do!

I really enjoyed the chance to be around the University and finding out what research was like. The WISEST program is one of the only programs that has introduced non-traditional roles for young Albertans. I believe this program will grow even larger in the years to come. Thank you WISEST!!!


Troy Shewchuk

An Introduction to Molecular Biology and Virology.

I spent my absolutely spectacular summer working in the Glaxo Heritage Research Institute in the Department of Medical Microbiology and Infectious Diseases. This lab is brand new, having only opened in April, and is run by Dr. Lung-Ji Chang. Most of my time was spent working with Deborah Robinson, a Ph.D. student, on two entirely different projects.

The first project was DNA cloning; which is used to modify and improve plasmids used in gene therapy by inserting new DNA fragments. First we made a map of the nucleic acid sequence of the DNA pieces to show that we would be working with the right DNA. Next, we made another type of map that showed the sites of activity of restriction endonucleases; restriction endonucleases are enzymes that recognize certain nucleic acid sequences and cut the DNA at these sites.

The first real step in cloning was to use the enzymes to perform a restriction digest, in order to cut our plasmids in the desired places. The cut DNA was then separated by molecular weight through gel electrophoresis and treated with Ethidium Bromide. When these gels are exposed to UV light one can see the individual DNA bands and their approximate base pair length. The desired bands were cut out of the gel and submitted to electroelution (reverse electrophoresis) so that we could recover the desired fragments. It was sometimes necessary to alter the DNA pieces through dephosphorylation or clean them using a magic mini-prep procedure. Next, a ligation reaction, using the enzyme ligase, was used to attach the original plasmid and our insert fragment together.

The newly cloned plasmids were then put into competent cells through transformation and grown in larger amounts. The cells then underwent a procedure known as a mini-prep, which destroys the cells and allows us to isolate the plasmids. We again performed restriction digests and electrophoresis on small amounts of plasmid to determine the orientation of the inserted fragments (sometimes the fragments can clone in either orientation; this is not always undesirable). The samples that looked promising were selected and grown in mass proportions in flasks. The DNA was again isolated from the cells and purified using a long and complex maxi-prep procedure. Our new and improved plasmids were then stored in the freezer for future use.

It can sometimes take months to obtain a successful clone and so I did not get to follow one plasmid through the entire process. I did parts of six to eight different clones instead and was even involved in a few successful endings.

My second project was with Debbie Robinson and Kathie Walters, who were just beginning a project on virus transactivation. Many viruses (i.e. HIV) become dormant because transcription stops in the virus. Transcription is the process by which DNA produces RNA. Without RNA production, there will thereby be no protein production and the virus will not replicate. However, it is possible for the virus to begin transcription again with the assistance of another factor which can transactivate the virus. The goal of our project is to determine what the effects of certain transactivators are on certain viruses and whether or not they are effective factors in "jump-starting" the transcription process.

We were experimenting with the presence and absence of four transactivators in six virus types. The transactivators are HBVX (hepatitis B), tat HIV, tat SIV, and tax HTLV; and the viruses are HIV, SIV, HTLV, MLV, RSV, and MMTV. Each of these conditions will be tested in four cell types: HeLa, Hep G2, Huh 7, and U937. Another goal of the study is to find out more about "tat", a nucleic protein that promotes transcription.



The first laboratory procedure is to transfect the cells with virus and in some cases, a transactivator. It is also necessary for us to add a small amount of the XGH5 plasmid as a standard for us to measure. If the XGH5 is taken into the cells then translation will occur and human growth hormone (HGH) will be produced and secreted into the culture media.

After three days, the media and cells are harvested separately. The media undergoes an HGH Assay, which uses radioactive ^{125}I and a scintillation counter to detect the amount of human growth hormone in the media. Lots of HGH present means that most of the XGH5 was accepted, along with most of the virus, into the cells, thus indicating an efficient transfection. The amount of detected HGH reflects fairly accurately the amount of virus that was accepted into the cells, thus giving us a means of standardizing the results of our other analyses.

The cells themselves go through a CAT Assay, which uses the radioisotope ^{14}C and analysis on a phosphorimager to measure the amount of CAT protein that has been produced, and therefore the amount of transcription that has occurred. This study will continue long after I am gone but I look forward to reading the published paper on it in the future.

The people in my lab were always willing to help me and made me feel like I belonged there within a few days. I've even been called the "mini-prep queen" due to my fairly decent success rate with that procedure. I attended lab and floor meetings, as well as Journal Club presentations (a.k.a. TGIF parties), and even went to the family BBQ held by my lab and the rest of the Glaxo Institute.

The WISEST program was an excellent opportunity and I enjoyed every minute. I learned how to use many pieces of complicated equipment as well as countless lab techniques that I know I will find useful in the future. The WISEST program has helped me to clarify which area of medicine I want to go into, that of microbiological laboratory medicine, and I thank WISEST for this. I hope that future participants enjoy their summers as much as I did.

Shannah Murland

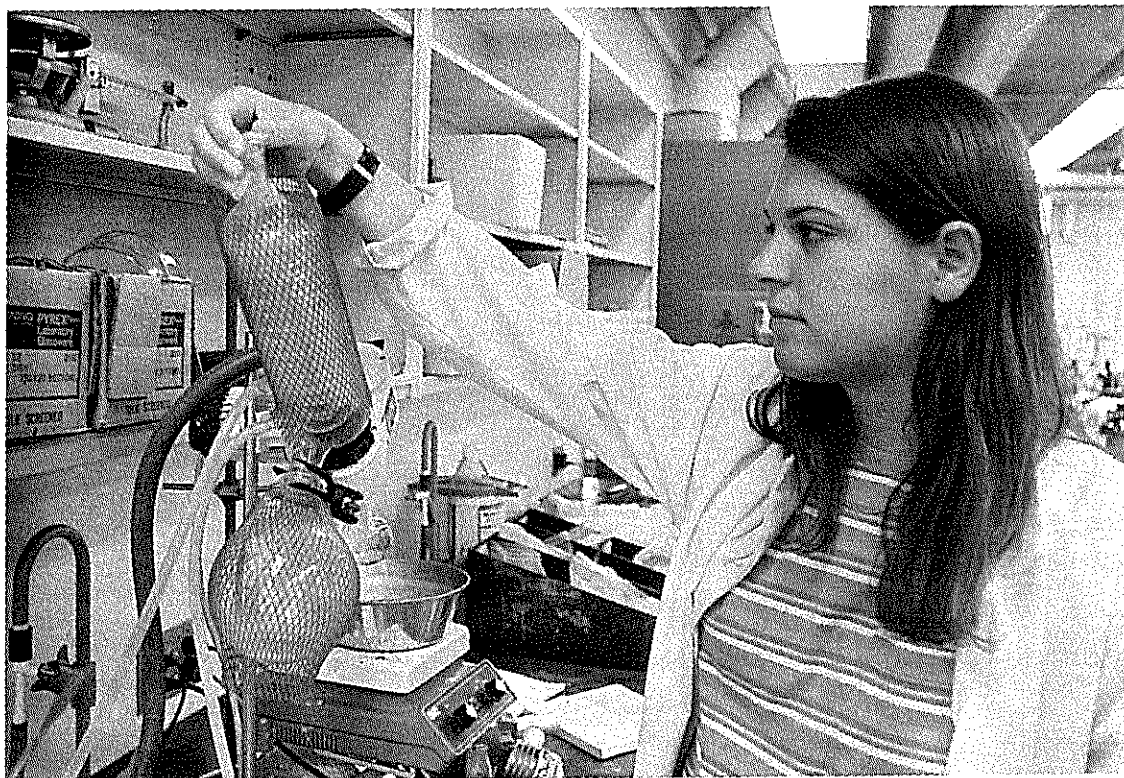
My Summer WISEST Experience

by Kim Dolynchuk

These six weeks as a WISEST summer student has exposed me to various aspects of science, more specifically chemistry and microbiology. With the guidance and teachings of Dr. Lois Browne, Dr. Pat Lane Bell, Kathy Vopel, Neal Fong, and Minh Vo, I have learned the techniques and the abilities needed to excel in the science field. Patience, precision, and determination are qualities I learned are necessary to become a research scientist.

My own project was on the identification and isolation of Bacillus Subtilis. Through these six weeks, a great deal of techniques were passed on to me. I was taught how to perform flash chromatography, TLC's, concentrations, bioassays, some measurements, use of the University library, and a great deal more. I believe these skills will not only help me excel in any chemistry course I may take in the future, but in any one of the numerous scientific fields.

My experience here at the University of Alberta, has helped me mature a bit more. Unlike school and the part-time jobs I am used to, here I was forced to think for myself apprentice. I was not there to watch and learn from my teacher, but perform the tasks myself only to be guided by my supervisors. I was taught to think of what the logical next step would be always trying to keep myself occupied. I also learned the value of cooperation. This being one of the main factors in research, and more than likely any job. It is always important that everyone keeps each other up to date and do their part. Microbiology and chemistry worked together on a common goal, my project. They needed and relied on one another to do their part so that the next step could be started.



The WISEST program taught me a great deal of scientific knowledge and background. This, however, is not all that it taught me. I learned many skills and qualities like patience and hard work, that will help me for the rest of my life. This experience has allowed me to grow, and become a stronger person because of it.

MY RESEARCH EXPERIENCES THROUGH WISEST
- by Jennifer Docker

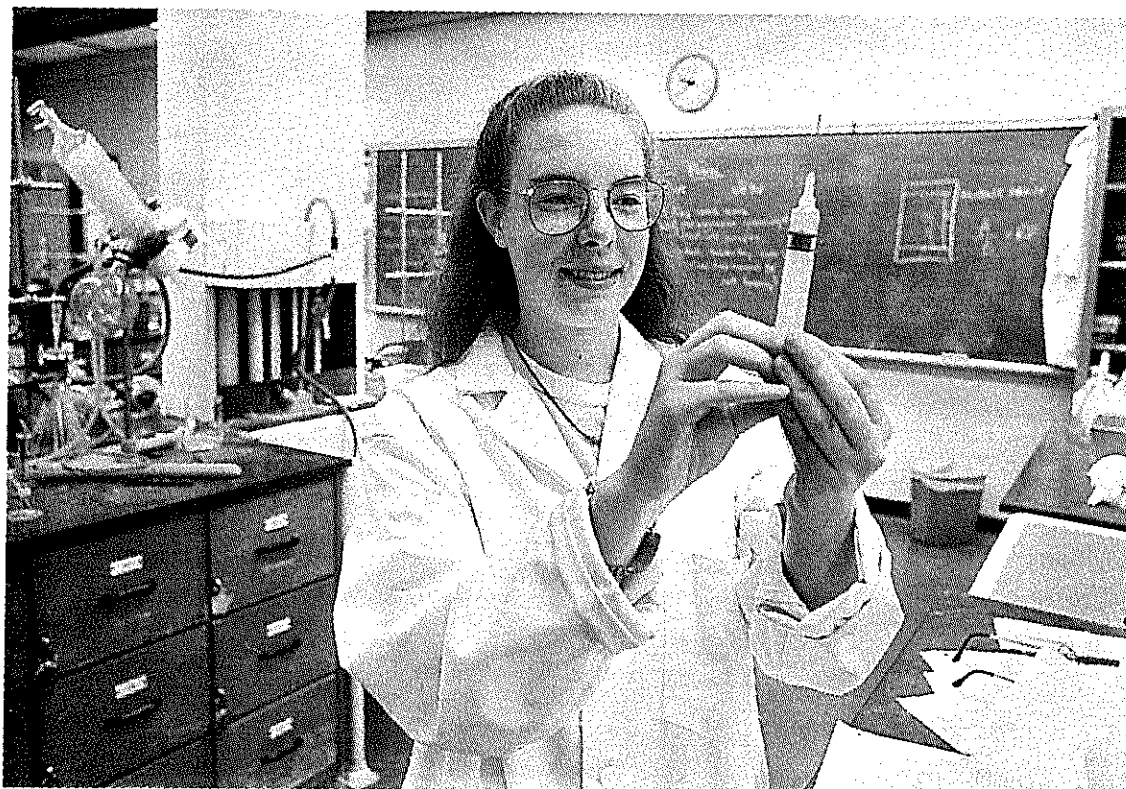
The WISEST Summer Research Program has given me the opportunity to work with Dr. Lois Browne in chemistry and Dr. Patricia Lane Bell in microbiology on the research of the isolation and identification of the antifungal agent of Bacillus Subtilis. Others who have helped me with this research are Kathy Vopel, Minh Vo, and Neal Fong. Through this research I have learned many useful scientific skills and techniques.

I had a number of interesting experiences in chemistry, one of which was flash and thin layer chromatography. The reason to carry out a chromatography is to separate a mixture into isolated compounds. I also learned how to concentrate compounds by removing the solvent using the rotary evaporator. I learned how to collect solids by vacuum filtration.

In the microbiology laboratories I inoculated potato dextrose agar plates with the Bacillus, then we fermented it into cultures. Another experience was doing a bioassay on the fractions collected from the chromatographical separation done in chemistry. Bioassays check the antifungal activity through growth inhibition.

During the past six weeks I worked in the Cameron and Physical Sciences libraries on the computers looking up pertinent Journal articles on research published of Bacillus. The Journals are valuable resources for researchers. They help to inform the research scientist about the results of others, they help guide the work, and they give the scientist different ideas and perspectives. The "hands on" part of my research project was a wonderful and fulfilling work experience.

Through this summer research program I learned that working in the science laboratories not only involves hard work and



patience, but also cooperation and interacting with others. The skills that I learned through my experiences were to be innovative, to manage time, and to accept responsibilities. I feel that these skills will not only be useful throughout my education, but throughout my entire life.

This WISEST program was an excellent, interesting, and fun learning experience. It has given me a greater insight on what science demands. The program has definitely left me considering a future in science.

Hi, my name is Freda Lo. I am working with Dr. Susan Rosenberg and her graduate students in the Department of Genetics. It has been a great experience so far and I have learned a great deal from them. The lab has been working on adaptive mutation, a relatively new phenomenon in the study of genetics. In the past year, Dr. Rosenberg and her two grad students Simonne Longerich and Reuben Harris have had their work published in the renowned journal called Science.

I have completed two experiments so far on adaptive mutation. Adaptive mutations are different from that of normal mutations in that these mutations are selected. These mutations are not random like normal mutations. These adaptive mutants seem to develop during the stationary phase of cell development. The ability for cells to be able to mutate in response to their environment may suggest a different view of evolution which does not correspond to Darwin's theory.

To test how adaptive mutations work, we work with the bacteria *Escherichia coli*. These bacteria are lactose intolerant, and therefore one would not expect them to grow if that was the only carbon source available to them. On the contrary, they seem to revert (mutate) at a higher rate in these conditions and this has been the basis of the experiments I have been working on. I have been testing whether the absence of a protein or gene will affect the rate of lac⁺ mutations. Lac⁺ means the *E. coli* are able to digest lactose. To determine the number of revertants, I count the colonies which arise on lactose plates. These colonies arise over time but they are not growing, which means that mutations occurred after they were plated on lactose.

What our lab wants to find out is how these adaptive mutants form. My first experiment dealt with Mut H, a protein which is part of the mismatch repair system for correcting DNA. I also used a control so that I could compare my results. I plated both kinds of cells on lactose plates. More colonies came up on the Mut H⁻ plates. This experiment has never been done previously so the role Mut H has on adaptive mutation is still unclear. This is because there are a number of hypotheses that are not strong enough to support my results. I have also completed a similar experiment using a different strain and my numbers were not significant enough to make any conclusions. I will be repeating that experiment as I did with the Mut H.

I have found the past four weeks of work in the lab to be most rewarding. I successfully attempted two experiments (success meaning that I did not contaminate the cultures or plates). It has been a lot of fun and also a tremendous amount of learning, not just about science, but also



about life in university. I have spoken to many people in the lab and also from WISEST and they have all given me a great deal of insight about how to manage time during school, and more importantly, that success comes from hard work. I am fortunate to have had the chance to work with some very talented and wonderful people.

I thank WISEST sincerely for giving me the opportunity to work in a superb environment and the people for inspiring me to pursue a career in science. This program has given me the chance to decide what I would like to do in the future.

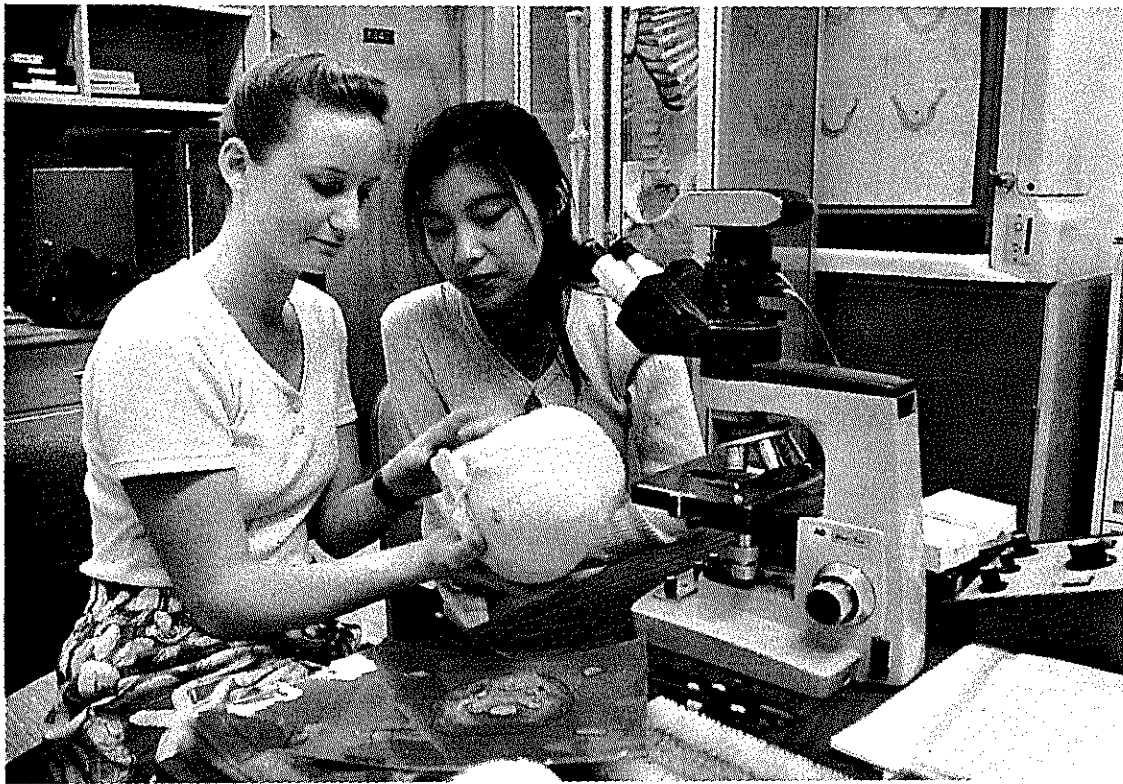
Summer Quest: Boldly Going ... ??
...to 3-D Computer Reconstruction
of Human Fetal Material

It has been an amazing experience. By the end of our term with WISEST, we will know more about the anatomy of the human head than we have ever dreamed possible at our tender ages of sixteen and seventeen. We are Winnie Lieu and Elisabeth Specht and we work in the department of Oral Biology with the Faculty of Dentistry. For the duration of our six weeks, we have helped work on three human fetuses and have completed the strenuous task of organizing the research lab where we work (which was occupied by males, and thus, no more needs to be said). We have learned much from our immediate supervisor, Dr. Wolfgang Arnold, a visiting professor, on his sabbatical leave, from Germany and our assigned supervisor Dr. G. H. Sperber.

Our projects involved the 3-D computer reconstruction of human fetal material. The purpose was to investigate the various disorders which have developed in the aborted fetuses, concentrating on the head region. Observing, identifying, recording and finally, understanding the abnormal changes that have occurred in the fetal specimens are among the major objectives of this research.

The process begins when Dr. Machin, a pediatric pathologist working with our research team, brings in the donated, spontaneously aborted, fetuses from the hospital. Then, our lab technician, Ms. Murdoch, implants the specimen in wax, eventually proceeding on to the delicate task of sectioning the fetus. This can be demanding work as the layers sectioned are only micrometers in thickness and in weather, hotter than thirty degrees Celsius above, there is the perpetual fear of the wax melting (and with Ralph Klein holding the reins, budget cutbacks flourish; while, air conditioning is virtually unheard of). Nevertheless, the courageous Ms. Murdoch strives on to conquer the hot weather. Thinking cool thoughts, following the sectioning of the fetuses, she mounts the layers on the slides and stains them.

Following her valiant footsteps, we, too, think cool thoughts while we boldly go where no McNally Tiger and no Lacombe Ram has gone before; the DARK ROOM. Not too soon after our first attempt to take a picture of the slide, containing the fetal material, did we realize the revealing nature of the title, "DARK ROOM." We soon became aware that turning on the lights while sensitive (ouch!!) photographic paper was sitting on the counter would not be the best idea. After a few mistakes, however, we finally caught its niche and successfully completed our voyage through the "DARK ROOM." The slides were victoriously magnified, photographed, and developed. We have even boldly returned to renew our quest whenever our services are called for. After the photographs were dried, we



Elisabeth Specht

Winnie Lieu

outlined the structures, which are of interest to our research team, on to transparencies then eventually retraced them (or digitized, as we say) into the computer -- layer by layer -- elevation by elevation. By the time the structures have all been digitized and "m"itted, we know their names and their place in our heads by heart. This is a great achievement for us, as in the beginning, we could not see what our research professionals saw. On our first day at work, we saw a computer-created image photograph on paper. One of us saw the image of a blue gorilla, sitting at a yellow desk, and writing with a pink feather pen; while, the other saw something absolutely different. Now that we have soaked ourselves with knowledge about the human head, we realize that much of what we saw were merely illusions conjured up by the creative, though not yet quite enlightened mind. Now we don't see zoo animals, nor see writing utensils from time of Napoleon; rather, we see cartilages, arteries, and nerves.

Being able to participate in the WISEST summer program has most definitely been a rewarding experience. We have experienced the true nature behind research work and have been exposed to the hard-work and dedication behind every discovery. Eureka! is not the sound of one man but rather the synonymous cry of a team. Research involves the skills of many devoted people who have spent their time to try to enlarge the spectacles which we use to envision our mystic universe. Thank-You to the research team (Dr. W. Arnold, Dr. G. H. Sperber, Dr. G. Machin, Ms. C. Murdoch, and Steven Sperber) for allowing us to join your investigation and be part of your team. We appreciate the opportunity. Finally, thank-you to all the people who have made WISEST possible. You have provided us with many memories. Thanx!

Winnie Lieu
Elisabeth Specht

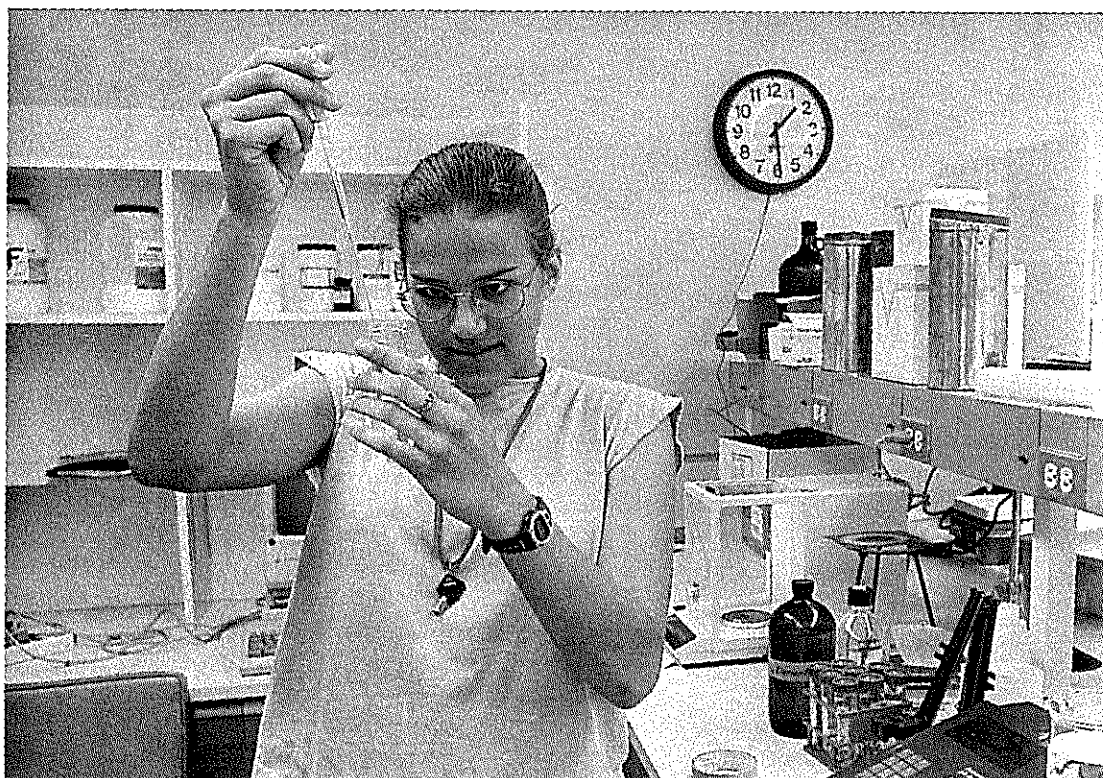
When I received the second letter from the WISEST Summer Research Program accepting my application, I was very honored. This would be a chance to open my eyes to another world that I would soon be a part of. WISEST truly is a remarkable program offering field trips to other labs of your choice and interest, and showing you that a vast variety of people from other countries and cultures are working right along side you! The people you meet and the experiences you have in this program are valuable knowledge, for through this program, you may decide your future. . .

My experience in this program was a rather fortunate one. I had the chance to work closely with two very different areas of work – biology and physics. Now one might say that there are many similarities between the two, and there probably are, but once you get specific, one begins to realize that each can lead a totally unique world.

For the first three weeks of the WISEST program, I was working with Dr. Ted Evans in physics in the field of magnetic paleoclimatology. When I first heard this long complicated word I thought. . . Uhh. . . What? But now when I hear the word, I know exactly what it means, what it's related to, and what a person does in the job on a regular day to day basis, which, in my opinion is extremely important. Magnetic paleoclimatology is the study of the earth's magnetism and how this magnetization affects climate and weather patterns of the past. My job was to study the magnetization of soil samples taken from China which contained readings that could be dated back about a million years ago. One of the questions we were trying to answer was why there were darker and lighter regions of this loess (soil).

A very important part of any research is the discovery of some possible solutions to the questions you have. In magnetic paleoclimatology, we know that, since the darker regions are generally more magnetized than the lighter regions, each of the regions refer to glacial (lighter) and interglacial (darker) periods. This greater magnetization of the soil during interglacial periods may be due to bacteria that live in the soil. Bacteria produced in the soil make magnets within and are more able to survive in warmer temperatures. Hence when the bacteria perish, the magnets that they produce remain behind in the soil, making the soil of interglacial periods more magnetized than the soil of glacial periods . . . Pretty interesting, huh! Anyway, I could explain to you every other detail of every single thing I learned in this project, . . . but I think I'll save you the frustration and agony of confusion. Basically what I did throughout the three weeks that I was there was find the mass of each of these samples that were in plastic 2 cm * 2 cm boxes (about a hundred in total), measured their magnetization on a machine called a Spinner, and then heated them to get rid of recent magnetizational effects of, say, a thousand years ago, on the soil.

-For the last three weeks of the program, I worked with Dr. George Owtrim in molecular biology in the field of microbiology. Here I was working with cyanobacteria and how we can put a control



mechanism on protein synthesis through the process of DNA to RNA to protein. Most of my work was emphasized on sterile technique and its importance. I totally have seen a major improvement in my technique when making solutions and media in the lab. Now, washing my hands before performing an experiment in school will be a must! A lot of my time was spent on making solutions, the use of pipets and other various tools, and watching the growth process in algae cultures. I enjoyed this project a lot because, unlike the physics job, I was able to get my hands wet. . . and believe me, I've been sprayed enough times with the water facet tubing when turning the tap, that I'm beginning to think that it's possessed.

This program was an extremely valuable experience, and I would encourage anyone to participate in it. WISEST gives you a chance to see the overwhelming number of choices that there are to an individual entering the career world. This step may be scary at first, but now that I have had this experience at WISEST, I have much more confidence and knowledge which will enable me to confront this new world head on! Seeing the numerous possibilities that my life can have has broadened my view and shown me that I actually can be anything that I imagine myself to be, because that's about how many careers there really are!

Lynnette Raffin

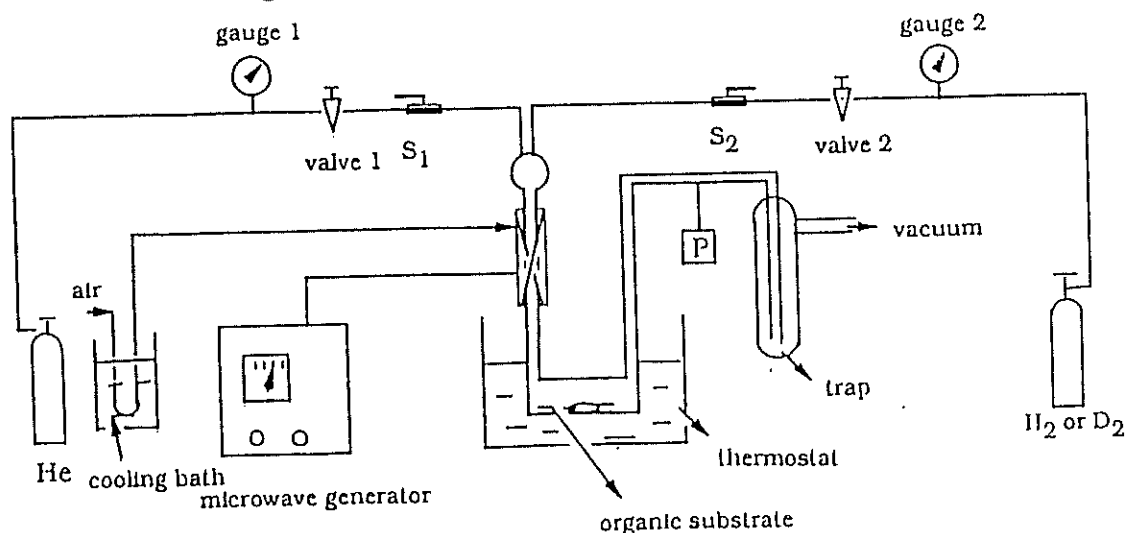
ATOMIC HYDROGEN REACTIONS ORGANIC CHEMISTRY

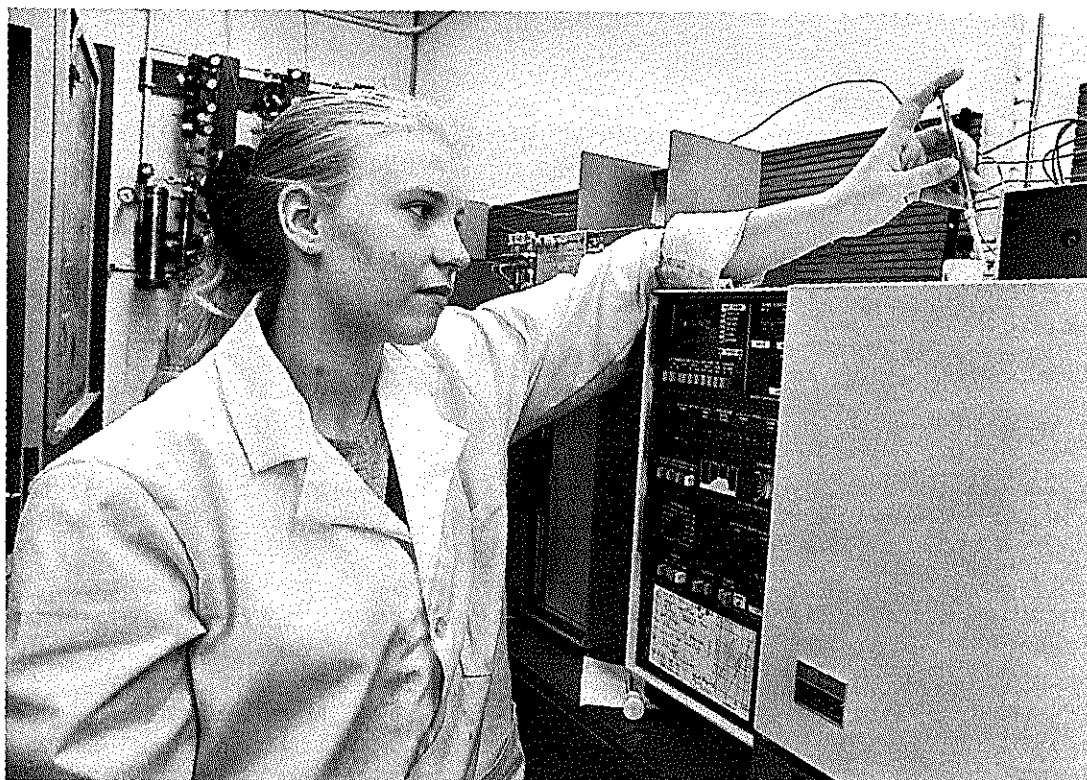
Purpose: *The aim of this project is to study the reactions of various organic substrates with hydrogen atoms and to analyse the product that is formed.*

Introduction: *The hydrogen atom is the simplest atom found on the periodic table, however, little else is known about it. In the petroleum industry, hydrogen atoms are blasted into the tar sands to increase the oil output. No one knows why this method works and it is also not known if there is a more effective method to increase oil output. This project will attempt to discover the answers to these questions.*

Apparatus: *For this project, a microwave apparatus was used (see diagram). This excites hydrogen gas into hydrogen atoms for the reactions that took place with the hydrogen atoms and a solution of organic substrates such as octene and acetone or dibenzothiophene and acetone. The reaction was required to take place at low temperatures such as -78°C or -100°C , so that the solvents did not evaporate. This was accomplished by using three cooling baths that may have been composed of acetone and dry ice or methanol and liquid nitrogen. The time for the completion of this reaction ranged from three minutes to four hours. As well, a Gas Chromatography (GC) machine was used to analyse the products of the reaction. In this machine, the product is heated using different programs and sent through a column. The lighter substances are detected first and the heavier ones later. The machine prints out a page of various peaks that correspond to each product in order of which was detected first.*

Fig. I. Diagram of apparatus for H atom reaction





Procedure: a) A solution was made, placed in the cell and then hooked up to the microwave apparatus.
b) The temperature of the reaction was checked and the corresponding cooling bath was made.
c) On the microwave apparatus, the H_2 (hydrogen) or CH_4 (methane) and He (helium) valves were turned on and the H_2 flow rate (mL/min) was adjusted.
d) The vacuum was turned on and pressure measured.
e) The air (to cool the cell) was turned on.
f) The microwave was turned on and setting adjusted to 60-80.
g) The excitor was used to start an orangish He flame.
h) The H_2 or CH_4 was turned on and the flame turned pinkish or purplish.
i) After the reaction, the product was injected into the GC machine.

Observations: In studying the reaction between 1-octene and methane gas, I have determined that the optimum flow rate for the gas is 1 mL/min. This flow rate yields the largest product. During this six week period, I have observed many reactions, however, space is limited to record all of them.

Conclusion: My job required me to gather data using the above methods. A project like this requires much more time than six weeks to complete, however, I have learned a lot about the world of organic chemistry in this time. Working with my supervisor, Dr. Tanner, this summer was an educational experience.

ALLISON LANE

MEANDOOK BIOLOGICAL RESEARCH STATION

This summer I spent my six weeks of the WISEST program at Meandook Biological Research Station. I found it helpful in deciding a future career, as I spent much time asking myself this question.

I spent my summer working with Ainsley Sykes. She is working towards a Masters Degree in Zoology. She studies bird and small mammal diversity within fencerows. Ainsley is looking to find the relationship between fencerow width, animal population, and vegetation density.

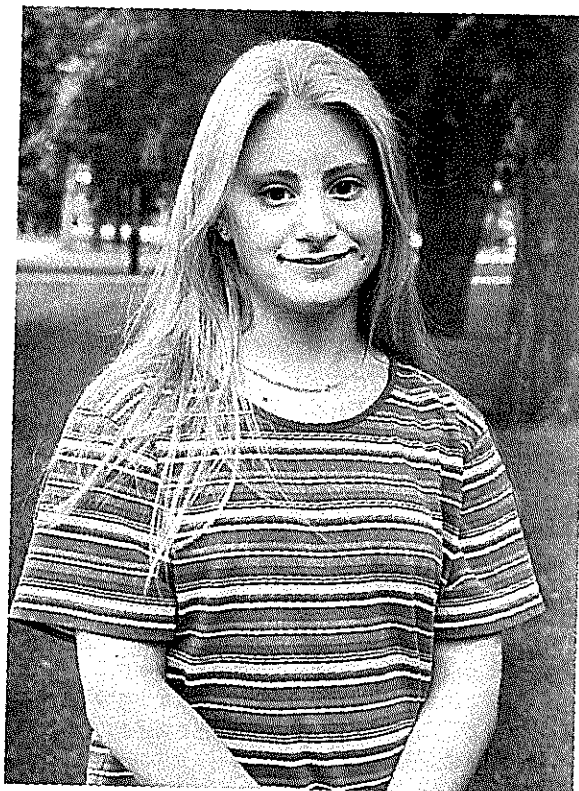
The first couple of days here, I went to some fencerows to help Ainsley empty the traps. Inside of the traps Ainsley would find mice, voles, or less commonly, shrews. She would then determine their sex and their species. She would also weigh and eartag the rodents captured. She also collected some other information such as pregnancy and the number of embryos the rodent was carrying. Some deer mice carry a disease which can cause death to humans, so I was unable to continue emptying traps with Ainsley.

While Ainsley and her two assistants emptied the traps, I spent some mornings coding data and entering it into the computer. Other mornings were spent collecting data on the woody debris within the fencerows. This basically translates into crawling through bushes counting twigs, while encountering many mosquitos and wasps. It is not as bad as it sounds, and I liked to spend my days outdoors.

Three days before the traps are open, they must be prebaited. This involves sprinkling some seed around the traps to attract the small mammals to the area. Along with prebaiting, we also opened traps in the afternoon. When opening the traps, we simply remove the rock and the protective board from the top of the trap, put in some bedding or woodchips, and sprinkle more seed around the area.

All the WISEST students at the Station were taken on a field trip to Calling Lake. At Calling Lake, researchers study the effects clear-cutting has on wildlife, especially the song birds. It was a devastating sight to actually stand in a huge area where you see nothing but stumps and fallen trees.

Good times include swimming at Narrow Lake, "discoveries" in the laundry room, a scientific study on face masks, the yearbook, and the endless removal of rosebush thorns.



A special thanks to Ainsley Sykes, Lori Mamchur, and Kate Murie for introducing me to the physically challenging part of science. Also, thank you for opening my eyes to zoology and making my summer one to remember.

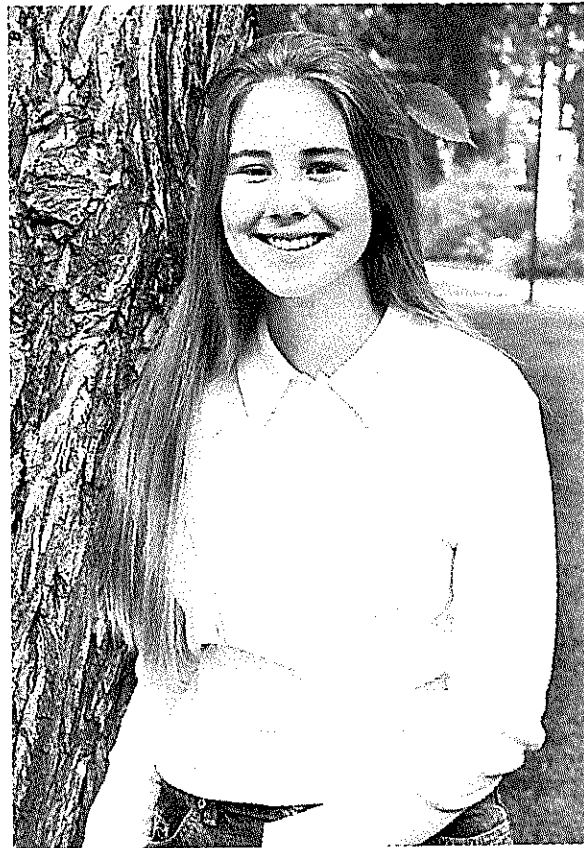
-Anna Taddeo-

My WISEST Experience

Leah Turner

When I began my six weeks of work with the WISEST program I had many expectations and goals. Now that the summer is almost over, I can honestly look back and say that most, if not all of them were fulfilled.

My summer was spent at Meanook Biological Research Station, and as I had previously visited there on a school field trip I was not surprised upon arrival. While we were there we began to realize just how lucky we really were after we visited another research station at Calling Lake. While MBRS has a T.V. and VCR, cook for week nights and everyone has individual rooms, Calling Lake inhabitants lived in tents and did not even have running water. Seeing this made me realize how devoted these people were to science, and the commitment it takes to be successful.



Although I assisted quite a few people over the six weeks and was exposed to many different things, the majority of my time I worked with Hilary Jones. Hilary is doing a study on the indirect effects of predation on the reproductive success of fathead minnows. This required a lot of field work, recording behavior, and cleaning fish tanks. Most of my time was spent doing field work at several lakes. I learned a lot about the joys of field work, which include pleasures such as exotic bug bites, and blazing sun burns. I also learned how difficult and strenuous it can be getting valuable, usable data.

Working in the WISEST program this summer has given me a more realistic view of what it is like working in science, and has also helped me gain a greater respect for the determination and commitment of scientists. I realized that science is not only miraculous discoveries, but also the years of hard work that go into a project.

I would like to thank everyone at WISEST for giving me this opportunity. It will continue to and already has helped influence my career choice, and exposed me to new areas of science that I had no idea existed.

I would also like to thank everyone at Meanook, especially Hilary, for making my summer even better. I will finish this summer with a lot of new memories and great friends. How could anyone forget taking out slivers, doing laundry (or what you find doing laundry), frog catching, meeting? new people swimming at Narrow, the bizzare people at Lower Chain and reading my yearbook?

MY WISEST EXPERIENCE

I spent my summer working at the Meanook Biological Research Station in Athabasca. I had the opportunity to work with several Masters students, most of whom were under the supervision of Dr. Ellie Prepas.

My supervisors were Karen Yee and Kim Burley. Karen's project is to investigate the effects of liming benthic invertebrates and Kim is investigating what kind of alternatives there are to liming to reduce the release of phosphorous in lakes using soil and water cores obtained from specific lakes. With Karen, I learned about the tedious side of science when I spent most of my time sorting through samples that she had obtained from lakes. I had to pick and count specific benthic invertebrates like chaobores, ceratopogonids, amphipods, oligochaetes, etc.. Sometimes I was able to titrate dissolved oxygen (D.O.) samples for Karen. When I worked with Kim. I helped her obtain and titrate some of her mini-D.O.'s. I also learned about the dirty and gruelling part of field studies when I went coring with Kim and Karen (she was helping too because it was a lot of hard work).

When I was not working with Kim or Karen, I was helping other people. Sometimes I was allowed to go sampling or to go work for Sandra Cooke, who is studying the phosphorus content of waste streams. Also, I went into the field with quite a few people - some of whom are: Paul Klatt (he studies Griebs), Bev Gingras who studies Loons, birdwatching/scouting with Scott Jamieson and his supervisor (I forgot his name), and helping some of the Americans - Jeff Chanton and Gary Whiting - test for methane release in parts of plants in wetlands (in this case a fenn), and study rates of photosynthesis and cellular respiration in plants to determine whether or not plants have control over opening and closing of stomates.

Since we missed out on Wednesday meetings and field trips our supervisors arranged for the Wisest students stranded in the middle of nowhere to visit a very "rustic" field camp. Calling Lake, which was REALLY rustic (no electricity, no running water, living in tents, etc..). It was a nice place to visit, but I would not want to live - study - there. We also went to look at and hike through ALPAC clearcuts, forests and buffer zones.



Overall, I had a a great summer of exploration in the Zoology/Biology zone of science. It also helped me determine prospective areas of science that I would like to go into. I wish everyone all the success and ...

Thanks, WISEST and everybody I worked with -
This summer was the best (so far...)!

Donna Fung

Summer at Meanook Biological Station

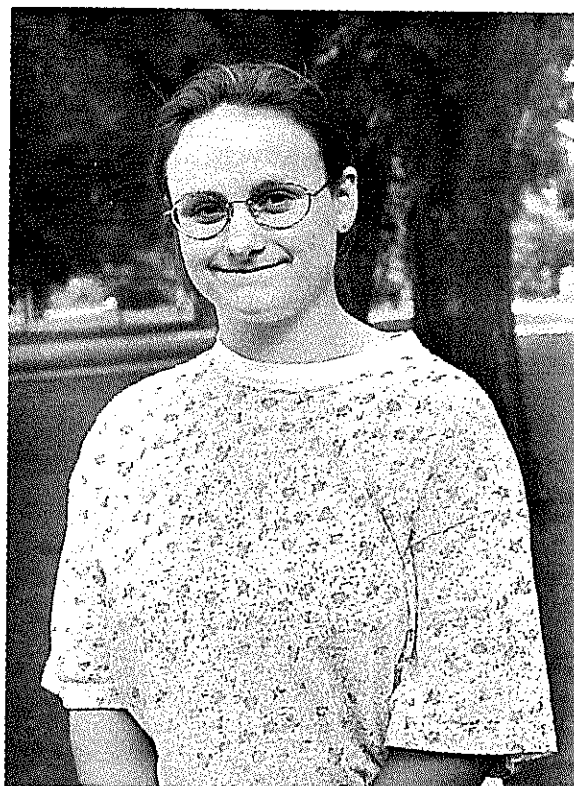
This summer is one that I will always remember. I worked with another WISEST member Donna Fung under three grad. student supervisors: Karen, Kim, and Sandy. Karen was studying the effect of liming on benthic invertebrates. When lime is added to the lakes, it forms a layer on the bottom of the lake. The creatures that live down there, the benthic invertebrates, could be affected. So for most of the summer I was looking through a microscope trying to find dead bugs that are the same color as the algae they are in. It was actually really neat to see the different types of invertebrates that live at the bottom of the lake. Some of them looked awful, but others were almost cute. Karen was running experiments that needed live invertebrates, so I got a chance to go out and take samples from the lake bottom with her. It was hard work, and muddy! Back in the lab we had to pick the live "bugs" -- they are a lot harder to catch when they are alive!

Kim also had to collect samples from the lake bottom for her experiments, but she needed the mud. Kim was using core samples from different lakes to determine what removes phosphorus from the water the best (e.g. lime or iron). Donna and I had to hang over the side of the boat to put caps on the cores before they fell out. We almost fell in several times. As the corer was pulled out of the water Donna and I had to make sure the caps stayed on. If they didn't, we got smelly mud all over us. It was lots of fun though, so we didn't mind getting a little wet.

Sandy was looking at nutrients in agricultural and forested streams. Samples from automatic water-samplers placed at various streams had to be collected every few days, especially if there had been heavy rain. I went with Sandy and her assistant a couple times to collect these samples. We also had to take the water temperature and height while we were at the stations. Because Sandy measured the water samples for phosphorus, all the glassware that she used had to be washed seven times without soap (soap has lots of phosphorus). Donna and I both ended up washing dishes several times, for Karen and Kim as well as for Sandy.

Because we were missing the Wednesday information sessions, our supervisors arranged for us to work with other researchers. Very soon I was plunged into the middle of nowhere and told to look at the sky through a toilet paper roll. I was examining vegetation for bird watchers. Getting up at six in the morning and walking through the forest in full raingear on a hot day with plenty of mosquitoes and a possible bear gave me another look at scientific method. Luckily, we didn't see the bear. Fortunately, it was early in the summer and I had a great time.

I worked with two other researchers who were studying loons. One day I got to sit in a canoe and paddle around the lake with Cindy, the other day I got to sit in the sun at the side of the lake with Bev. When we were canoeing up the lake we saw plenty of wildlife: a great blue heron, kingfishers, at least a dozen pelicans and even a deer. We didn't see many loons though. When I was with Bev, she got the easy part -- looking through the binoculars. I had to write down what that particular loon was doing. The mother would come up from a dive, feed the chick, and dive back down all within five seconds. It got hectic.



As well as the U of A researchers, there was a team of researchers from Florida State University. They were studying the release of methane from fens and bogs. Both Donna and I went out with them to the fen. Plastic chambers were set over some plant and sealed. Every four minutes we had to take a sample of air from the chamber with a syringe. That was one of the easiest days I had. I worked at the fen several times because my own project that I was doing.

As part of the "experience" all five WISEST students at Meanook Biological Station were taken to Calling Lake where there is a research camp. The researchers live in tents for the summer. Compared to Calling Lake, Meanook was very nice! We didn't get to see the main camp because the roads were very bad, but we got to see another smaller camp. We learned about ALPAC's tree cutting methods and talked with a couple researchers about their research. Most of them are studying the effects of logging.

My summer at Meanook station is, as I said, one that I will never forget. It helped me realize that much of research is preparation, not just field work. I learned that it can be tedious at times. I realized also that scientific research can be fun and interesting, if you like what you are doing. I really enjoyed my time at Meanook, and as a result I realize that I still want to go into science. Maybe I will end up back at Meanook.

Dorothy Kelker

Getting Paid for Doing Something I Enjoyed

Working at the Devonian Botanic Garden has been a educational and worthwhile experience. (And fun!!) I've gained knowledge that will be useful in the future and learned processes that I may do again. Although I haven't become obsessed with botany, I have an interest in it that I may pursue. (Watch out plants here I come!) Also, I've discovered a appreciation for nature, flexibility, cooperation, and other people.

Through out the weeks I've been working mostly with Mrs. Elisabeth Beaubien, M.Sc. (My mother away from home.) She is a research associate in phenology. Phenology is the study of the times of recurring phenomena in nature, especially in relation to climatic conditions. Her phenological studies include one project that was started about six years ago and is ongoing. This is a survey of fifteen Alberta wildflower species. I aided her with the correspondence for the Wildflower Survey. We also went on seed collecting expeditions. (What's a libo?) She's very much a naturalist and was great fun to work with.

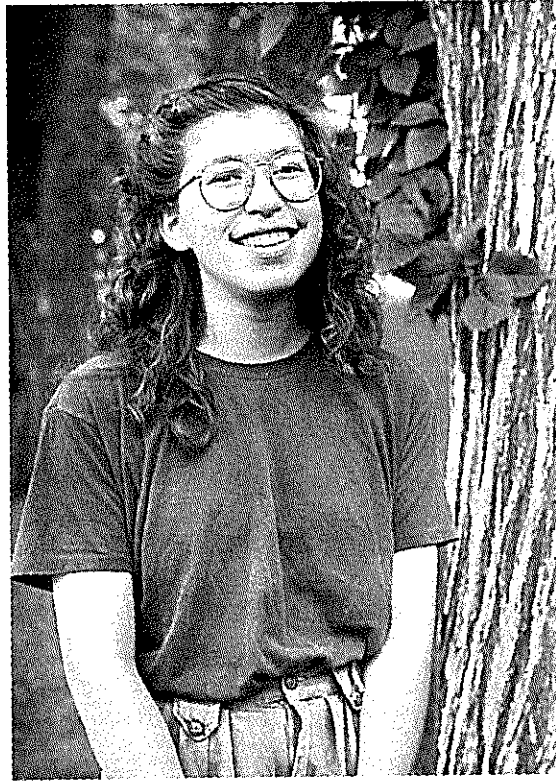
Dr. Dale Vitt is the director of the Botanic Garden and is also my overall supervisor. I think I saw him all of three times. He's been on holidays a lot, he's in Tennessee now, when he comes back he's going to China. Dr. Vitt's interested in the restoration of damaged ecosystems. To assist his work I've been recording the flowering and fruiting dates of the Albertan flowers in the Garden. (Yes, this plant is in full bloom, so it's R7.) Mrs. Beaubien was very patient when I was learning how to do this. Once the information is gathered I record it on a database. It'll be easier for people to collect seeds, etc. when they know the times to do it.

Twice a week I help raise public awareness. There are many flowers in the Garden but as instructed by the assistant director I pick about a dozen different species to display with a label. (*Solidago rigida*, Goldenrod.) Labelling the flowers not only helps the public but also teaches me more Latin and more about the plants. The Garden is blooming with flowers so it's fairly simple to find some to put in the cabinet. (The day after it hailed was a little more difficult.)

It may sound like my job has been boring but it was actually far from it. One day I helped one of Dr. Vitt's graduate students. She's studying the restoration of harvested peat lands. We "planted" peat moss and labrador tea by spreading thinly with shovels. It was muddy, wet, windy, and loads of fun. I've enjoyed the wonderful ice cream at the concession. Not only did I enjoy ice cream but I did spend more than half my time outside in beautiful surroundings.

I've also learned the important skill of using a power sander. I'm sure not many people have sanded aluminum stakes before, so I feel very privileged to have had this opportunity.

The WISEST program has been a wonderful experience. I'd like to thank Elisabeth, Maureen, Sharon, Claire, the butterfly people, and other people I've worked with for making this six weeks the best summer of my life. I really can't believe it's over. But I'll sadly say good-bye to potting soil, data sheets, incompetent



computers, phone-pro, mosquitos, seed packets, squirrels, and the best ice cream in the world. And I got paid for doing something I enjoyed.

Liana Bradley ©

MY "WISEST" SUMMER

by Jessica Shewchuk

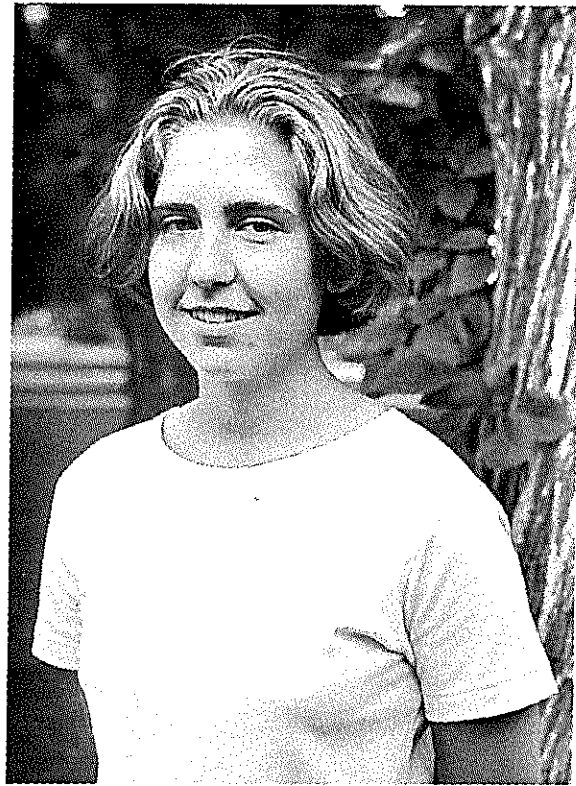
I had never heard of WISEST until my biology teacher gave me the application for it. I decided to apply and to my surprise I got a positive reply and this annoying survey to answer. After mailing in the questionnaire, which took me a lot longer to answer than what they said would be forty-five minutes, I waited. As you can see, I was pleased to be accepted for the six week work program.

The first day I was really nervous. I had never been on the university campus before and didn't know what to expect. I was relieved when I found my way to the meeting area without any problems and that everyone was really friendly. After preparation speeches were given and forms were filled out, we finally met our supervisors. I was to work with Dr. Dale. He took me to his office in the Biological Science building and gave me a brief explanation of what I'd be doing in the next six weeks. I had previously been informed that this building was very easy to get lost in and soon found that it was.

My six weeks consisted of several assignments. First, I was to research papers looking for information on positive associations between plants. At first this was rather difficult but after a few hours I understood both the articles and the library system much better. Secondly, I did some more research on the population genetics of wild herbs. My third task I worked on tracing lichen mosaic patterns from slides to graph paper. I would mark the borders of the lichens and then enter the information into the computer. We had a few problems entering the data, as we discovered errors only after completing a few mosaics. Though this task was repetitive the final results were interesting.

In my fourth job, I was lucky enough to be working outside, on the roof of the Biological Science building. I planted, watered and weeded for an experiment on the growth competition between plants. My fifth and main job was also outside working out in the field at Wagner Natural Area. The work consisted of seventy-five hundred quadrants 10cm^2 filled with different grasses. My job was to identify which grasses were present in each quadrant and then measure their height. At first it was difficult to identify the different species, but I soon caught on to the little differences in texture and shape. Finding some of the pegs that marked the quadrants was an adventure as was trying to keep the horseflies away. In the end we killed thirteen horseflies, beat the heat with water fights and still managed to get all the work done.

Having a variety of jobs to work on during the six weeks made repetitive tasks interesting and enjoyable. More importantly I've met new friends, worked with interesting people, gotten a feel for university, gained valuable work experience, and made a little money. I've gained knowledge about science (particularly botany) and the university environment in general. I am



looking forward to the possibility of a job next summer assisting Dr. Dale. My "WISEST" summer was very rewarding and I'm very thankful for the opportunity. I would strongly recommend the program for other students and would suggest that it be made more widely known especially to students.

Claire Galibois: Devonian Botanic Garden Butterfly House

The main purpose of my project was not research, like most of the others, but public education. As such, in some ways, it was much more interesting. Never a dull moment one might say. Visitors, though mostly Canadian, were often European or even Australian!

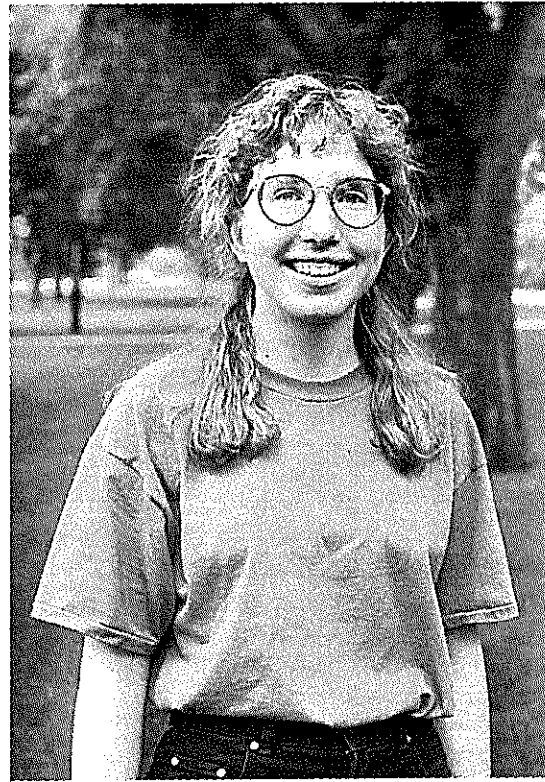
Along the lines of public education, we talked about the butterflies in the house, throwing in interesting little stories about the butterflies, like the story behind the Postman's name; it has a specific "route" of flowers it goes through every day without fail. We also often talked about native butterflies and the plants necessary to attract them.

Talking to people, though important, wasn't the only thing we did. Every two weeks (or so) a shipment of pupae would come in. Brent Karner (entomology Masters student in charge) would take them through Customs at the Muni and once he got back, the often ... interesting task of "pinning" them would begin. Each caterpillar hangs itself by a silk pad when it pupates, and most of the pupae came with it. With those, it was simple enough; stick a pin through the silk pad and then through a strung cord in the incubator. For the ones not fully equipped(!), we made silk pads with white glue and cotton batting. Both procedures were often made more difficult by wriggling cocoons - the end that wriggles is the one we have to pin!

Every morning, the first "thing to do" is checking the incubator to see if any butterflies emerged. They come out in the morning, usually before any staff arrive. Members of one species, the Blue Clipper, make it really hard for us to move them into the house. They all come out at once and are usually flying around the incubator by the time we get there! They usually have to be released and netted them because they do not sit still! The largest butterflies don't fly off until much later in the day; their wings take much longer to harden.

Did I not mention hardening before? When butterflies first emerge, they either hang from their cocoons (chrysalis?) or climb up the side of the incubator/branch and wait until their wings expand. Once they are expanded, the wings start to harden. The butterflies usually fly off as soon as their wings are hard enough. Hardening continues throughout life; by the end, the wings are so brittle that being knocked against a leaf the wrong way can break them. Thus old butterflies are usually quite ragged.

A word of explanation is perhaps needed about the picture. The box is the incubator: glass, with brown paper taped on to limit the amount of light allowed in. The dark things on strings are the pupae, and I am unpinning one with a butterfly dangling from it, though that part is blocked by my hand. From there, I took it into the house, where I stuck the pin into a crossbeam and left the zebra there until it was ready to fly. Now to plants.



Despite their rapid growth, some plants still need protection from the butterflies that lay on them. Postmen and Zebras both lay on the Passionflower vine, and their larvae have eaten a few plants almost to death. Because of that, we checked each of those plants several times a day for eggs. We then moved the eggs to plants with more leaves. In one case, I found six eggs on each of the four leaves of a vine. I might stress that each larva eats, by itself, much more than four leaves. *Slight* overestimation of resources, I'd say!

Care of the plants also includes daily watering, a process which on a hot day can take up to two hours. The daily watering is a time where sometimes more than the plants get watered. And I'm not referring to butterflies, either!

Anyone who's wandered through the house will probably have noticed two yellow dishes on poles. These contain fruit punch for the butterflies. They provide both a pleasant change of diet (some other houses use rotting fruit halves) and great photo opportunities. We kept an eye on them to make sure there was always something in there.

The saddest (and one of the dirtiest) jobs was looking for dead butterflies. Butterflies live only two to four weeks as adults, so there are always some dying. There are a few "forgotten corners" in the house that I checked; most of the dead were found there. A fair number of dead butterflies came from the blinds; on a hot day, they'll fly up and literally fry because the sunlight's so intense. If they were in good enough condition, we (Brent, Kirsten [a staff member], or I) or the Crafters would mount it. Some could be mounted immediately, others had to be "relaxed" first in the relaxing can: a tight lidded can with water in the bottom and mesh to hold the butterflies. The well mounted ones were then sold in the gift shop. I practiced on the not quite good enough butterflies, which is just as well, considering the damage I did to some! At any rate, none that I mounted were ever for sale.

The other dirty job has been dubbed "spider patrol" or "web watch." Spiders do sneak in and one of my most important jobs was destroying the webs and crushing the spiders. Might I add, my most disgusting job. I rescued some butterflies from webs, but by the time we found them it was usually too late. Spider patrol often involved climbing into even more forgotten corners than looking for dead butterflies as spiders *do* chose the oddest places for their webs!

There is no such thing as a typical day at the Butterfly House. Each day is completely unpredictable, and I quickly learned to work on a "need to do" basis. Weather played a big part in my schedule; if it was too hot we couldn't do any work near the roof (like shaking out the blinds). As well, if it was hot (or cold) we couldn't plant anything. And sometimes (like my first day), a shipment of cocoons would come in unexpectedly and Brent would have to abandon his plans for the day and leave me to find something else to do - like the neverending weeding.

Overall, I've had a wonderful job and am quite sorry to see it end. I can never see the long-term results of talking with the public, but a lot of people were quite grateful for the information I gave them. Best of all, I am now comfortable with public speaking. An indirect result, but an important one to be sure! I can only hope that the next WISEST student to get this placement will enjoy it as much as I did!

MY FUTURE

For all most every child growing up an important question that is asked is "What do I want to be when I grow up?" Children play games about it, teenagers go through different fads as to what they will choose as a career, but as you approach the time of decision the games stop and you have to face the fact that what you decide to do will affect the rest of your life. In my life, there have been many things that I've thought of doing but as I entered high school and was beginning to find out who I really was, I began to get a better idea of what I wanted to do with the rest of my life. But now, thanks to the WISEST program and all the people I had the opportunity to work with at Meanook Biological Research Centre near Athabasca, I now know, for certain, the area that I am going to choose as my career and the kind of work that I will love. I have ways enjoyed science and working outdoors, and I know now that I can combine what I enjoy most in life and turn it into my career in Biology., thanks to my wonderful experience this summer.

The work that I did out at Meanook has been one of the best learning experiences of my life. I worked for an enthusiastic, but sometimes sarcastic, Graduate student Rena Vandenbos. Rena is looking at populations of fathead minnows and trying to determine that if the population size is known at the end of the season, could you predict the population for the coming year, taking into account such factors as survival of the fry (baby minnows), mortalities, population densities, food availability, and cannibalism. This could be very beneficial for fish management activities and predicting the future always is of a great value.

Rena has two experiments taking place over the course of the field season. For one, she has three ponds that are divided into six subponds with polyvinyl tarps, in which she has stocked specific densities of fish; one fish per cubic meter and four fish per cubic meter. She has nest boards set up for them to lay their eggs on; fat heads lay their eggs on the under sides of such things as lily pads or logs. This is where she is testing their reproduction, survival of the fry, affects of density, and other factors. Biweekly, we would trap the fish in minnow traps, count them and measure them. They were already marked according to sex and general size with a pigment that she had injected just under the scales; different places for the different sexes and sizes. Daily we would check the nest boards for eggs and record their location, stage of developement and the number of them. We would also catch fry using tow nets and preserve them for a later date when Rena will examine the contents of their stomachs. These three ponds are the center of her work and experiments.



She also has a pond in which she has built twelve enclosures where she is going to run cannibalism experiments. We were just beginning to prepare these experiments when I left. We were going out to lakes and catching as many fry as we could with dip nets, bringing them back to the station for measurement, and preparing the size ranges that she is going to test in the enclosures. For this experiments she is going to put several hundred fry of different lengths into these enclosures along with several adult minnows. After a period of time she will collect the fish and determine how many of the were eaten by the adults and of what sizes. This will help her determine certain factors that affect fry mortality.

I also worked alot with another Grad student, Mariola. Her project concerned how the growth rate and survival of minnows depends on the quantity of food, in this case zooplankton (small invertebrates). Knowing the effect of population densities of minnows on the food structure can help predict their survival and growth. I mainly helped Mariola collect samples dealing with the water quality and the plankton using a water sampling trap and Shindler-Patalas trap. It was wierd seeing how many things live in just a drop of water, and some of them are kind of cute.

I experienced all the different sides to field and science work, from the tedious to the exciting. I inputted data into computers, processed samples collected in the field in the lab at Meanook, worked with microscopes, and cleaned many fish tanks. I also spent a lot of time out in the field (that was the part I liked the best) collecting samples of minnows. I really enjoyed the variety in scientific work.

My experience at Meanook was quite unique because I got to help other Grad students with their work, I didn't receive a limited perspective on scientific research by working solely on one person's project. The other WISEST students and myself were also lucky enough to spend a day out at another, more rugged field camp where we saw another side to field research. The people out at the Calling Lake camp worked with Al-Pac (a logging company) researching the effects of logging on song birds. They lived in tents for their season and got around on quads. It was a very different life than the one we were experiencing at our luxurious research station.

My summer and the work that I did has been one of the best experiences of my life. The information that I gained concerning everything from research to the way the University works has been invaluable. I even learned that fish were cute and I got over my fear of leeches. The people I met were fantastic and very willing to tell me anything I wanted to know about their projects, how they decided what to do, how they got interested in it or anything about university in general. Thank you to the WISEST program and everyone I worked with at Meanook for the valuable experience.

Kathy Uradlicka

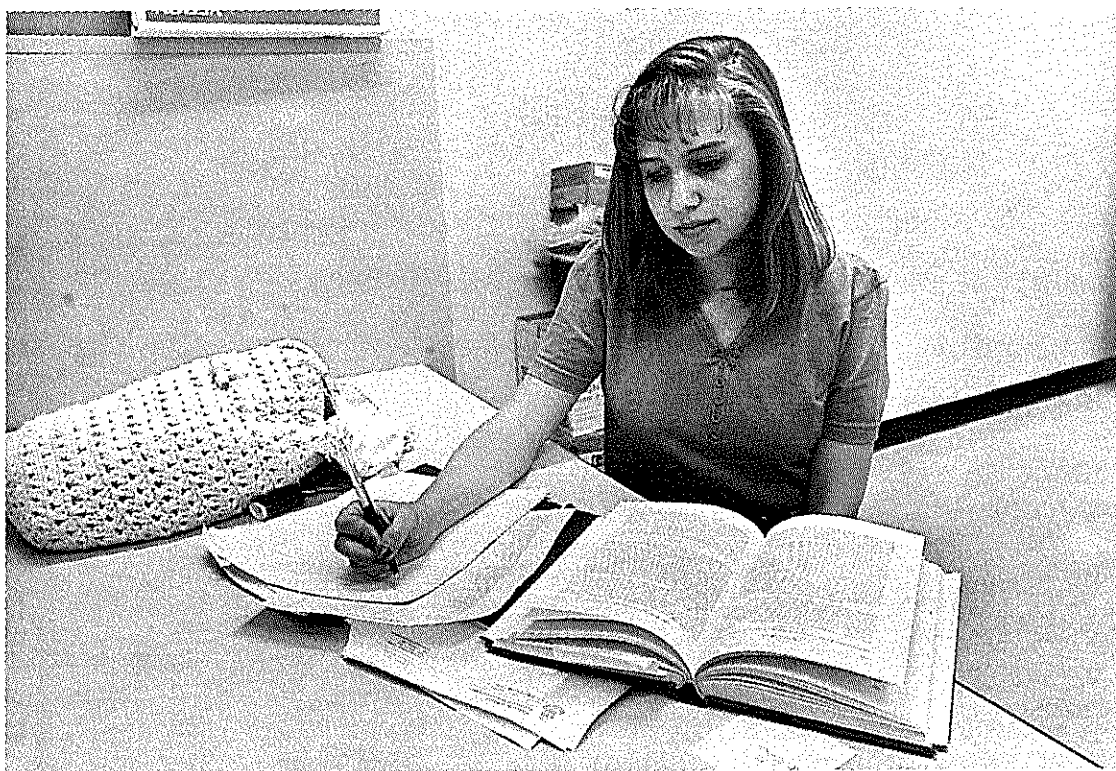
This summer at WISEST, I worked in the Mathematics department at the University of Alberta under Professor J. Timourian. This has been an experience I will not forget. My project was to find out information about different mathematical problems that have practical applications, so that someone could see what is taking place and be able to figure it out in a number of different ways. This would include solving the problem mathematically, actual, statistically, computer-generated answers and in some cases even chemical formulas were part of the answer. I spent a lot of time in the Mathematics library and the Cameron library and believe me, when our tour guides said there are about 3.5 million books in the university campus libraries, they were not kidding! While I was in the library I compiled reference lists of books which would be useful to the person who is actually going to set up this exhibit. I also interviewed other mathematicians to hear their views and ideas on what they thought would make a good math exhibit.

The purpose of my project was to help set up the math exhibit so that when other young people who are in high school come to the university, they can see hands-on applications of math rather than as Professor Timourian said, "A bunch of old mathbooks and professors!"

I must admit that at the beginning of the summer, I was overwhelmed. The books I was researching were way over my head and it looked all Greek to me. The material that I researched this summer is still very hard for me to understand but now I have some idea about what to expect in university if I decide to pursue a degree in mathematics.

The last two weeks of the program, I was given a specific problem to work on dealing with the math of finance. The problem was to find out how long it would take to earn a million dollars in the bank if you were to collect 100 aluminum cans everyday. Every Friday morning you would take the cans to the bottle depot and receive \$0.05 for a can. This money would then be deposited in the bank at 8% interest compounded monthly. I have determined that it would take 47 years and 30 weeks to achieve this.

As far as my experiences with WISEST go, I have had a very good summer. I enjoyed meeting so many other girls who like math and science as I do, and I was even more amazed at



the large number of people who applied for WISEST. I feel very lucky and grateful that I was given the privilege to work here for the summer. I was very surprised to see that there are very few women here, for example, in the mathematics department I didn't see any women professors at all. On the whole, I believe this program is definitely a step in the right direction for promoting women in science.

By

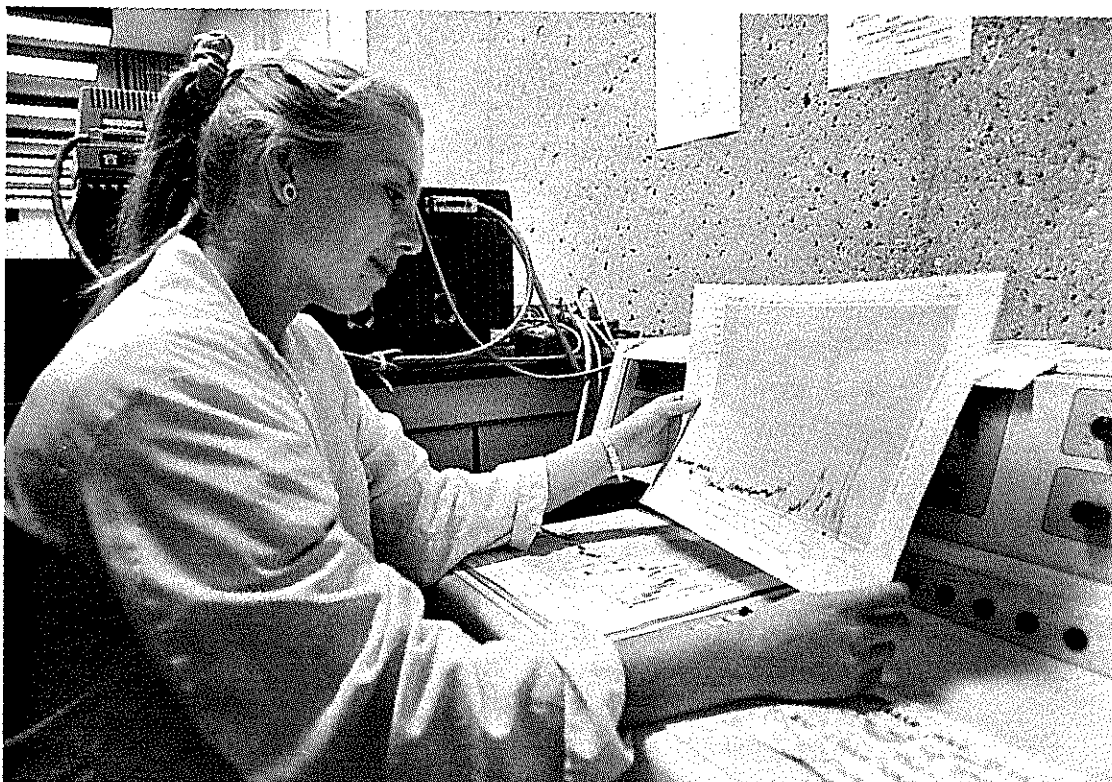
Lisa Wagner

Mathematics

My WISEST Experience

Hi! My name is Lisa Marie Soetaert and I worked with Dr. Kopecky in the department of Organic chemistry with Marika Warren. I was assigned my own individual research project which involved completing a series of reactions in order to create a 3-ringed alkene which is highly reactive and needed for further research. The final product will be lysed with O_3 where if it becomes luminescent, it can then be used in DNA sequencing research. I got as far as completing the first 2 reactions and producing 2 types of crystals. The first reaction yielded reddish-orange crystals known as 4-nitrophenylglyoxal and my second reaction which I am just completing yielded fine white crystals which looked like miniature snowflakes. I can't describe the feeling I had when after a lot of hard work, dedication and failure in the 6 weeks, I finally achieved my desired product or so I hope. I just finished performing a number of analytical tests like a NMR (nuclear magnetic resonance), TLC (thin-layered chromatography), a mass spectrum, elemental analysis and a MP which will come back proving the true nature of my compound, hopefully showing positive results. At the beginning of the program I have to admit I wasn't crazy about my job and found it uninteresting but I have grown to really enjoying my work and hate to leave it unfinished. I wish whoever takes over my project the best of luck in obtaining the 3-ringed alkene.

I would like to personally thank Dr. Kopecky for giving me my own research project from which I learnt a lot and for his infinite amount of patience with assisting and answering all my questions. I would also like to thank Sarah and Paul for showing me how to use all the high tech equipment and in helping in any other way they could. Most importantly I'd like to thank my lab partner Marika who was terrific to work with, even though I did not share in her passion of music. Marika was a constant source of entertainment and there was never a dull moment with all her witty comments and actions like dancing down the hallway and playing dead on the lab floor. In her spare time you could always catch Marika at Sarah's desk or at the storeroom for one reason or another.



One of my highlights through the six weeks was having the picnic at the Legislature where I ended up totally soaked but had a wonderful time doing so. I have made many friends and memories here which I will cherish in my heart always. New careers and doors have ~~now~~ also been opened for me and I feel more prepared for University which I plan to attend after High School. Good luck Marika, Cindy, Lana, Jessica, Nikolina and the rest of the WISEST participants in the future and may all your dreams come true!

Thank you very much WISEST for making this summer experience possible for me, you did a great job!!

*Lisa
Sobczak*

Summer of 1994

Final Written Report
Department of Zoology
Erin Dixon

I began working in the Department of Zoology approximately six weeks ago as a part of the WISEST program. This was my first real job and one of my first times on the University campus, so I was overwhelmed and very nervous the first few days. I was supposed to work with Dr. Prepas but she was in Meanook working on the field, so I had Gertie Hutchinson and Patricia Burgess as my supervisors. I also worked with another WISEST student, Vicki Christeas.

For the first few days, I washed many dishes; *beakers, graduated cylinders, test tubes, etc.* The process for cleaning dishes is very tedious; first you rinse them a few times, then put them in a hydrochloric acid bath to soak overnight. Next you take them out, rinse every single thing seven times, and finally, you put them in the oven until they are dry. After a while, I got very tired of doing dishes, but I found that they were not that difficult once you learn about the shortcuts (like rinsing four tubes at a time instead of just one).

Basically we test water samples from lakes throughout Alberta. Many samples are sent in by companies and individuals in Alberta and sometimes the samples are collected and brought in by people I work with who have gone out in the field. The lakes are sampled for various things, as different lakes are being tested for different things, for example, one person is testing only saline lakes to see what happens to them after time. However, I have done several tests for numerous samples from different areas.

After a while I was introduced to more interesting and challenging tasks. I have helped test for a variety of things, such as, chlorophyll, phosphorous, turbidity and color, TDN (total dissolved nitrogen), ammonia and nitrate, TKN (total Kjeldahl nitrogen), pH, etc. To do these tests, I was able to use much of my chemistry knowledge. I had to filter samples, add chemicals, and work with sophisticated machines and tools.



During the last few weeks, I began getting more comfortable with the people I was working with. We talked more and even joked around during breaks. I was disappointed to leave just after feeling as if I belonged. I was also getting familiar with the University environment and many of its' facilities.

I have met new people from both, where I worked and the WISEST group. I really enjoyed the Tuesday lunches and the Wednesday afternoons together. I think one of the highlights was the trip to the TR Labs and the picnic afterwards. The water fight (and the walk back to the University) after our tour and picnic was definitely something to be remembered.

I feel very lucky to have participated in something as challenging and educational as the WISEST Summer Research Program. This program has given me some new alternatives in planning my future. I believe one of the most important developments of this program is my own personal growth. I have a new understanding of responsibilities and am certain that this alone will help me through the rest of my schooling and working career. I can not believe it is already over!

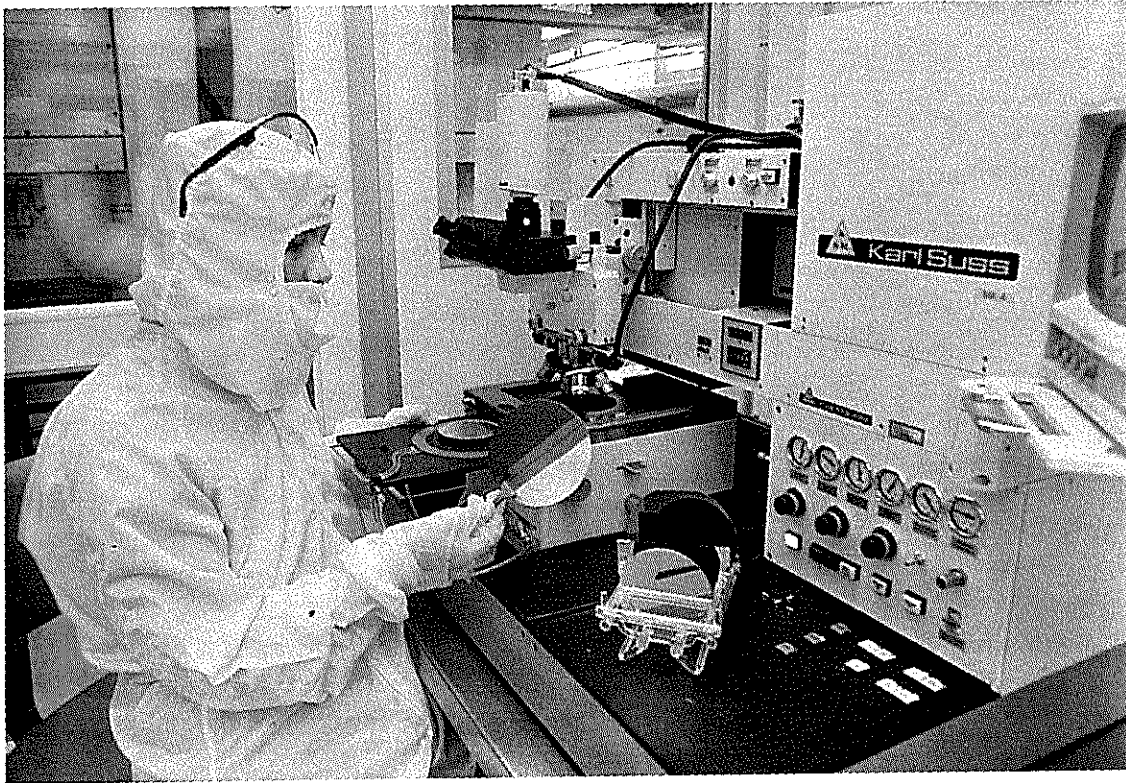
MY REPORT ON THE WISEST EXPERIENCE

I spent my summer working at the Alberta Microelectronics Centre here on campus. My supervisor was Dr. Yuebin Ning, but I ended up working with several people on various projects. The two main projects that I worked on were photolithography and electrochemical discharge drilling of glass.

Photolithography is the process by which thin films of metals are patterned onto other substances. It has many applications in creating microelectronic devices. I assisted in developing photolithographic processes to produce computer screen displays, thermal printheads for fax machines and delicate medical equipment.

I also spent time trying to drill holes in glass microscope slides electrochemically. This involved placing glass slides in a petri dish full of sodium hydroxide, placing the tip of a tungsten needle in contact with the glass and running an electric current through the needle. The electricity causes a chemical reaction that should drill a small hole through the glass. However, the process was extremely temperamental and I ended up devoting a lot of time to making it work better.

I have learned many things this summer. I have definitely learned from my mistakes, which have been numerous. (I think Murphy's Law was written with me in mind.) Fortunately, the staff at the Alberta Microelectronics Centre were willing to let me work at my own pace, which helped me adapt to the routine there. For example, part of the lab is a "clean room" that is specially designed to keep out particles that can damage microelectronic devices. To go in, everyone has to wear a bunny suit that covers them from head to toe. (Unfortunately, the suits no longer have ears since they kept getting dipped in toxic chemicals.) I'm kidding. They never had ears, or tails, but for some reason the name stuck. Go figure. In a clean room, everyone looks the same from the back so I had a great time learning names.



I was also exposed to many new ideas and lots of new technology. Some of the devices that the Alberta Microelectronics Centre works with include accelerometers, microsensors, and microphones, all of which I picked up some background information on. I learned how to use several large machines as well. All in all, I consider this a valuable experience that will help me decide on a future career.

Rose Yewchuk

Six Weeks with WISEST

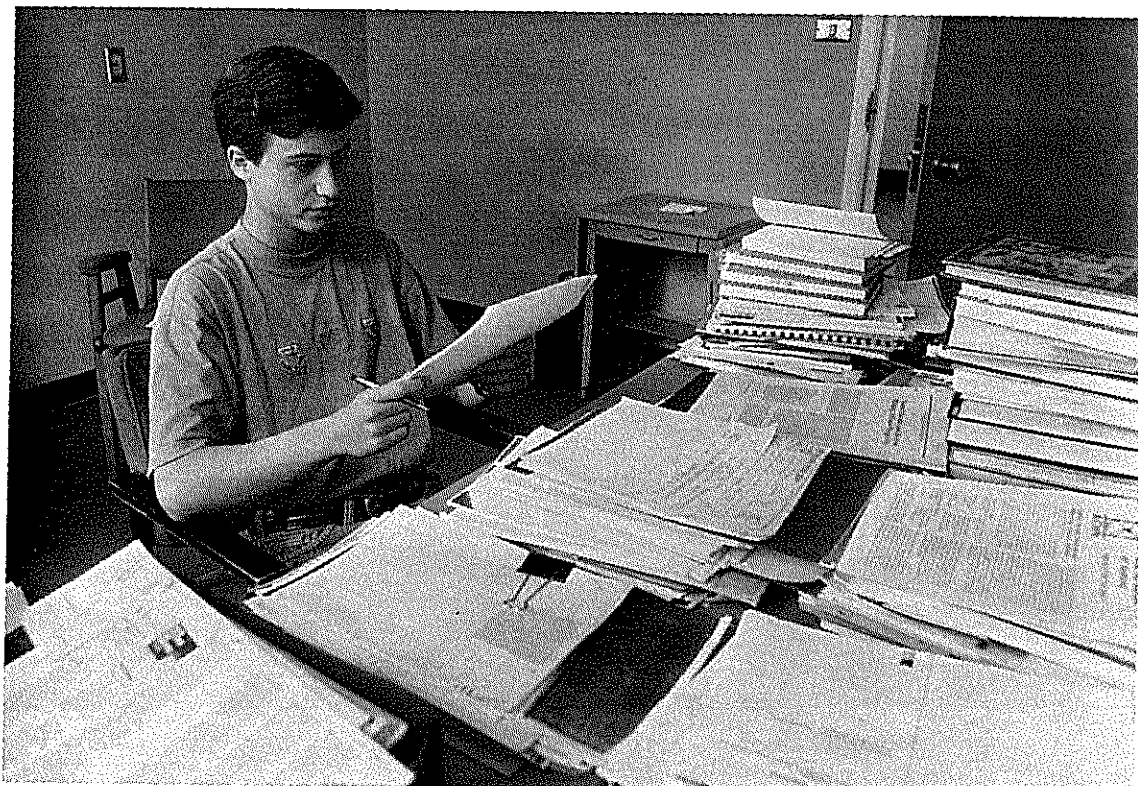
by Zsolt Gabos

When I was first notified that I would be participating in the WISEST Summer Research Program I was excited but unsure of what I would be doing. I was informed that I would be working in the Faculty of Nursing with Dr. Patricia Valentine. I was unaware of what actually went on in nursing and I had the stereotypical notion that a nurse was someone who assisted a doctor with caring out tasks. My image of a nurse was completely changed over the rewarding six duration of the program. Over the course of these six weeks, I was introduced to areas and occupations which I did not even know had existed.

I began my job assisting Dr. Valentine with various tasks involving her research in the area of nursing. This was one of the first of many new things I learned. I was unaware of the fact that research is an important aspect of nursing. I assisted Dr. Valentine by creating bibliographies for her papers which she plans to publish in journals. I used the program Pro-Cite to enter the information into the computer and print it out in the form of a bibliography. I also assisted Dr. Valentine by conducting research in the library to locate resources for the papers she was working on. I learned to use to library's CD-ROM system and the online catalogues to locate various resources for the bibliography.

After working with Dr. Valentine for a week, she left on vacation. I resumed my work with Dr. Beverly O'Brien, also in the faculty of nursing. I also assisted Dr. O'Brien with creating a bibliography for her research project on vomiting and nausea of pregnant women (morning sickness). For the research project, which was only in its beginning stages, I gathered some background information from the library necessary to start the project. If the project gets approved by various ethics boards, it hopes to determine the effectiveness of common ginger and the drug Diclectin for treating morning sickness, which lasts the entire day in many severe cases.

During my work in the Faculty of Nursing, I was taken to observe various other areas related to health care, along with the other two WISEST students working in the Faculty of Nursing. These trips were excellent experiences as they provided us with incites to all the different fields in the area of nursing and other health care related professions. Until WISEST, I was unaware of all the different fields in the area of nursing alone. We visited the Indian Reserve Enoch and were introduced to the public health nurse who provides services to the Indian community. On the other end of nursing, we were introduced to a nurse in the intensive care unit (ICU) at the University Hospital. A public health nurse and an ICU nurse are very different in the services they provide. On another field trip we were introduced to an optomologist at the Charles Campsell Hospital. We watched three eye operations and were given the opportunity to discuss optomology with the doctor.



My six week experience with WISEST was very beneficial as it introduced me to some of the many opportunities available for the future. My work introduced me to some of the aspects of the ongoing research at the university. I learned new skills in terms of more efficiently conducting research. I also learned how to prepare a bibliography, which will be necessary for the future.

INGREDIENTS FOR A WORTHWHILE, INTELLECTUAL, SUPER, ENTERTAINING SUMMER TIME

INGREDIENTS

- an interest in science
- courage (to ask your teacher for a recommendation)
- luck (it was a draw NOT brains -thank goodness)
- six weeks of summer bumming-around time
- room in your bank account for a thousand bucks
- a desire to meet new people and try new things
- dedicated professors willing to sacrifice their time and effort
- grad students (and others-like Lory) willing to let you follow them around like puppy dogs
- co-ordinators (Dr. Armour, Dr. Tovell, Salima and Linda) willing to do everything possible to make the summer enjoyable and educational

Our homeroom teacher has this habit of tacking up useless, good-for-nothing notices on the board. I'm the first to admit I NEVER look at them. How then I eventually ended up applying for and being accepted into the WISEST Program is a story in itself.

My classmates were up at the board, drawing moustaches on the women on the calendars, when all of a sudden I heard a shriek and a voice (of a future Arts student) exclaim "Oh my God for that kind of money I'll change my major and pretend I'm in grade eleven " (a condescension in itself-as any grade twelver will tell you). What were they talking about I wondered and soon found myself doing THE DREADED and LOOKING at the bulletin board! It was a notice for the WISEST Program and I decided to apply. After all what could I lose? To my surprise I actually got accepted. I was ecstatic (at first). But as the fourth of July approached I began to dread the fact I'd even applied. What if I was the dumbest one there? What if I couldn't do what they asked (like isolating embryos)? Would they toss me aside like a dirty rag (they didn't)?

The first day was no picnic. When the only building you know on campus is "the big yellow building", you're in trouble. I remember searching for Chemistry E3-25. After asking one guy who hardly knew where he was going and an art student who really didn't care where Chemistry was I finally somehow wandered into it. The orientation was the usual - forms, introductions, and more forms.

The second day was tougher. Jennifer (my partner) and I were on our own. There was no one to ease the pain. It was just us, Dr. Cass, a whole bunch of new faces in the lab, and five rooms filled with corn plants in the department of botany. We were going to be working on a project involving in vitro



Jennifer Tees Jeena Oommen

fertilization of corn. Now you're probably thinking what I first thought: is this a sick joke? Well it isn't. Plants reproduce just like humans-by fusing the sperm and the egg. Here's how it works (minus the gory details). The corn plant grows tassels (kind of like branches), and on the tassels are anthers. Inside of the anthers is where the pollen is located. By means of the wind, water, and other organisms, the pollen falls onto the silks of the ear. Inside the pollen is the sperm and once the pollen has travelled down the silk it forms a pollen tube to the egg where the sperm and the egg produce an embryo (not all that different -- in concept anyway -- from what we learned in grade three). The smaller project at hand was whether it was possible to isolate the sperm and the egg and control fertilization. If so, would it then be possible to improve the corn plant genetically through micro-injection of specific genes during fertilization? All of this might eventually lead to increasing the world food supply by making corn production possible in colder, drier, or hotter areas.

Jennifer and I were mainly involved in doing Viability Tests and isolating embryos (something I tried to avoid at all times even when I had to do inventory). But I won't bother explaining those to you. All you have to do is flip through this book to "The Wisest Summer Ever" by Jennifer to find out all you need to know about isolating embryos-yuck! - (sorry John-see I mentioned you).

All in all I enjoyed my WISEST experience. Thanks to Dr. Cass who was always willing to assist us, everyone in the lab for letting us invade the lab (especially Lory for thinking up things for us to do) and the entire WISEST Program.

By Jeena Oommen

The Wisest Summer Ever

I was sitting in class one day and my chemistry teacher was reading the daily announcements. In it there was a poster of the WISEST program. It explained about the summer program at the U of A and since I was looking for a summer job, I thought I would look into it. I decided I would apply and see what happens. A few months later I got a letter that said I was accepted. Here was my chance to make some good "connections", get to know the campus, meet new people, and make a bit of money!

Here I am now, sitting in the plant anatomy lab, typing up my report. For the past few weeks, my bud from WISEST and I have been kept pretty busy. The project we have been working on has to do with the fertilization of corn. The main question we are trying to answer is whether or not it is possible to improve the corn genetically. One reason for doing this could be to increase food production by making the corn able to grow in areas that currently is unsuitable. That is the big picture. However, the work that we have been doing has to do with developing techniques to isolate sperm cells and embryos. This will allow the sperms to be micro injected into the embryo and fertilization can take place.

Specifically, we isolated embryos and counted pollen grains. The embryo isolation involves sterilizing the pollinated cob and the entire work area. We then had to scoop the embryo out gently and place it on a media that contained the ingredients it need to grow. As it grew, we took observations to see which media the embryo liked best. Counting pollen grains required years of watching Sesame Street. I sure am glad that I put my daily hour in! Anyway, what we had to do was to count all the fluorescent green grains and the all the grains in one microscopic field of view and find the percent of the living ones (they were fluorescent). Thirty of these counts were required for each plant. I had two. Their names were Bernice and Herbert.

Sure we did other things that weren't that exciting, but that's life and I'm not going to bore you with the details.

I must say something about the life at Lister Hall. It was a blast. Except for the food. And maybe the elevators that never came to our floor. But all in all, I enjoyed meeting everyone and all the good stuff we did together. Keep in touch!

The past six weeks have been a real learning experience. Dr.Cass, his grad students, and the others who were in the lab taught me a lot about botany and about research. Though they were busy, they took time out and helped answer many questions. I have found WISEST to be a great opportunity and will never forget the WISEST summer ever.

by Jennifer Tees

My Six Weeks With WISEST

by
Petra Studer

I really had no idea what to expect when I found out that I had made it into the WISEST program. I was excited and scared. Excited because my love for science would now be tested, but scared because I would be away from home for six weeks, living in residence where I didn't know anyone. But here I am now, packing up and getting ready to leave wishing this summer would have never ended!

I was in computing science, something I knew nothing about before I started. But thanks to very patient people, I slowly began to catch on. I had a partner named Jennifer Mueller and we got along right at the start. Our supervisors were Dr. Jim Hoover and Dr. Joe Culberson. They got us started on little jobs throughout the summer, leaving us to finish them on our own. I am really glad they had so much trust in us, so I really hope we didn't mess up anything!

One of the main things that Jenn and I accomplished this summer, was making a homepage for WISEST on Mosaic. Mosaic is a program which people from all over the world have access to it. On this homepage that we did for WISEST, we answered some frequently asked questions and also wrote a little about what WISEST is. Schools which have Mosaic will eventually have access to information concerning what exactly WISEST is.

Jenn and I didn't have a specific research project. We became familiar with the way research will be done in years to come. We explored on the computer and tried out different things. It was definitely an interesting way to spend working for six weeks.

Staying at Lister...hmmmm...now that was an adventure in itself!!! There were eleven of us from the WISEST program that dared to stay in residence. I didn't really know what to expect...I don't think any of us did. But little did any of us know that we would all have so much in common!! I will always remember the long talks, card games, LRT rides, our song ("Let's Get Physical"), late night walks down Whyte Ave, fifth floor (and J.F.), parties on ninth Henday, and of course "amoeba". It was a very eventful six weeks!!!

Although in some ways it is good to be going home (real food!!), I do have to admit that this was one of the best summers that I have had! The things I have learned here I will use to my advantage in choosing a career best for me, and the people I have met here have been the best! I feel like I have known them for six years not only six weeks!...I am going to miss this place!



Petra Studer

Jennifer Mueller

The WISEST Experience
by
Jennifer Mueller

I know that when I get home I will be asked one question... Did you have fun? Well, the answer will be...Yes!! I was definitely scared and questioning my decision to come here. but I knew that everyone felt the same way as I did so I was relieved! Right from the first time I walked through the door where we all met I had fun!

I enjoyed my work, and now I know that science is way more than what you see in science class in high school. I was not doing research, but from others reports I found that they were actually doing something new, not something that was done over and over. I learned a great deal about computers(a little programming) but mostly I learned the aspects of the information highway and how amazingly it works for not being run by any one person. It is not formatted, policed and has no borders so the information you come across is unlimited! It is amazing to see how it's possible to receive information from somewhere across the world without lifting a finger.

My main purpose in computing science was to learn how to research in the form that is widely and quickly changing! You don't have to go to the library and look up books and authors for two weeks anymore! It may take two hours to find the information you need from the Internet, through new techniques and being able to contact people and transport information so quickly and cheaply! You have e-mail to contact people as well as newsgroups to ask questions on where to find some information, etc. We used a program that used links to find information called Mosaic as well.

My partner was Petra Studer and we got along just like to best friends that had knew each other since grade one! Our supervisors were Dr. Jim Hoover and Dr. Joe Culberson, who were very busy moving offices most of the time as the buildings were rearranging, so we were often left on our own to explore and find new things we could use. We would not have survived alone if it were not for the great help of two first year students, Adam Beacham and Howard Cheng, who got us out of quite a few binds! "Hellllp!" , was often heard throughout the day!

It was a great experience! But of course it was not all work and no play! I met a lot of new friends not only from WISEST, also from penpals on the computer! I am not from Edmonton, but I did not stay in residence. I stayed with friends, but I was still welcome to visit the "Lister Hall gang" as if I was staying there! I made new friends over the computer through penpals that I will continue to write even though it won't be through the computer.

And of course there were our "socials". I only went to one of them (the Edmonton Space and Science Center) it was fun and I really enjoyed it!! Science, science and more science! :)

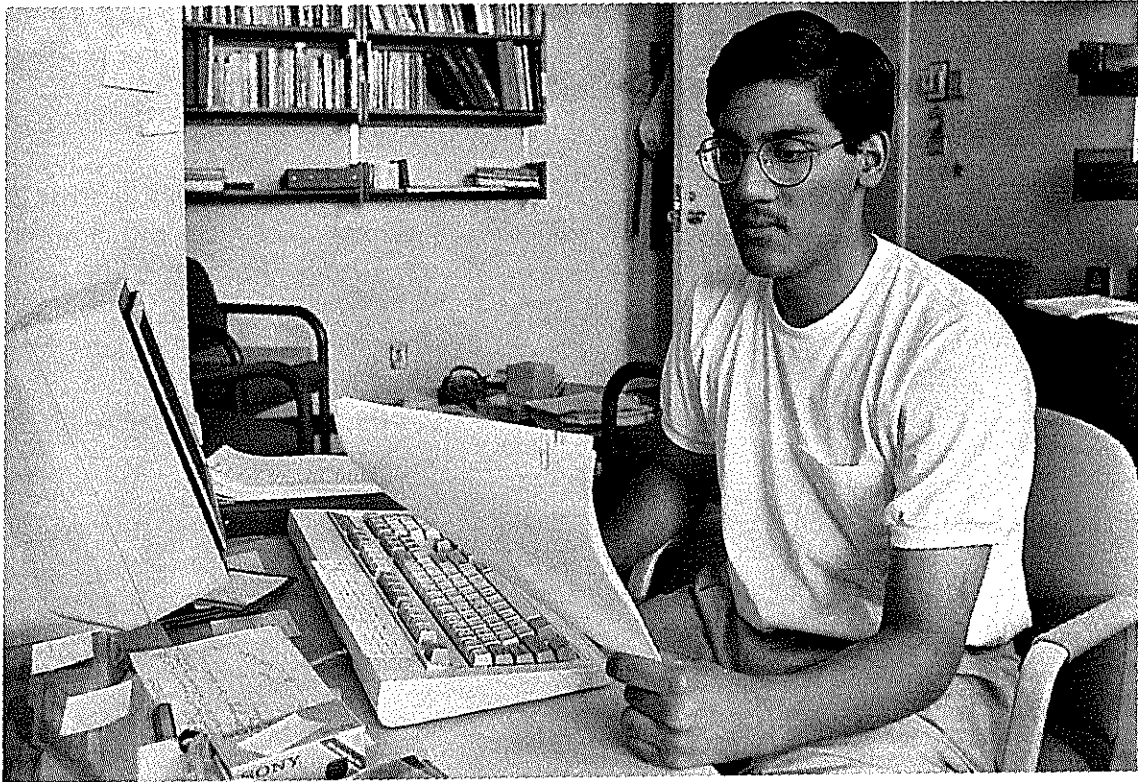
Now regretfully I have to say that our fun has come to an end! I have learned that with interest, science is open to anyone of all walks of life, including women! And I will be grateful that I had the chance to experience University life before hand. I feel somewhat privileged! Now I know that university is not all that intimidating and that it's not all that hard to make friends! I am grateful that I was chosen to be here for a great experience and thanks to all those that made it possible for me to be here!

SIX WEEKS OF SUMMER : MY EXPERIENCES IN THE WISEST PROGRAM

By Nasiruddin Ali Khan

The six weeks of summer, how fast they have elapsed in front of all of the us in this WISEST program. As my duty in the WISEST program was that I was working the Faculty of Nursing in the Clinical Sciences Building on the University of Alberta campus. I was working for Dr. Olive Yonge, who is my supervisor during my stay. Together with Lyle Thomas, who was WISEST student about six years ago, and Gillian Lemermeyer, who is a nurse working in the NICU at the University Hospital. During my six weeks stay, I accomplished many tasks, such as using the photocopier, going around on library searches and working on the best program in the world, PRO-CITE (ask any other person using this program on how enjoyable it is.) The main area of concern of our research is our study on exceptional, non-traditional, caring nursing practises, where we go through interviews of exceptional nurses and code them accordingly to the set guidelines of the research. The categories of sense of self, acts of kindness, outcomes of the acts of kindness, telling of some type of narrative, and demographical information of the subject are all taken for the audiotaped interviews which were completed before my arrival. The coding is completed with a set of letter that were established for the Ethnograph program which summaries the interpretations and analyzes completed by our research group and then place it in the program to complete a search to show a trend that might be occurring according the interviews among the nurses. This research project is very interesting due to the fact that you are able to interpret the kind of personality the nurse has towards her patients as the transcripts recorded. It shows how nurses do different things which makes the patient more comfortable in his new surroundings.

My experiences in the WISEST program has been wonderful. The Tuesday afternoon lunch with other students, the Wednesday afternoon meetings, and the visits to other places outside campus. The visit to TR Labs was an enjoyable one and following that the picnic at the Legislature grounds. I also enjoyed the visit to another lab besides the ones that some other students were working at. Besides the group trips taken; Troy,



Zsolt, and I went to visit other fields of interest that was arranged by our supervisors in the Faculty of Nursing. We went to the transplant unit in the U of A Hospital, watched some Eye surgery at the Charles Cammell with the helpful organization by Dr. Marion Allen, travelled to the ENONC Reservation to see the medical facilities, and also we visited the Pre-Natal Research Lab at the Heritage Medical Research Center. Also, I went to visit Gillian at the NICU (Neo-natal Intensive Care Unit) at the University of Alberta Hospital. The tours and visits to different locations has expanded my knowledge and understanding of the world of Science and especially how difficult of a job it is to be a nurse and I give a lot of respect to the women and men who give their time so that others will be well again. These six weeks in the WISEST program has given me a greater understanding of how difficult it is for women to attain high ranking jobs when the majority of the places are held by men. This program has been very valuable to be on my quest to obtain more knowledge and understanding. Thank-you WISEST.

Nasiruddin Ali Khan
Faculty of Nursing

WELCOME TO THE WONDERFUL **WORLD OF PHYSICS**

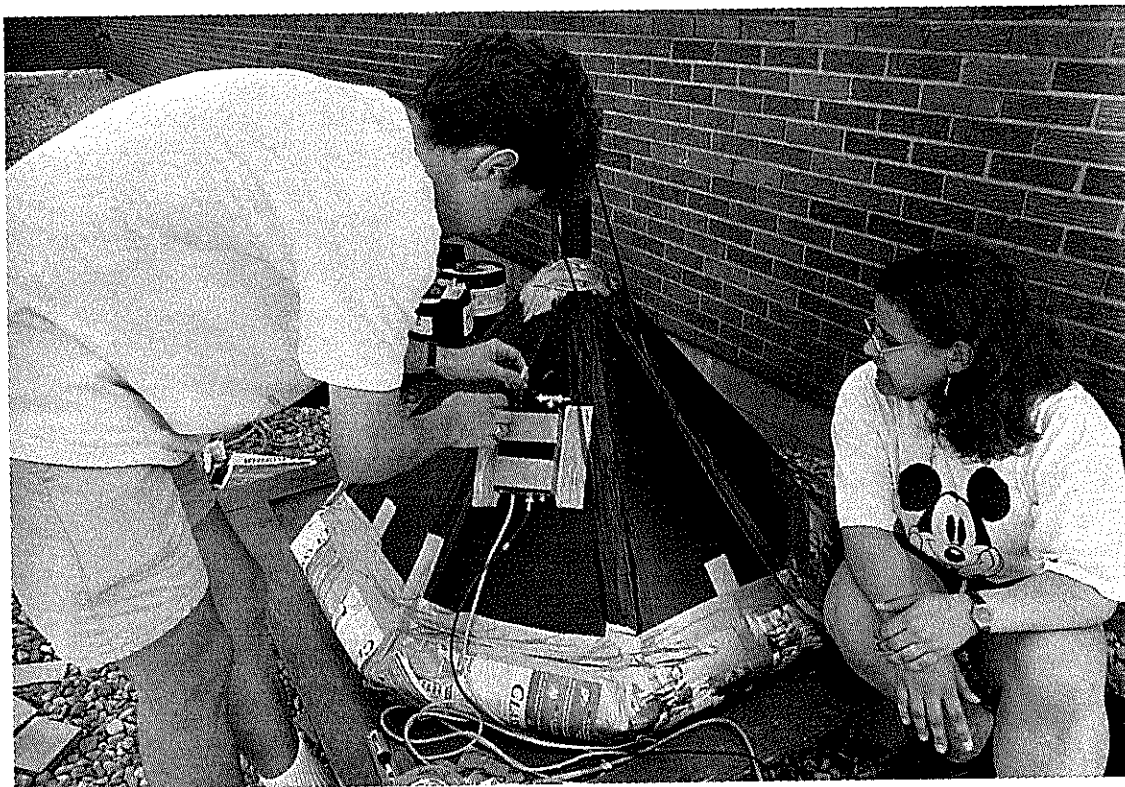
Hi, my name is Nikolina Previsic and I have been working in the Physics department for Dr. Frank L. Weichman for the past six weeks of my summer holiday. For me this has been a great experience. I have learned a lot about physics and about the university life.

One of the things that I first noticed is the fact that the physics taught in high schools is totally different from the what they teach it at the university. First of all, while in high school you are told that a certain formula works, at the university, the teacher asks you, first of all, why you think the formula works and then of course to prove it. Another thing that I have noticed in the past few weeks is the fact that in physics nothing works the way it is suppose to. There are errors, but not necessarily human errors, and then there are discrepancies in the results that you get. Another thing you should be ready to accept once you start dealing with physics is that there are problems that arise out of nowhere. Most of the people that I have met here have adopted the word eventually because you never know when you are going to finish something.

I did not have my own project, but I have helped other people with what they have been doing. I liked that because I found out about many different projects that people were working on. There are many aspects to physics and to enjoy physics you have to find the area that interests you. I have found out that most people do things that they do enjoy. Considering that sometimes you have to be doing the same thing over and over again you pretty much have to love your work.

One of the things I was helping Geoff Steeves and Norm Buchanan on is the cosmic ray telescope. In the galaxy there are a whole bunch of gamma rays that get transformed into cosmic rays in our upper atmosphere. There is an International Research Lab in Switzerland that is doing subatomic research and the cosmic rays mess up their experiment because when the rays hit something they give off radiation (that radiation does not kill human beings and we can not do a damn thing about it= at least not yet). The purpose of our experiment is to develop a telescope that will detect when a cosmic ray shower will occur so that the experiment can be shut off. The telescope is made up of a scintillator dish at the bottom and a photo multiplier tube at the top. When a cosmic ray passes through the telescope and hits the liquid scintillator, the scintillator releases a photon of light which then goes into the photo multiplier tube and can be analyzed. This is not as easy as it sounds. The whole telescope has to be light proof (meaning there should not be any holes or light can get in= too much light can overload the photo multiplier tube and the \$4000 tube would be broken). The future goal of this research is to find out where these cosmic rays have originated, in other words where have they come from.

There are other things that I have been doing, too. For example, for a while I was helping Krista Stefan with the under graduate labs for the first year physics courses. All of the courses now have to be computerized. Up until now the air resistance lab was done with ticker tape. There are a lot of problems with ticker tape; they are tedious and they do not give the most accurate results. By introducing the computers to the lab some of the problems will be eliminated, but the students would be getting the same education.



I was also working with Alan Hughes with his summer job. Although this may sound very funny it is a very useful project. Alan's job is to develop a set up and a computer program that would check cracks in eggs. Telling the computer if there is a crack or just a mark on the egg is not easy. The computers can be very stubborn at times.

Some people have a prejudice that scientists are not sociable people because they are so devoted to their work and that is not true. All of the people that I have worked with are very friendly people. Scientists also do happen to have social lives.

Now I would like to thank Salima Hajee, Dorothy Tovell, Margaret-Ann Armour, and Frank Weichman for making this opportunity to work at the university possible. If there is anything that I have learned this summer is the fact that science is a very complex subject and that there are endless opportunities out there in the world.

It was nice to get to know all of you and I hope we will see each other again next year.

Bye from

Nikolina Previsic
Nikolina Previsic
☺ Smile

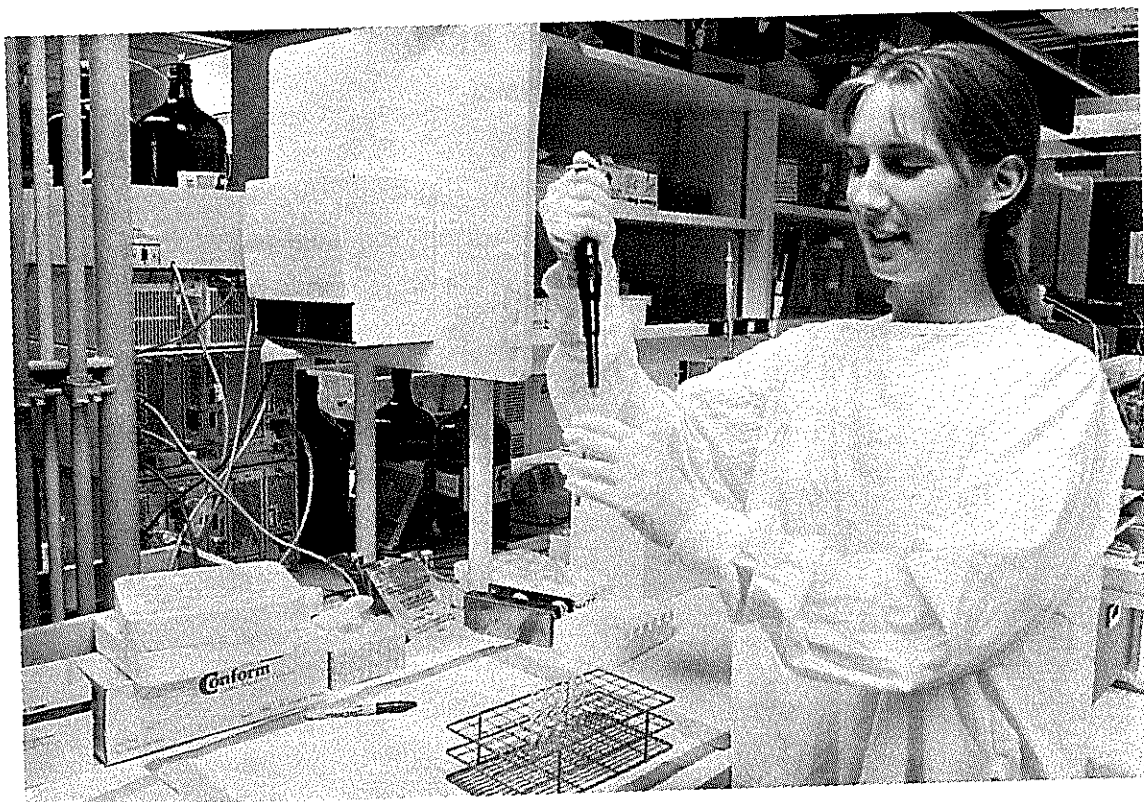
MY WISEST EXPERIENCE - Lana Buerger

Participating in the WISEST program this summer has definitely been an experience. Not only did I have a lot of fun, but I've spent my summer learning (something I'm not accustomed to) and attaining valuable experience in scientific research. I was able to gain hands-on experience in the lab and I had a really great time meeting new people and making new friends.

I worked in the Department of Laboratory Medicine and Pathology under the supervision of Dr. Val Dias. Over the summer I worked with a number of graduate students and helped them with their projects. In our laboratory, the main area of study is immunosuppressive drugs and how they effect the organ transplant patients who take them and if the drugs are effective. Immunosuppressive drugs are basically capable of slowing down the immune system and stopping rejection of the transplanted organ. These drugs have to be taken by transplant patients for the rest of their life in order to ensure the organ won't be rejected. We did both *in-vivo* and *in-vitro* work to help us carry out this study.

One of the projects I was helping out on was to find the most appropriate way of monitoring drug therapy to ensure correct dosage and correct dosage adjustments to optimize the immunosuppressive effect and minimize toxic effects. We used the drug RS-61443 which inhibits a step in the early production of DNA. We took blood from rabbits who received one dose of the drug at different times for 24 hours, and measured the enzyme activity and drug level. We observed that there was an inverse relationship between drug concentration and enzyme activity (as the enzyme activity increased, the drug concentration decreased).

I also helped out with a project measuring the effectiveness of two immunosuppressive drugs: cyclosporine A and rapamycin. These drugs stop lymphocytes from initiating an immune response. What we did was, for 20 days we gave several rabbits different doses of these drugs and every day we weighed them and calculated how much food they ate. What we were trying to see is if the rabbits who were taking the drugs lost weight compared to the control rabbits who were gaining weight. We also obtained blood samples and urine samples from these animals to measure drug levels. At the conclusion of the 20 days I took these samples back to the lab and was able to analyze them. I got to use the centrifuge to separate the blood into the cells and plasma. I was also



able to do urine extractions to collect the metabolites produced by the drugs. After that I used the HPLC to separate the metabolites from this urine. That is a very long procedure, but it was interesting to know that a machine can actually separate metabolites from a 15 microlitre sample. My job also involved pipetting and labelling test tubes and other jobs I could do around the lab.

I also enjoyed the Wednesday afternoons where we did all sorts of fun things with the other WISEST students. The Tuesday lunches were fun too, where we got to talk to others about their projects and hear about the other careers available in different areas of science. Being around the University has definitely been a plus because now I know my way around and it doesn't seem like such a maze anymore.

I am very happy that I was able to have the opportunity to participate in the WISEST program. It has given me the opportunity to experience what it would be like to have a career in scientific research and more importantly the hard work required at school before a career is available to you. Things that made no sense to me at the beginning of the summer (like immunosuppression) now make sense and I more than understand the basic ideas of what we were trying to accomplish. This was definitely a valuable experience that I'm sure I will remember when I'm finally choosing a career. THANK-YOU WISEST AND THE LAB!

WISEST STUDENT REPORT

by Cheryl Steer

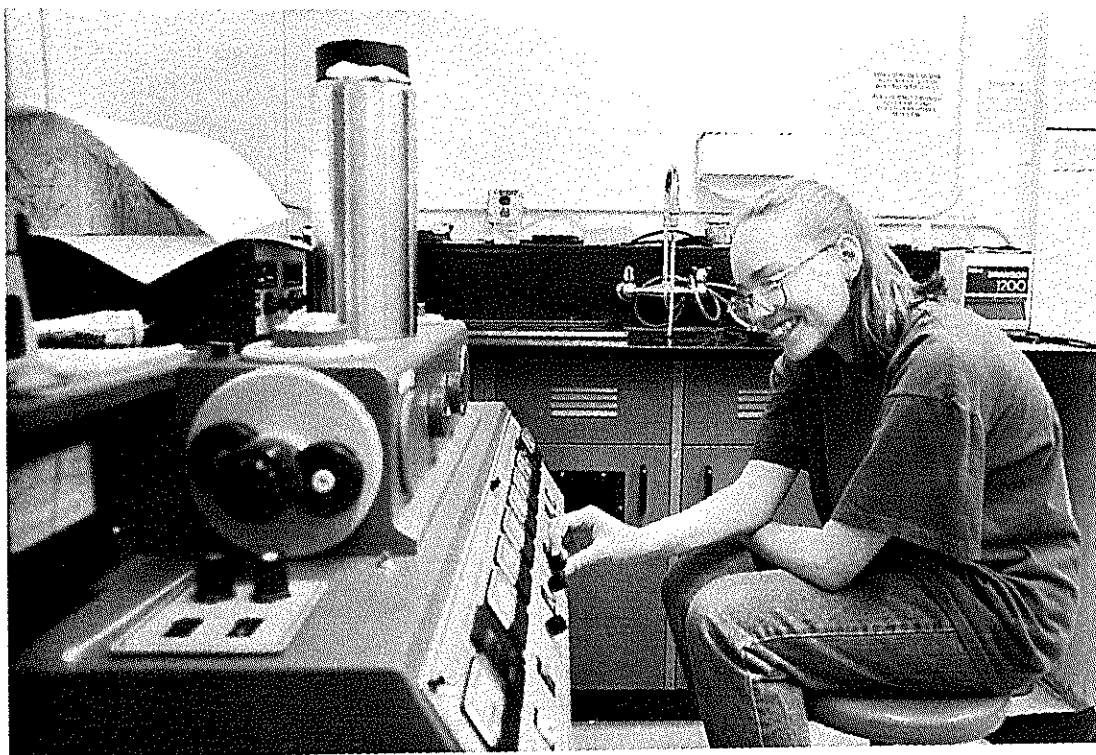
My project was in metallurgical engineering. In case you were wondering, this branch of engineering deals with materials such as metals, semiconductors, ceramics, and so on. I had good expectations when I came here; yet, it turned out to be even better than I expected.

I worked under Dr. Ivey. For the first four weeks I helped Bob (a graduate student) in his research into reducing oxidation in copper at temperatures around 600°C to 850°C by using a barrier. Then, because he was finished, I then helped Dipo (another graduate student) in his research into the effects of disposing toxic wastes such as chromium into cement. In both cases, my job was to take samples from the experiments and to prepare them so they could be analyzed in a transmission electron microscope (TEM).

This was not an easy task, since the part of the sample being analyzed had to be 100-200 μm thick. I had to carefully sand, grind, polish, etc. the sample (which was 3 mm in diameter) until there was a really small hole in the centre with a lot of thin area surrounding it. Sometimes, the samples did nasty things such as cracking, breaking, or getting lost; once, I even sanded one down to nothing. Nevertheless, it was nice to know that, if things didn't turn out, I wasn't alone; these things happened to everyone I worked with, no matter how good they were. The process could also get tedious; I might be able to get only one or two samples done in a day. From this, though, I learned that I actually have a lot of perseverance. It also helped to know that I was being useful, and I was glad that I was usually able to see some of the results from my samples.

I also found it interesting to find out the things other people were working on. I was able to see a transmission electron microscope and a scanning electron microscope; I was also able to ask questions about some of the other ways they analyze materials. In addition, I found that the people I worked with were always willing to answer my questions. I was also able to find out more about engineering, especially metallurgical engineering.

This described only the main things I did. I have honestly enjoyed my project; looking back, I would not want to trade mine for anyone else's. I learned a lot this summer, especially since I stayed at Lister Hall. I thought it was an interesting experience to be able to be responsible for myself for these six weeks. In addition, since I will have to move away from home to go to university, this experience has given me more confidence in this area.



Overall, this experience has given me a lot of confidence -- in going away to university after grade 12, in going into an engineering program, and a bit more confidence in myself. When I first started my project, I was almost overwhelmed. I was also a little unsure if I could do everything I was expected to do (ie. Can I really get a sample that thin?). Yet, I now know that I can. What is also amazing is that I was never asked to do anything beyond my ability. Now, when I see what I was able to do, I am amazed, and I feel as if I could tackle almost anything that comes my way. It is a wonderful feeling to have.

My experience here has been excellent. I would honestly recommend it to people interested in science or engineering. It is a great way to learn about yourself and potential career fields.

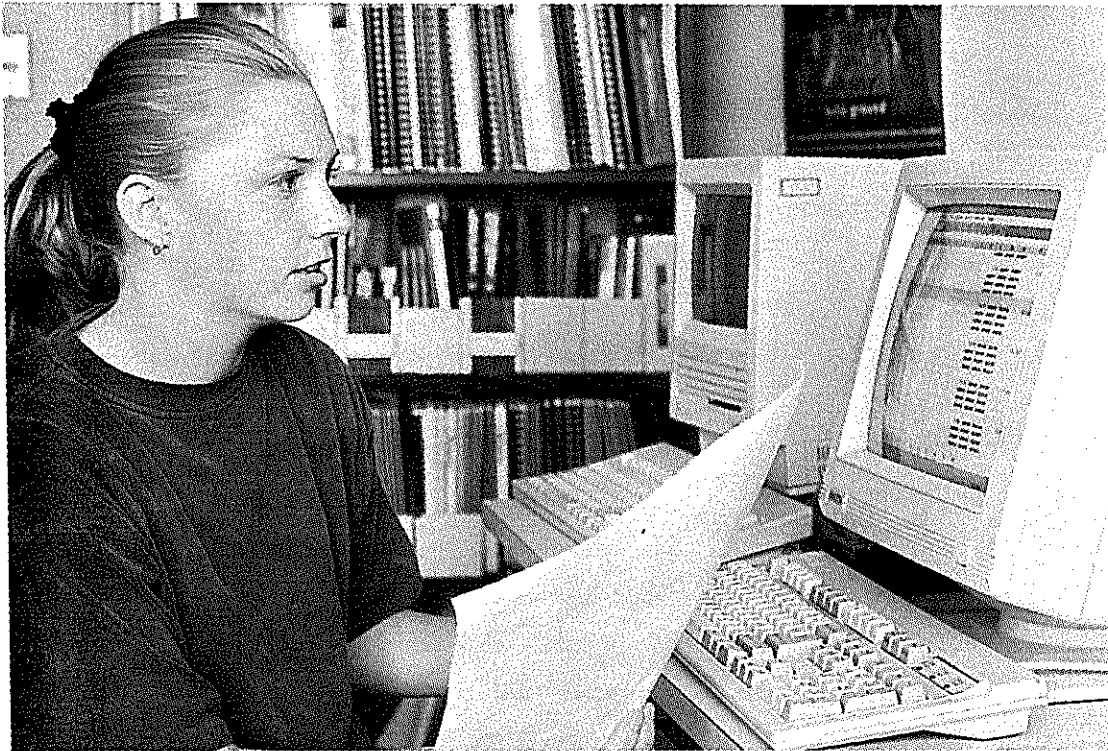
I would also like to thank Dr. Ivey for providing the project, along with Bob, Dipo, and the others I worked around for making this experience a good one.

Melissa Moulton
Forestry Science
Dr. M.A.Naeth
Summer in the Soil

My "WISEST" summer was spent working in the department of agriculture and forestry, I joined the various research groups working under Dr. M.A.Naeth. When I first discovered that I would be working in forestry, I was not sure what my job would entail, but after the first week, I soon learned that I would be a very busy person. My summer was going to be spent helping graduate students on their various research projects. After hearing this, I was anxious to begin my work and learn more about the science of forestry.

My first trip was to Elk Island National Park and Mundare where research was being done on revegetating grasslands to native grasses and forbes. Native grasses and forbes are the plant species which were there originally. If the project is successful, they may eventually plow up areas of the park and plant native species as they are often better for the bison which roam the park. Other objectives of the project include seeing how native plant species compete with weeds and how different plant root systems prevent erosion. The results are not known yet, as the project has just begun this spring. The next project I began work on was at the Lacombe Research Station in Lacombe, Alberta. The objective here was to investigate how soil and vegetation react to different plants and grazing intensities. We were also seeing the effect of grazing on soil quality, runoff and erosion, water quality and litter accumulation. The results here were that litter depth and ground cover were higher for perennials than annuals and higher for lightly grazed than heavily grazed. My work at the Research Station was spent taking soil moisture readings with radioactive probes.

The next project I helped with, was at the Highvale Coal Mine near Keephills, Alberta. There were numerous projects here, but the two I were involved with were Keephills productivity and Sulphur Gypsum. The Keephills productivity project was conducted on pre-mined land. The mining company is required to establish the land back to its original capability. By doing the Keephills productivity project, it will give a basis to see if the post-mined land is as fertile as the pre-mined land. Based on other projects, the reclaimed forage yield is comparable to the original capability and in some cases better. The Sulphur Gypsum project is being conducted to see that by adding sulphur or gypsum, will it improve soil tilth. The results here are that by adding the sulphur or gypsum that it changes the soil chemistry and soil tilth is improved.



Throughout the summer I was also able to work at the Edmonton Research Station, where I sorted and weighed vegetation and the Ellerslie Research Station. I did some computer work, entering and checking of data and was also able to join along in a tour of the Highvale Coal Mine. I would like to thank Dr. Naeth and all the graduate and undergraduate students that I worked with throughout the summer, you made my WISEST experience enjoyable and I was able to learn alot through your detailed explanations. I would also like to thank Salima, Dorothy and Dr.Armour for the excellent sessions and socials that were organized.

GLOBAL WARMING IN NORTHERN ALBERTA

Just kidding! The project we worked on this summer involves the examination of permafrost in northern Alberta, specifically in the Fort McMurray region. We looked at several aerial photographs spanning from 1950 to 1991. After we determined the scale of each individual photo, we took an average which we used for our calculation. This part of the procedure was very tedious because we had to take into account factors such as lens distortion and varying heights during photo shooting.

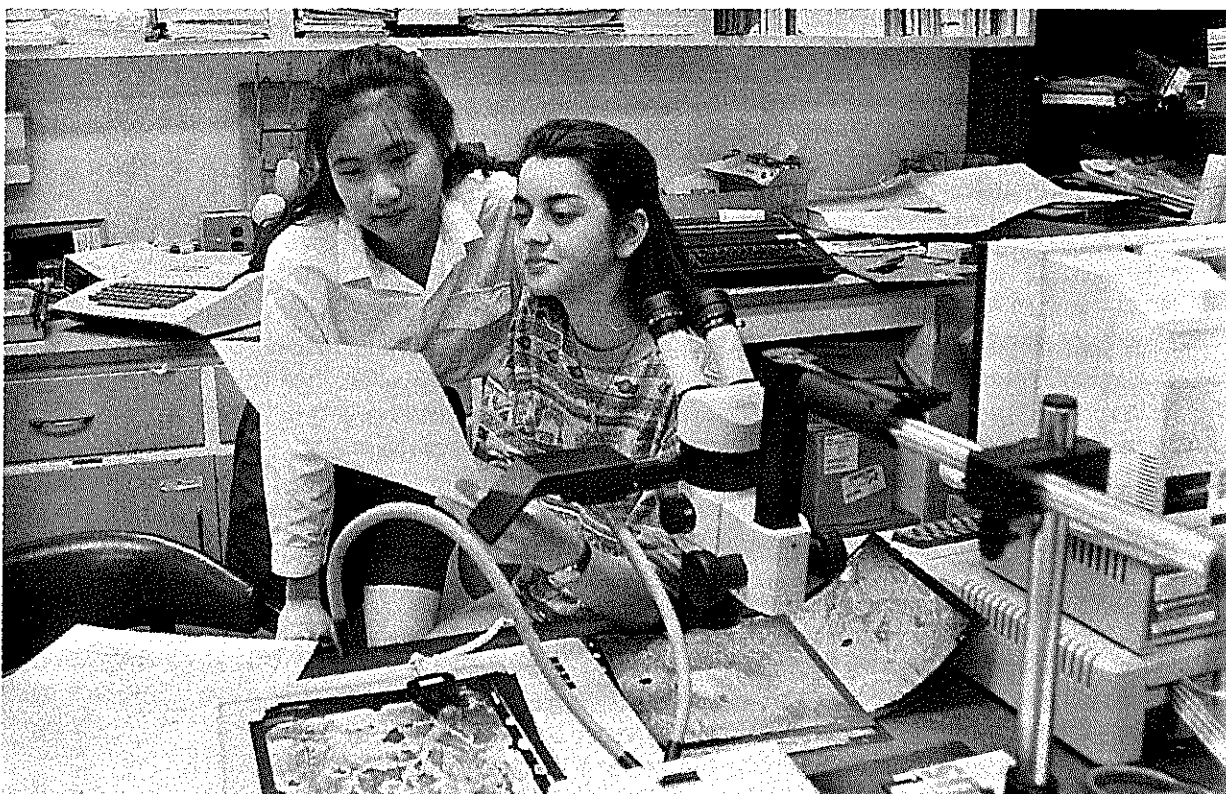
Next, we located areas on the photos where permafrost thawing has occurred in the last 40 years. Those areas where peatlands are present is where permafrost is preserved best. Permafrost is easily identified because it is most likely to occur beneath black spruce communities. In the photographs, collapse scars - which result from the melting of permafrost - can be identified as white spots within these black spruce communities.

We calculated the area of collapse scars that occurred in 1950 as well as in 1991, by using a digitizer. Also, we looked at the climate pattern of Fort McMurray. A direct relationship between the temperature and the increase in size and frequency of collapse scars, supports the hypothesis that the Earth is experiencing global warming on some scale. However, further research must be done, as in the past the area was subject to forest fires and possibly infrastructure development. Furthermore, it is not uncommon for thaw pockets to occur in cyclic evolution.

The melting of permafrost will affect a number of areas, mainly water levels. Continuous thawing will, to some degree, increase emissions of methane and carbon dioxide in the atmosphere. These greenhouse gases will further contribute to global warming.

The study of permafrost degradation in this particular area is highly significant, because the study area is within that agreed upon for logging between the Alberta government and the ALPAC Forestry Company. In () the government did a survey of the area and determined that there was a sufficient supply of poplar available for logging by ALPAC. When ALPAC moved in, they discovered that the amount of poplar was far less than agreed on, and is now seeking compensation.

ALPAC's interest in the area has also stirred up the concerns of various environmental groups. These parties are concerned about the damage that could arise from logging the area. The ecosystem here is especially sensitive to human activity because of the extensive distribution of permafrost and the peatlands that thrive on them. Even setting up pipelines would generate enough disturbance in the form of heat to disrupt the natural life system. Environmentalists are emphasising the fact that this area is part of the grazing grounds of caribou and that its destruction would largely decrease their food supply. As a result, a lot of research is being done with regards to the restoration of peatlands in northern Alberta as well as in the rest of Canada.



Joanne Kok Juliana Uto

First of all, I would like to extend my gratitude to WISEST and its supporters for making this program possible, to Dr. Vitt, Linda Halsey and Sandi Vitt for their help and support and to my lab partner Joanne Kok, for sharing her knowledge and thoughts with me during our research.

Working in research at the University of Alberta this summer has been a great honor. The tremendous amount of knowledge and insight I have gained will, without a doubt, help me a great deal in whatever science related career I choose. The WISEST program has provided me with the opportunity to gain valuable understanding into research and learn what it is like to attend university. Because I am not from Edmonton, I was able to stay at Lister Hall for the entire six weeks. I enjoyed it because I got to learn about other people's projects and I met a lot of girls who have the same aspirations as I. All ten of us staying at Lister became really good friends. Some of us formed friendships that hopefully will never be broken. All in all, the WISEST experience was very rewarding and enjoyable.

Juliana Uto

Juliana Uto

MOSESSES, LICHENS AND LIVERWORTS !!!

What could be more exciting than working in a department where people are totally passionate about the green and not so green stuff that grows in places where you would not even dream of sticking your hands into? I never imagined that mosses could be anything but green, gross and boring, yet this summer I met people who have devoted a lifetime of research to this seemingly unessential part of our biosphere.

Dr. Dale Vitt and his company of bryophyte fans study the diversity of these life forms to discover their potential uses and hopefully preserve their well-being on this planet. These are the specialists that industrial organizations and governments call upon to survey and examine an area before any form of development can begin or, in many cases, when irreparable damage has already occurred. This involves the tedious task of gathering data and analyzing the area's capability to cope with human activities- a noble job but certainly very unglamorous.

When I first discovered what my research project was about, I hadn't the slightest idea what it was about or the point of conducting such research. Then, as the weeks went by, I began to realize the implications of this discovery. Everything in research does not make much sense in the beginning but as we compiled more and more data we begin to get a complete picture of what is going on. I realized how every separate event can have much larger implications on an entire system. Realizing that every little discovery made a difference to the total picture helped me stay motivated on the days when progress was too slow and gradual. It was a challenge keeping a high energy level when we had to strain over the microscope taking measurement after measurement, searching through the library for books that were adamant to remain hidden forever and tolerating the fumes of the acid bath. I still seriously believe they recycle the air at our workplace, the lack of oxygen kept making me sleepy. (Or was it the monotony???)

However, I am glad to say that I survived through both the good days and the bad. I have made many new friends, gained valuable experience and I am not as overwhelmed by the size and immensity of the university campus. I have witnessed the kind of work and dedication involved in pursuing an uncharted discovery. I am looking forward to the future years when I too will be able to participate in this pursuit of knowledge. Hopefully when the time comes for me to do so, I will be able to meet the challenge with as much vivacity as the people I have met this summer.

Bryophytes, like research involves more than meets the eye and I am glad to have this opportunity to appreciate them both better. Thanks to all the supportive people who helped make my experience a memorable one and THANKS WISEST for the opportunity of a lifetime!!!


Joanne Kok

An Entomological Adventure

Six weeks of work have never gone by so quickly before, although it seems sometimes that I have been here always. The time I spent in entomology this summer through the WISEST program has given me so much, as well as acquainting me with some unusual and fascinating earthlings. I regret that we are already come to a close.

I worked with Cindy, my WISEST partner, officially under the supervision of Dr. John Spence, but in practice, under Nora Berg, and with many other people in the department. While we didn't have a specific project, we helped out with the maintenance of waterstrider (henceforth referred to as gerrids) cultures in the lab, a population dynamics study of the gerrids out at George Lake, and any other work that the grad students wanted to give us.

Some of the best times were wading around on Experiment Pond, engulfed in a pair of (sometimes leaky) chest waders, hunting the gerrids. We caught, counted, identified, sexed, painted, then finally released the confused creatures back onto their home, only to repeat this the next Tuesday. At the same time, we got to observe all the other wee beasties that live there, and how the pond changes over the course of the summer. It was a great to work outdoors. Some of the field work was a little more tedious, such as weeding, or defoliating tansy all day.

Back in the lab, we cleaned and fed the gerrids, some of which were being bred to observe the effects of hybridization, which Dr. Spence observed occurring in nature. We also spent a fair deal of time sorting out the contents of pitfall traps, weighing all sorts of things, and counting gerrid and moth eggs. While these tasks were repetitive, each student that had us doing work for them took the time to explain the grand scheme of things. I was grateful that they did not simply throw this work at us, and leave us guessing why.

I appreciate the friendliness shown to us by everyone we worked with. I admire this entomological lot for their curiosity into a vast and relatively unknown world, and for their sense of adventure and wonder. I also admire their policy of leisurely coffee breaks. That took some getting used to.

As for the WISEST activities, Cindy and I missed out a little due to being in the field. However, our special guests, tour of a different research lab, and visit to the Space Sciences Center were refreshing breaks. I would like to thank all the women and men (including, especially, the dozen or so we worked with in entomology) who made this program possible. I heartily encourage them to continue providing this unique experience to young people in the future.

WISEST has stretched my mind. I've learned a lot about university, and a little about entomology. I'll fondly look back to the characters I've met: both the small beasts, and the crazy monkeys, for a long time.

Camille Mantua Lyford



Camille Lipford Cindy Esteves

My WISEST Experience

Oh yuck I hate bugs! This was my first reaction when I received the news that I would be working in entomology this summer with Dr. John Spence. Since I couldn't think of a good reason why I needed a transfer I reluctantly went. Much to my surprise when we arrived at Dr. Spence's lab the insects I saw were interesting and sort of cute so I decided to give this summer a chance.

Good thing I did. This summer has been one of the most rewarding I can remember. Not only did I learn a great deal but I had fun doing it. Camille, my trusty sidekick, and I did not have our own projects so we worked with many of Dr. Spence's grad students. We worked with Robin on her project involving the control of the pest insect Birch leaf miner. It was her idea that by placing landscape fabric around the base of the tree it would limit the amount of these insects by preventing the adult from emerging and the larva from entering the soil where they develop. It was our duty to walk around campus and check and repair her traps. To catch Birch leaf miners to use in experiments we had to suck them up using an instrument called an aspirator. This instrument has two hoses attached to a pill bottle. One hose goes over the bug you wish to catch and the other in your mouth. When you suck in, the bug should go into the pill jar. However, I advise you to be sure that the net covering the hose which leads to your mouth is on or else in go the Birch leaf miners and they don't taste very well.

Trust me, I know. Camille and I worked on a number of projects such as the Tansy experiment, which required us to pull weeds on our hands and knees in the grueling heat, and we also worked sorting pit fall traps for an experiment on Western Gall Rust. Of all the projects we were involved in the work with Dr. Spence's Gerrids was the most enjoyable. Every Tuesday we would jump in the truck for the hour and half ride to George Lake, being sure to stop at Tim Horton's on the way of course. Once there we would pull on our leaky chest waders and grab our nets for a day of water strider hunting. Once all the Gerrids off the pond are captured we separate them by species and sex. Then they get a nice model paint dot on their back so they may be identified again the next week. With this experiment, Dr. Spence is the population fluctuations of the Gerrids on this particular pond. This experiment has been running for over eleven years.

Aside from my experiences working in entomology, being part of the WISEST group has provided me with several other learning opportunities. The guest speakers in non-traditional occupations were very informative, and the visit to the anatomy lab thrilled me.

During the six weeks I spent here at the university I have made many new friends and have gained valuable experience. I can't think of a better way to spend a summer. I would like to thank all the people involved in the WISEST program for giving me this opportunity.

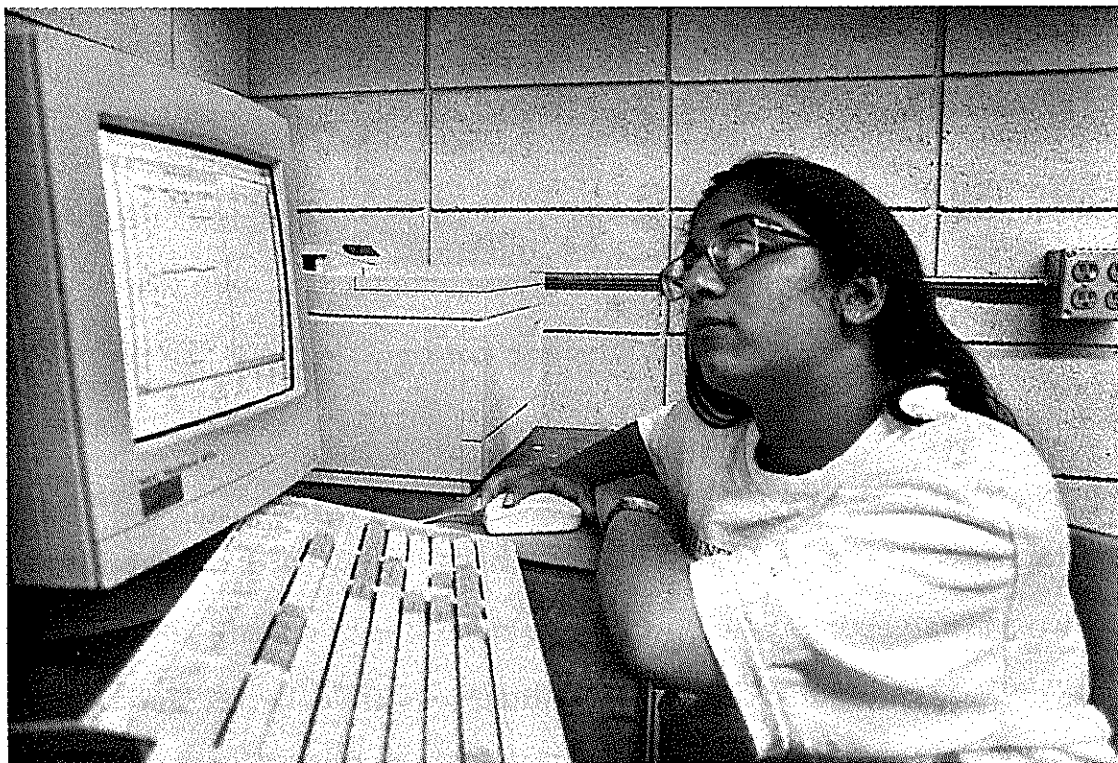
Cindy Esteves

WISEST Summer Research Program
Department of Electrical Engineering
Saira Bhojani

This summer I had the opportunity to work in the department of Electrical Engineering, with Dr. Robinson and some undergraduate and postgraduate students.

The work done in our lab is based on the concept of electrical resistance which is embedded in Ohm's law, expressed as $v=iR$, where i is the current in amperes and v the voltage in volts across a resistance of R ohms. However this law is theoretical, and due to factors such as size of the resistor, amount of etching, temperature and the power emitted, the expected direct proportionalities from this law, such as voltage and current and voltage and resistance, do not always occur. Therefore the students in our lab run various tests with micromachined polysilicon resistors, placed on chips, to find out when Ohm's law is not followed, and to provide their own reasoning.

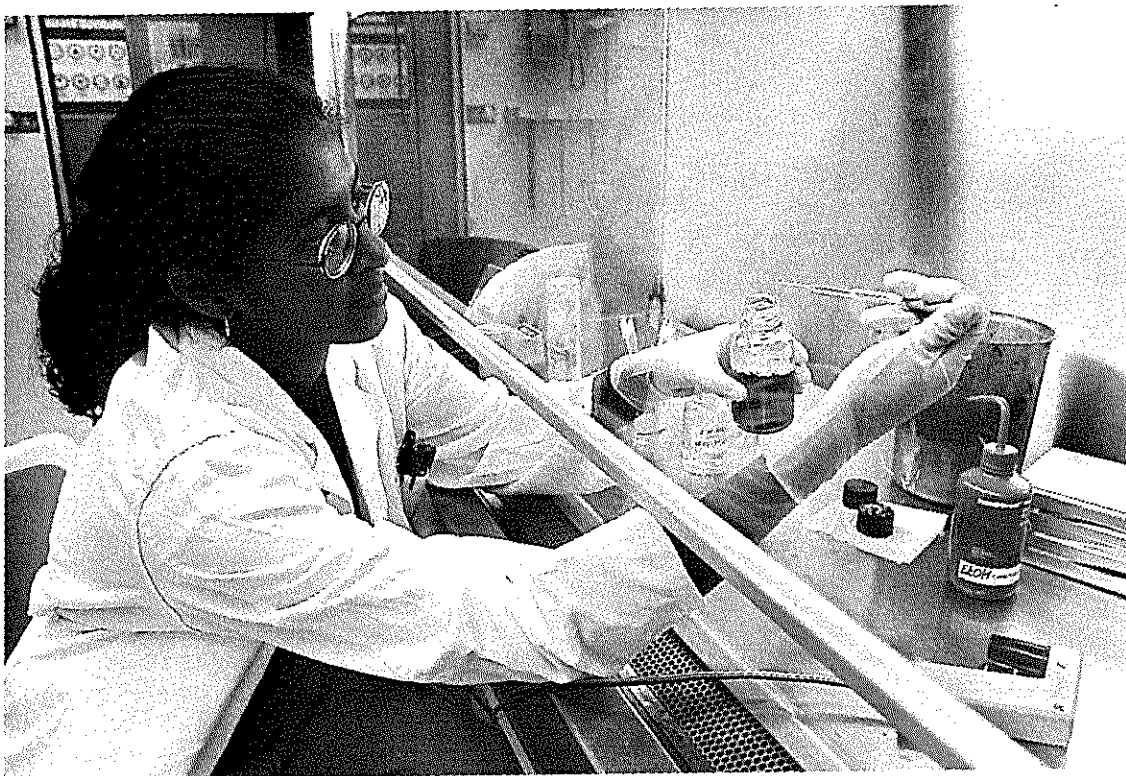
My project was to make constant power measurements on these polysilicon resistors. Passing an electrical current through the resistor causes it to dissipate electrical power and raises the temperature of the resistor. Since work is done to put a current through a resistance, and power is the rate at which this work or energy is transformed, if a large amount of current is put through, then a large amount of power will be emitted, and if it is large enough the resistance will change permanently. My project was to find out, for a given resistor geometry, how much power can be given off in the resistor before this initial resistance changes. This critical power can be found by using the Constant Power Testing Systems to dissipate specific values of constant power, and measure the resistance before and after each power measurement. I have carried this procedure out with small and large sized resistors on the Mitel chip, to compare the differences in the critical powers.



This project enabled me to provide useful information to my supervisor and the students, in an area that had not yet researched. I also received a detailed understanding of one very small area of electrical engineering, which gave me an overview of the entire department. The six week program, offered to me by WISEST, educated me not only in the department I was involved in, but I also received a very basic understanding of other fields by listening to others speak, and visiting other labs. I now have an insight on the various routes I could possibly take in my post-secondary education regardless of which field I choose to pursue. Wisest was a valuable experience, that gave me a clearer view of what lies in my future.

The WISEST research program has been such a wonderful and fulfilling experience, that it is difficult to find a beginning from to start explaining. From the first day of meeting new people with similar interests to the Tuesday lunch hours to the visit to the Space Sciences Centre, I've enjoyed every moment. Though this experience has not been all fun and games, I have learned a great deal in the past six weeks. Mostly, it has been laboratory protocols and techniques, but I managed to grasp the concepts of the summer students' own research projects. The undergraduate student with whom I was fortunate to work with, patiently showed me not only the basic lab practices, but also a few somewhat complicated and advanced theories, one of them being a technique called the Polymerase Chain Reaction, in which strands of DNA from certain species can be identified. Another project that I was working on was known as "harvesting" where just a few millilitres of culture are grown up to a volume of 2500 mL and finally the individual cells are collected and suspended into a small volume of about half a millilitre. In this project I was able to operate a centrifuge extensively. If there is one thing that I can say that I'm an expert in now, is pipetting. I have learned to use the pasteur, serological and Eppendorf pipettes with an enhanced degree of skill unlike the first day I visited the lab and could not keep anything in the tube.

Of all the get togethers that were held I think that I have two favorite ones, number one the Space Sciences Centre and a close second, the tour of campus. Although I already know my way around most of the campus (I studied there during my finals) and have been to the Centre many times, it was exciting to meet new people from all over Alberta, especially with similar



interests. The Tuesday informal “brown-bag-it” lunches were a relaxing way to get away from the pressures of the lab (Just Joking).

I don't think that I would have gotten all that I did out of WISEST if I did not have supportive people behind me like Christine Zinner, an undergraduate student, and most of all Dr. Robertson, my supervisor. Thank you to everyone who allowed me to take part in a rewarding program that gave me a further insight into a field of science that I knew little about.

Written by

Prasanna Bukka

Did They Grow Or Not Grow.. That Is The Question

Amanda Arndt

Imagine spending six weeks sleeping on a concrete slate, eating "wonder" food, living with LRT-riding-bus-singing trekkies (a.k.a. Lister roommates) while having a intimidating-looking-vogue-strike-a-pose technician and a I-know-he's-around-here-somewhere supervisor, all while in the processes of growing and killing bacteria, and analyzing what they did in their brief-but-important-to-someone life. Yes, this was a dream summer... and it was all mine. (And I got paid too... be jealous!!)

Actually, this was my greatest summer ever. I worked in the microbiology department in Dr. Page's lab under the supervision of grad student Tony Cornish. My assignment: growing mutant bacteria to characterize the presence of siderophores. Allow me to explain.

Prior to my arrival, Dr. Page had taken a parent bacteria, *Azotobacter vinelandii*, and manipulated its DNA to create many different strains of mutants. He and Tony want to see how different parts of a cell's DNA affect the cell's survival. So we presented the bacteria to a condition where it would have some trouble growing: low iron. See, for this bacteria, iron is an essential nutrient, as it allows for electron transport to occur within the cell. When there is sufficient amounts of iron present, the cell flourishes; iron limited conditions, and the cell starves. When the cell starts to starve, it kicks into overdrive to survive by producing iron seekers called siderophores which bring any available iron from the environment to the cell.

Tony, through what he likes to be known as "great science" discovered that by growing the bacteria in Mo (molybdate), the siderophore production was increased to measurable rates. So we attempted to grow each strain of bacteria in two conditions: low iron & low Mo and low iron & high Mo. The three day old bacteria were allowed to grow in these conditions for 24 hours, where we then killed them and analyzed them to see if anything grew through such tests as protein assays, optical density, ethyl acetate extractions and thin layer chromatography.

All of the data I gathered is growing to be used to complete this stage of research. Tony and Dr. Page are hoping to eventually discover the steps to siderophore production and apply this to humans and diseases.

I had a great time in my lab. Dr. Page, Tony, Brent, Karen, Mike, Manisha, Joan, Kathie and Nadia were excellent teachers, entertainers, and friends. The fear of boredom always kept someone on their creative toes. And it provided some interesting stories to share on the commercial breaks of "Star Trek" and "Power Rangers" back at Lister.



I must say that I had a fabulous time outside of the lab, too. I stayed at Lister with ten of the wackiest and craziest people I have ever met. But six weeks of 2 am card playing, story telling, TV watching, Whyte walking and eating can sure bring together a group of strangers. We shared an adventurous time together, and I feel lucky going home knowing I made some great friends.

Thanks, WISEST. You gave me the opportunity of a lifetime, topped with memories and friends for life. What else can one ask for from life?

~Amanda Arnold

My experience as a WISEST student

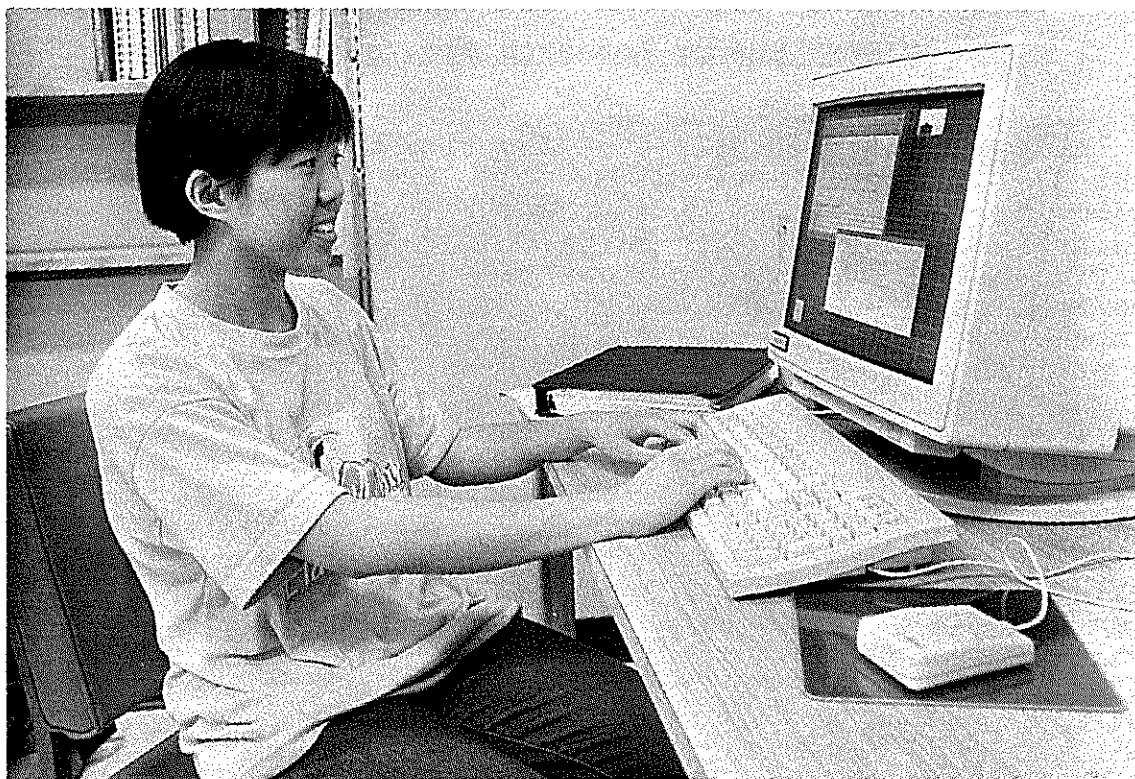
By Yuen Fong Chan

Mosaic? Internet? UNIX? These are terms that I would not know if I did not work in this WISEST Summer Research Program. May be I should introduce myself first...Hi! I am Yuen. I am from Archbishop MacDonlad High School. I feel very proud to be selected in this year's summer research program. I work in the department of computing science under my supervisor, Carol Smith.

It has been great for the six weeks that I have working in computing science. I have learned a lot from the job. It gives me a broader view of what computing science is actually about. I am able to realize that science and technology are very important in improving our societies. Therefore, women should get themselves involved to build a better world! In my six-week journey, I have the chance to travel the advanced information highway by my computer. I come to know that there are programs run like a library, where you can get all kinds of information from them. In fact, the information that could obtain by these programs are unlimited. Through the electronic mail system, I could easily communicate with people from all over the world. I am able to get several nice penpals on the net, they are from countries like the States, France, Germany, England, etc. It is interesting to know what things people are doing in different parts of the world. And the great advantage is that it saves a lot of time! It does not have to go through all the complex procedures in regular postage mail. Only several minutes would bring you to a totally different space! The most important thing is that these utilities are very easy to use. I could manage quite well after the first week there.

I also have a chance (there are so many opportunities for me to learn new things) to work with Jim Easton from the Operations group, on a printer accounting report script. I trueely did learn a lot from him, and he is good at explaining things to me, thanks Jim! I understand now that how a simple program could be written to run. Hey Jim, I think our script run just fine!

Besides learning a lot of computing science stuff, I also have the chance to meet a lot of people. Some are students from the same program, others are from the place where I work. It is a pleasure to get to know so many new friends, and the only thing I could say is, hey it is fun! The



benefit is not only that I get to know them, but I also get to know things that I would not be able to know from my school friends. I also get to walk all over our beautiful U of A campus. I think I will not get lost when I come here next time!

I wish that time would not pass that quickly, but it is slidding away from me already. It is hard to believe the fact that I'm leaving at last. I wish I could stay longer....Anyway, this is an invaluable experience to me and I know that science will definitely be my first choice when I enter university! Thank you Carol and the WISEST staff to give me this chance to work in the university!

Brent Mortensen
August 7, 1994

WISEST Summer Research Program Report

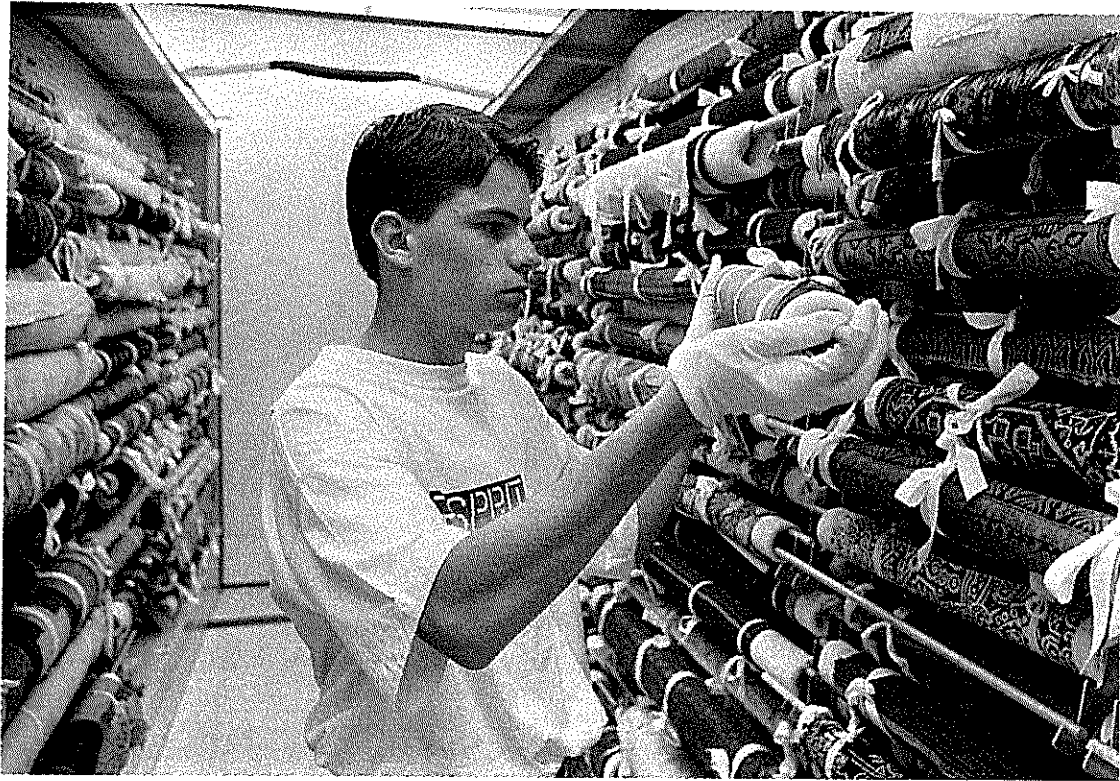
The past six weeks (five at the time of writing) that I have spent in the WISEST Summer Research Program have been a very rewarding experience. The program was much different than I had originally thought and much better. When I first decided to enter the program, I was worried about two things. First of all, the male/female ratio of 4/46, and secondly, that I would be working in an area in which I was not really interested. Once I had been in the program for two days, my ideas changed completely.

I was placed into the faculty of Human Ecology, in the department of Clothing and Textiles. More specifically, I was working with the Clothing and Textiles Collection/Conservation. When I first came into the department, all I could think about was "sewing." I hated sewing. Well, I was very wrong about that. Working in the Clothing and Textiles Collection was like working in a museum. My jobs and responsibilities included handling, cataloguing, computer data entry, and a research project involving Guatemala. Also, I did attach labels to a few artifacts, which in some cases did mean sewing. But the sewing was minimal.

Most of my work involved small jobs and tasks, not research. There were two exceptions to this. I had one project involving gathering information about Guatemala for a future museum/anthropology exhibit. My favourite part of the program was my second research project, in which I worked in the conservation laboratory. The collection had just received six archaeological artifacts from the ancient Incas of Peru. These artifacts were extremely old and fragile, and had lain against organic material in tombs for a long time. I do not believe I need to explain what the organic material was. I did analysis on these artifacts, both microscopic and macroscopic. I determined what the material was made out of, and how much deterioration had taken place. My research projects were interesting to do, and will help other people study the culture of Guatemala and ancient Peru.

As far as the social aspects of the project were concerned, there were no problems with the male/female ratio. I enjoyed the Tuesday lunch sessions and the Wednesday sessions. I also enjoyed our tour of TR Labs; it was nice to see a lot of employment opportunities somewhere. I would have liked to have attended the socials on Tuesday evenings (I thought it was a wonderful idea), but was unable to because of other commitments. I made quite a few new friends in the project, so for people reading this, try and get involved in the social activities.

Overall, I liked the project and have learned many new things. For instance, how many of you think of chemicals and microscopes when someone mentions clothing or textiles? Not to mention the



experience this will give me for my next resume. Two improvements could possibly have been made. First of all, I think it would be great to have a second student in the Clothing and Textiles Department. Secondly, I would have liked to have had additional research projects to have worked on, instead of all the little "odd jobs." I want to thank all of my supervisors and the WISEST people for helping to make this work out well for me. Again, the program was great!

Paul Anderson



MY SUMMER ON THE FARM

When I applied to WISEST I anticipated many things, but never working with chickens. This summer at the U of A Poultry Unit, at the farm, was both exciting and a great experience. I learned a lot from both my co-workers and the animals.

While I was at the Poultry Unit I saw some of the research that was going on. Some of the experiments were with turkeys and different lighting and its effects, different feeds on broiler breeders, dubbed vs. intact cones and their feeding habits, pecking habits, and there was an experiment where diseases were injected into the chickens and then they watched the side affects of the diseases.

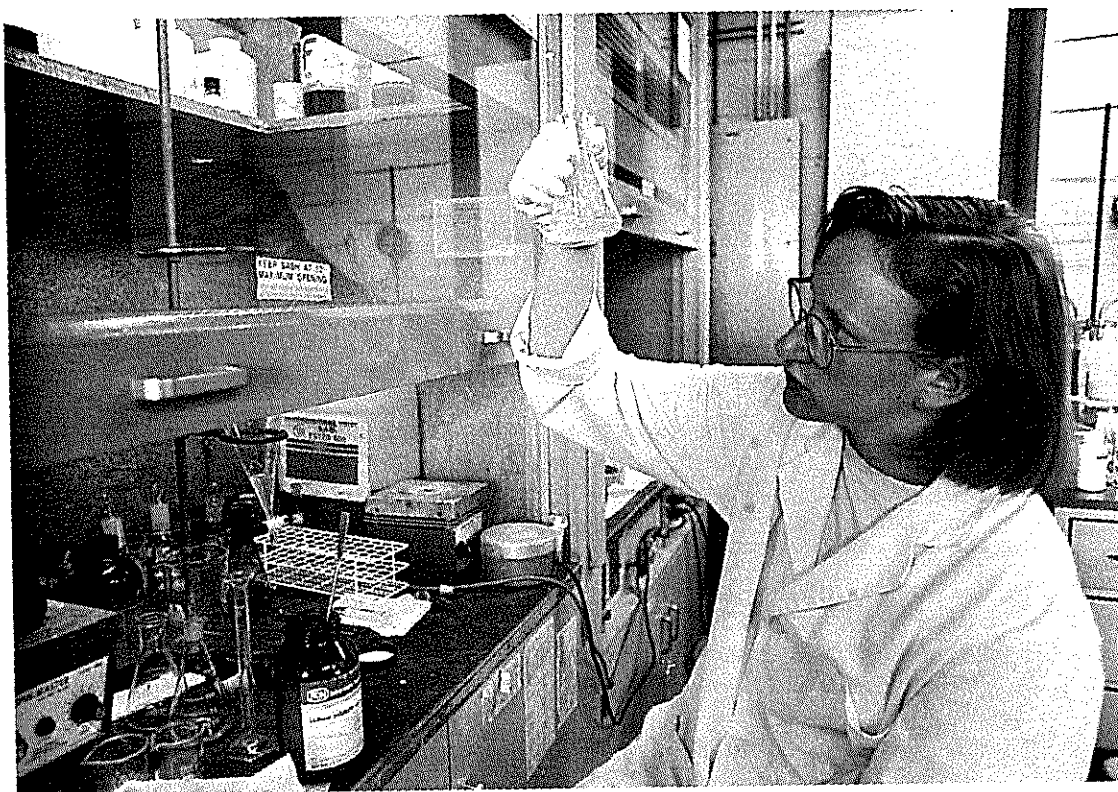
At the farm, there was a daily routine and I mainly helped the people who needed help. I cleaned out barns, laid new straw, collected eggs, cleaned eggs, artificially inseminated chickens, and watched how unborn chicks were graded then killed. I also witnessed how they cooked whole chickens/turkeys up and then pureed them to find out different contents of the bird; for example, protein.

I was under the supervision of Dr. John Feddes and Nigel Davidson. My co-workers were very nice people who were very helpful. They showed me around and they always made sure I had something to do and if I ever had any questions someone was always around to answer them.

While I was in Edmonton, I stayed at Lister Hall. I met many great friends and had many unforgettable experiences. I am very glad that I was one of the chosen few to take part in this summer's session of WISEST.

Thanks WISEST

Stacey Kohlman
Department of Animal Sciences



WISEST FINAL REPORT

I spent my summer working in Organic Chemistry under Dr. Armour. Everyone in my lab made me feel welcome from the very first day. Their friendly, open attitude made me feel much more comfortable and at home.

I learned that making mistakes is common in a lab. After throwing out a product that took two days to get I learned important lessons. The first one that you always label everything, secondly, that it could have been something I'd have been working on for six months. The people in my lab learned to look the other way while I poured things on the counter, broke glassware (last count of six items) and generally proved my incompetence.

I had a project of my own to do. It involved the disposal of two hazardous chemicals, toluene and nitrobenzene. I was surprised how much independence I had to complete my experiments. It was great knowing that my six weeks of work actually made a difference. The results I got will be used as groundwork for future procedures.

Next to my job, staying at Lister Hall was the best part of the summer. 3rd Mac will never be the same now that we have gone. In 6 weeks, I have made better friends than with people I've known for years. Knowing there was someone to talk to about my hard day at work when I got home made my evening more enjoyable. Lister Hall quickly became home, and I will never regret staying there.

Being in WISEST and meeting so many different people has opened my eyes to the possibilities waiting for me when I graduate. I will always remember the summer of 1994 with sliding down muddy hills, our Big Sister, all the people I've met, and 3rd Mac.

I hope everybody had as much fun as I did. Have fun be safe and MOVE IT!

Lauri Wischoff

STUDENT REPORT

This summer was most definitely a summer I'll never forget. I worked in Zoology doing water testing. This project may seem simple and boring but after working on it for so long it became more complex and interesting. Water actually is a very well rounded topic to research.

I worked in Zoology (actually Limnology) and my supervisor was Gertie Hutchinson. The building I worked in everyday was the Biological Sciences Building. My lab where I spent most of my time researching existed on the eighth floor. This floor existed in one area of this building as the Biological Sciences Building was designed by five different architects.

The work I was involved in was quite interesting as time went on. Of course when you have no idea what you're doing in a lab it seems dull and boring. This was my problem at first but until I understood why we were testing for certain things about water, my work became enjoyable.

We received samples of water from many places in Alberta. Places ranging as far as the mountains to as close as the rivers. These samples contained different amounts of assorted solids. Phosphorous, chlorophyll, and silica are some of the solids found in these samples. We would also test the turbidity, color, pH, heat conductivity and temperature of these waters. Whatever exotic results we'd receive, we would record down and analyze the answers to determine how healthy or safe the water really is!

I know that my job may sound boring but it was actually as much enjoyable as it was educating. The work wasn't the only thing that existed in my lab. In my lab many people worked there also, which gave a pleasant atmosphere to work in. I did notice that I did get bugged a lot, but that actually added a smile to my face as it was quite funny. The people around the lab were great to be around. I never felt out of place. Also whenever I needed to ask a question in my lab, I always got a reply with friendly faces. Everyone in my lab was always there to give me a hand when I needed it.

Another great thing about this program was staying at Lister Hall. At first I expected to be alone without meeting new people but was I ever wrong. I met the greatest people who have almost the same exact interests as me. I enjoyed very much staying at Lister. Not only was it close to work but it was close to action and people.



This summer experience most definitely changed me. I feel that this change is for the better and I never regret applying for this program because if I hadn't I'd be kicking myself.

Vicky Christeas

BACTERIA, LISTER AND I ...

This summer I worked in Medical Microbiology and Infectious Diseases with Dr. Mark Peppler and Kate, a technician who worked as my "personal trainer" all Summer. I helped to research a bacteria called *Bordatella bronchiseptica* which causes a type of a whooping cough. The question that my work was trying to answer was "How do changes in the bacterial surface affect it's ability to produce diseases ? "

Basically what this means is if we change the outer surface of *Bordatella* cells, how will that affect it's ability to make us, or anything else, sick ? My department made the mutants of *bronchiseptica* by changing (cutting) the molecules on the cells (which is what the body sees) called lipopolysaccharides, or LPS into different sizes. We inject mice with these mutants and get the antibodies from the mice to study. Since all the mutants' LPS are different sizes, different antibodies are made by the mice, depending on the parts of the LPS that are exposed. All these different antibodies tell us more about the different sections of the LPS. The specific antibodies that bind to only a certain part of the LPS are called monoclonal antibodies. By testing these monoclonal antibodies against the other forms of *Bordatella* such as *s. pertussis* (which affects humans) and *parapertussis* we can find out the similarities and differences between them, trying to link them together.

The future benefit of all this research is to eventually develop a good vaccine. There used to be a vaccine available for whooping cough but it was suspected that it caused brain damage. So hopefully, a vaccine can be found that has no serious immunological side effects.

I learned a lot this summer at WISEST. I came here to see if I actually liked science and if I wanted to continue with it into my chosen career. Since I was in MEDICAL microbiology, I decided that I definitely liked the medical aspect of it.

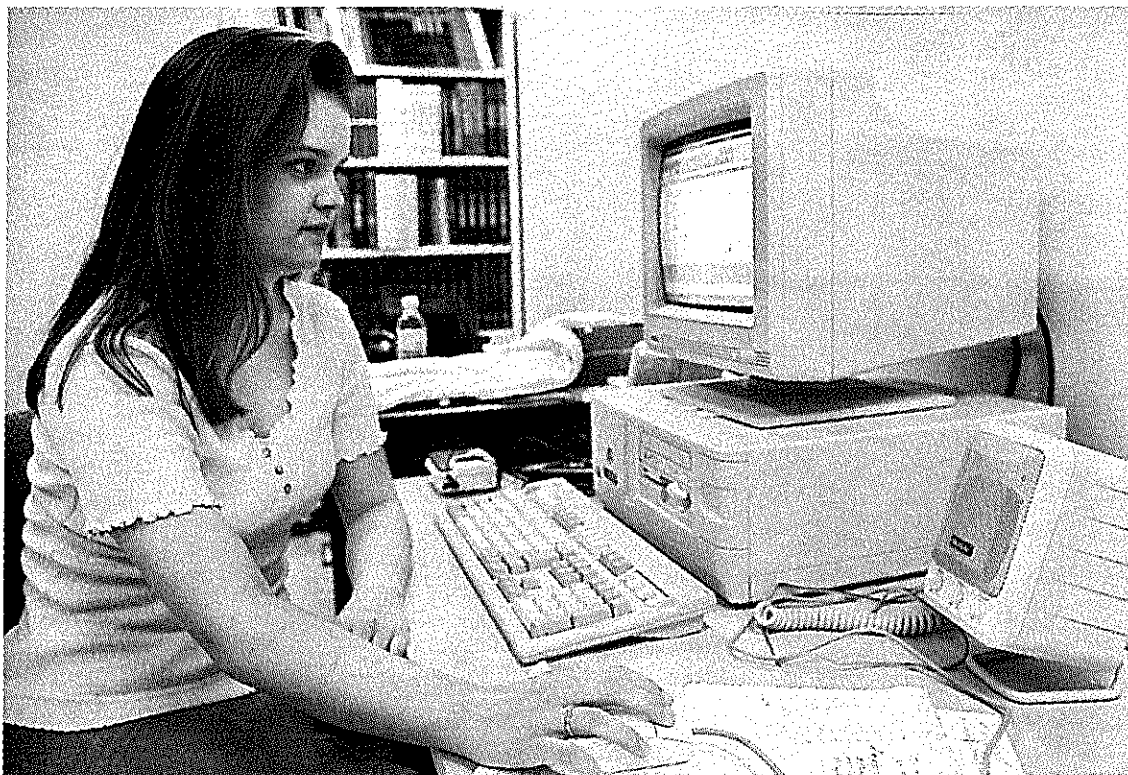
The people that I have met through the WISEST program are people that I will never forget, that's for sure. I am from Grande Prairie so I stayed at Lister Hall and I lived with 10 other people also in WISEST. I had expected people from WISEST to be 100% science and "study-all-the-time" people. But I was wrong. In fact, these gals are some of the most fun people I have met, yet they all have the same goals and interests as me. I am sure that I will stay in contact with them for sometime.

I highly recommend WISEST to anybody who has a science interest, and this has definitely been a summer I won't forget soon.



Thanx to Dr. Peppler, Laurina, Sharel, Yvon, Trevor, Ric, Annette and especially Kate for showing me how to hold a pipette ... and other important stuff!

Jocelyn Magat



MY WISEST EXPERIENCE (Summer 1994)

My experiences with WISEST this summer were new and exciting, both the job I was placed in and the program in general.

For my six weeks of work I was in the mathematics department with Dr. Ivan Baggs as my supervisor. What I did was not really research, but I did learn something new. I worked on an IBM computer with the program EXCEL 5.0 sorting and organizing data from files already on the computer and putting that data into tables; basically summarizing the files. Before I could do any work on my own, I had to learn how to use the program, which is really very simple. After learning the basics, such as getting into the program (which is kind of important) and finding certain functions, the computer did the rest of the work. If I had a question or a problem arose, I just used the HELP feature which answered most of my questions. I think the most important thing about this program was to remember to save my work often. I waited too long to save once and I paid the price because I lost the work I had been doing since 8:30 am at almost 11:00 am. After that, I saved very often.

As for the WISEST program itself, I liked it very much. The afternoon group sessions were a very welcome break from the working part of the program. They were fun and also helpful in answering some of my questions about certain careers, like pharmacy and physics. I enjoyed the meeting with people in non-traditional careers the most. I liked hearing their reasons for choosing their career path and learning about some of the obstacles they have faced so I know what to expect in my future. Some had it fairly easy, others faced many barriers because of stereotypes.

The other activities were fun as well, such as the campus tour, which will be helpful in a year or so, and the oral reports. I liked listening to other people talk about their work. This way I learned what their particular area of work involved even though I had not experienced it, and so I didn't feel like I was missing out on anything.

Overall, my summer with WISEST was very enjoyable, but also very tiring. After six weeks of 7 hour working days I can't say that I'm not looking forward to a little time by myself, but I will remember this experience for quite a while. It was something new to me and I'm glad to have been chosen to participate in it.

Kirstin Holland
(Mathematics)



TEENAGE MUTANT NINJA BACTERIOPHAGES

This summer, while most of my friends were frolicking outside under the depleting ozone layer, slathering their bodies with SPF 2000, I was doing something much less life-threatening. I was playing with mutants. Oh joy oh bliss oh rapture, you may say innocently. The poor girl has lost her mind. She's playing with mutants. Wow.

So let me tell you just how fun mutants are. I worked in a lab filled with highly interesting people (these are NOT the mutants). Dr. Linda Reha-Krantz was in charge and everyone, in one way or another, is trying to answer the same question: How does DNA polymerase work ? Polymerase is the enzyme that does DNA replication. It also checks to see how accurate replication was - this is called proofreading.

My job was to do a mutational specificity test on a bacteriophage called *FC238. *FC238 is usually toxic, so it doesn't grow too well. Occasionally, there is a detoxification mutation, meaning that *FC238 can grow. I was supposed to identify the location and nature of the mutation causing the detox. So I isolated some *FC238 detox mutants, then I crossed their DNA with the DNA from a second bacteriophage called $\Delta 1231$. The resulting recombinants were grown on different strains of E. coli. By observing which strains of E.coli the recombinants grew on, we could identify the mutation.

So I got to play with DNA. Big deal, you may say, she's just one step closer to becoming a mad scientist. True, but I did (on the way to mad science) learn amazing amounts of things. When I walked into Dr. Reha-Krantz's lab a month ago, I knew what DNA was. DNA replication was fuzzy, and anything beyond that was alien to me. So I was buried in textbooks and papers for a while and oddly enough, I now understand DNA replication and mutation. I can reason what I'm doing and why I'm doing it. Of course, the chances of me being held at gun point and being forced to figure out mutations in phages are really slim, although the knowledge will probably come in handy in University. Mostly, this job forced me to think really, really hard. I had to learn piles of information in a short period of time. My brain says thank you for the workout.

The Search For Fort Edmonton
Department of Geophysics
Michelle Knettig, Shawna Nemeth, Melanie Woytiuk

Three of us were assigned to Dr. Edo Nyland, a professor of geophysics. On the first day we were given our assignment, to use a magnetometer to locate Fort Edmonton V. To do this we would be working outside most of the time on the south lawn of the Alberta Legislative building. The second part of our project would involve manipulating the data and typing it into the computer and working inside in the physics building.

We soon found out what a magnetometer was. It is an older machine that is used to measure the magnetic field and changes that occur in it. For our experiment we would strap two magnetometers together so that the two are vertically about one meter apart. A two wires extends from two cylinders mounted on the pole which are connected to separate boxes that are worn in a harness by two people. The third person holds the pole that is approximately two and a half meters tall. When metal is near by, under the ground, the reading from the magnetometer increases because the metal is magnetized by the earth's magnetic field.

The first three days were spent familiarizing ourselves with the magnetometer and the computer system that we would be using for the next six weeks. Our first assignment was to make one line across a large field on the university grounds with a single magnetometer. The next day we used the both magnetometers joined together to make another reading across the same area. We then entered the data into the computer and graphed the results, which were very interesting. Two magnetometer's were used so that the depth of the metal underneath by the differences between the two.



Shawna Nemeth Michelle Knetting Melanie Woytiuk

Since we had yet to receive permission to begin our study at the Legislature, we took a trip down to the Provincial Museum. There we met archaeological professor Heinz Pyszczyk, who had done previous excavation on the site we would be investigating. There we were shown artifacts from other trading post, like Fort Edmonton, and some that had been found in his excavation of Fort Edmonton. We also received a historical summary of Fort Edmonton V. He took us on a tour of the south lawn of the Legislative ground and told us where everything is thought to be located.

Thursday, of the first week, we went on our first real project. It was to find the Strathcona Coal Mine, located under the Pitch and Putt Golf Course at Kinsmen Center. The first thing we did at the golf course was take readings across the course in a straight line five meters apart. We did this in four areas in different directions. We then went back to the University and entered the data into the computer so it could be graphed. The next day we studied these graphs to decide where to make a grid to find the air shaft of the coal mine. One area had higher readings and larger differences from all the rest so this is where we decided to make grid readings.

The grid was fifty-one meters by forty-five meters and we took readings every three meters. We had some problems avoiding the golfer's but we did finally finish. We once again entered the data into the computer then Dr. Nyland used another program to graph the grid into a three dimensional graph. It showed an area that couldn't be explained by other metallic objects in the grid and was approximate size of the air shaft. We assume that this was the air shaft of the coal mine although it is inconclusive. The data, that we have collected, will be used in the future by university students for a more detailed survey.

Monday of the second week we received permission to begin our survey of the magnetic fields of the south lawn of the Legislature. First we measured the area in which we would conduct the study. The area was one hundred and three meters by forty-three meters. The grid was one meter by one meter and we took three readings at every coordinate. For the next four weeks we collected, manipulated and entered data.

During the last week of our project, we checked and corrected the data in the computer then wrote a report on our findings. The reports better explain what we did and made it clear to others who are going to continue with this project.

We enjoyed are project greatly because we were able to meet many interesting people within and outside of the WISEST program. We are also glad that we got to work with our peers and got to know each other so well. Our project allowed us to spend the majority of the time outside in the beautiful summer weather, which we enjoyed immensely.

We would like to thank, first of all, Dr. Edo Nyland for allowing us to work on such an interesting project. He gave us responsibility and allowed us to make some of our own decisions while still offering guidance. We would also like to thank Dr. Heinz Pyszczyk for the tours and information. Our thanks goes to those at the Legislative grounds for their patience and assistance. We would like to especially thank Salima and the entire WISEST organization for allowing us to participate in this enjoyable experience.

