S. Namchuk

During the past two months I have been given the opportunity to participate in the WISEST (Women in Scholarship, Engineering, Science and Technology) Summer Research Program, a program which allows interested young women to work in a science related field, in many cases, a field in which they may be considering a career. Through this program I was given the chance to work on a project in the Department of Mineral Engineering. It was a project funded by Stelco, and dealt with a problem encountered in electric arc furnaces when used for steelmaking.

As is true of the majority of steelmaking plants today, Stelco uses an electric arc furnace to melt down their scrap metal. These furnaces work by passing electricity through three large cylindrical electrodes. The electricity strikes the scrap metal in the form of an arc, which passes from the tips of the electrodes to the scrap. This current easily generates enough heat to melt the metal.

The cost of using this type of furnace is relatively low; but Stelco and other steelmaking companies feel costs could be further reduced if the electrodes, which account for about twenty percent of production costs, were made to last longer. It seems that during the process of melting the metal, the electrodes undergo oxidation and sublimation due to the high temperatures and the atmosphere present in the furnaces. In these ways, electrode life is reduced, and it is necessary for the electrodes to be replaced often. If we could somehow make the electrodes stronger and oxidation resistant,

the high cost of electrode replacement could be reduced, and so too the cost of steelmaking.

Much work has been done already on this problem of electrode consumption, but there has not as yet been much progress. Many researchers have tried coating the electrodes for example, but these coatings have a tendency to wear away too quickly. An idea that has been tested only recently and which we feel to show the best prospects is that of impregnating the porous graphite electrodes with a strengthening, conductive material, that will not oxidize. This material would penetrate into the pores of the graphite, and would last much longer and therefore be more effective than an outer coating.

There is of course an infinite number of compounds that could be impregnated into the electrodes and tested as a protectant. It is in this area that our project has concentrated. We have impregnated a number of samples of electrodes with many different impregnants by means of vacuum. We've then tested them by exposing them to high temperatures, and calculated the loss in mass due to oxidation consumption. Our best results came from impregnation with calcium oxide and sodium silicate, but we feel there are still a number of other compounds that could prove effective and should be tested in the future.

My part in this project was to first research the topic, by finding any information related to previous work done on this problem, and to factors that would effect electrode

oxidation. With this information Dr. Etsell, Dr. Patchett and I were able to decide on what compounds were to be tested. When the choices were made, it was then my job, with the help of the technicians, to make up the solutions, to impregnate the sample electrodes, and to test them by heating. I then was able to calculate the percentage loss in mass of the samples, and to record the results.

Although we did not reach any major conclusions, the project can still be considered a success in that it was a starting point for future progress in this field. As well, it proved beneficial to me in that I was given a good introduction to university life, and to the workings of the library on campus. As well, I was given the experience in organizing an experiment, and now have a good idea of the difficulties that can be encountered in experimental research. Most importantly though, I now have some idea of what engineering is about and of what I want for a career.

LAMP is a project being conducted by a research team of the Psychology Department at the University of Alberta. This stands for Lifespan Adult Memory Project. LAMP is a study conducted to provide information on Alzheimer's Disease. Alzheimer's Disease is the deterioration of parts of the brain which leads to a loss of memory. As the disease progresses, there is more severe loss of brain function, for example, speech and decision making.

Studying this disease may help many elderly people in the future. The research team, which I assist, are developing a battery of tests which, if successful, will be used in the diagnosis of Alzheimer's Disease. The tests will also be used to create memory aids. Memory aids are mechanisms used to help people remember common words, such as the word "fridge". Putting up lists around the house of hard to remember words may help the dementia patients cope with their disease for a longer period of time, before they have to be institutionalized.

Tests will be conducted on about 500 people ranging in age from 30 years old and up. Over a period of about 5 years, if funds are provided, these tests will continue. Each year the same people will be returning to University to be tested. I must stress that the research team is NOT trying to find a cure, but is trying to find an early diagnostic tool for this disease. Since the Psychology Department has received a large number of volunteers it is inevitable that a few of them will develop Alzheimer's Disease in years to come.

At a later date, the research team may look back at previous tasks which the Alzheimer's patients performed, and see what specific tests they did poorly on. Finding out this vital information may lead the research team to find an early diagnosis, which can lead to the further development of memory aids. Finding these memory aids will benefit the dementia patients by enabling them to live a safer and more enjoyable life, for a longer period of time, at home and in the community.

Now that you have a brief run down of the project, I can tell you exactly what I have been doing. During the research project, the 500 people being tested will perform tasks that involve speed, memory and language comprehension. It is important to be discrete about timing the participants so that he or she does not become unnecessarily nervous, thus affecting results. My job is to construct a "foot pedal" which will activate and deactivate the timer. This foot pedal must be perfectly silent in order for the timing to be effective.

I am also one of the many human guinea pigs in the office. Many tasks are just in the developmental stage and must be tested out before they are administered. My favorite test is the Hidden Figures Task. In this task, you are given a picture of a shape and asked to find that exact shape in another complex patterns.

I have also done a lot of research in various libraries on campus. I look up articles in journals that may be used to back up future research. The refereces to these articles have to be typed up and to do this, I use the IBM computer.

During the last 6 weeks, the Psychology Department has provided me with work experience that I will undoubtedly find valuable in the future.

BY: Shallen Letwin
FROM: Archbishop O'Leary High School

Department of Civil Engineering

Charlene Dunn

Water is something most people take for granted. But I got a chance this summer to see how the water from the river is transformed into the clear liquid that comes out our taps. I was given this chance by the WISEST program, along with the Department of Civil Engineering. The name of the project I am working with is called "Combined Chemical and Biological evaluation of drinking water alternatives on a pilot scale in conjunction with the City of Edmonton." This project is funded for the most part by Health and Welfare Canada, with assistance by Alberta Environment and the City of Edmonton.

A pilot plant is being built beside the existing Rossdale water treatment plant. This plant's capacity is 50 000 litres per day, while the capacity of the Rossdale plant is 12.4 million litres per day. The pilot plant will be used to try out four different disinfectants to find out the effects on many different factors. These factors include pH, alkalinity, total organic content, and hardness. These four disinfectants are chlorine, chlorine dioxide, ozone, and chloramines. Everything that touches the water while it is being treated is made of stainless steel, glass, or teflon. I was also testing a silica gel to see if any contaminants were given off by it. If none are found, this gel may be used to seal some connections within the system. The method by which I tested the gel is as follows: I covered the sample of gel with 250 ml of distilled water and let it sit for five days.

Then I mixed this water with dichloromethane, which removes any organic substances from the water. The dichloromethane was then drained from the water and put in a roto-vaporizer, which evaporated the dichloromethane to leave a thin layer of residue on the bottom ofthe flask. This residue was then dissolved in 0.5 ml of dichloromethane and a sample injected into a gas chromatagraph which measures amounts of substances in a liquid. As of yet, the samples have not been injected, so I do not know if the silica gel will be used.

The process which river water goes through can be described in a few steps. Firstly there is presedimentation which means that the water sits in a big tank until most of the particulate or floating matter sinks to the botton. Next is coagulation and flocculation. This means that alum is added to the water. Alum bonds to any matter still floating in the water and makes bigger and bigger lumps until the whole lump is so heavy that it sinks to the bottom.

Next there is flow splitting. This is where the partially treated water is split into the four disinfectant tanks. After the water has been disinfected by one of the four methods, it is pumped into a glass coulmn full of sand and granular activated carbon. This helps to get rid of any last bits of particulate matter still floating in the water. After this last filtration, chlorine is added to the water as a post disinfectant. This

helps to disinfect the water if there is anything in the reservoir or in the pipes on the way to your tap.

Some tests that I do on the water are turbidity, hardness, pH, and alkalinity. These tests are conducted at eighteen different points along the purification process. Turbidity measures the amount of particulate matter floating in a sample. Hardness is a measurement of the number of calcium and magnesium ions there are in the water. If water is too hard, soaps and detergents will not lather as much as if the water was soft. Edmonton is the only city where drinking water is softened before it is passed on to the consumer. Alkalinity and pH measure how basic and acidic, respectively, the water is. Edmonton water is kept at a pH of about 8.0.

I have had a very fun summer, learned a lot, and made many friends and associates whom I plan to keep in touch with in the future. I enjoyed all of my many and varied duties, some of which included using a pH meter, titrating, distilling, and sand blasting.

During this six week program I am working in the department of Civil Engineering. I work in the South Lab Building in an environmental lab. Presently, the people I work with are involved in a water treatment project. The name of the project is "Combined Chemical and Biological Evaluation of Drinking Water Treatment Alternatives on a Pilot Scale in Conjunction with the City of Edmonton."

The purpose of this project is to investigate the effects of four different drinking water disinfectants. The disinfectants they are testing are chlorine, chlorine dioxide, ozone, and chloramines. Near the Rossdale Water Treatment Plant they have built a new pilot plant especially for this project. The plant consists of a pretreatment stage where the water goes through a series of steps such as sedimentation, coagulation and flocculation. After this stage the water goes through four independent process streams, one for each disinfectant. Each process stream includes injections of disinfection chemicals, dual media filtering (sand/athracite), granular activated carbon columns, and backwash storage tanks.

As the water passes through the whole system samples are taken in eighteen different locations throughout the plant. These samples are run to the ground floor level and through resin adsorption cartridges, which are used to concentrate dissolved substances for lab analysis. The materials used for the construction of this project are stainless steel, glass, or teflon. No other materials may be used. This particular project is funded mainly by Health and Welfare Canada, with assistance by Alberta Enviroment and the City of Edmonton. Also the budget for this project is approximately $ 270 000.00 and it is to be in duration for about two years.

Mr. Rea Kloster

Recently, where I work I have been doing a number of standardization tests to see whether or not they can be used down at the plant. One test I have been working on is to measure hardness of water. Total water hardness is the sum of both calcium and magnesium concentrations, expressed as calcium carbonate ($CaCO_3$) in milligrams per litre. After preparing the proper solutions we titrated and found that the hardness of Edmonton tap water is approximately 114 mg $CaCO_3$/L. This value is within an acceptable level for Edmonton standards because it falls between 110 and 120 mg $CaCO_3$/L.

Another test I have been doing is one for turbidity. Turbidity measures the amoung of particulate matter in a sample. This is measured using an insturment called a turbidimeter. First, you place your sample into the machine and a beam of light is passed through it; however, if there is any particulate matter the light will hit the particles and scatter. The scattered light then hits a photomultiplier tube which changes photons into electrons and creates and electrical current which causes a needle to move. According to the voltage of the current the needle may move over only a little or over a large area. If the needle does not move then your sample is clear; however, the more the needle moves, the more turbid your sample is.

A third task I perform involves setting up distillation processes. Distillation involves the boiling of solvents at a certain temperature and as the vapors rise they enter a condensor which is a tube that is cool so the vapors will turn into droplets. Once the vapors turn into droplets, they are emptied into a bottle and stored until needed. Some of the solvents I am single and double distilling are dichloromethane, hexanes, and acetone. After the solvents have been double distilled they are used for various purposes around the lab. One common purpose is the cleaning of other chemicals to get rid of all the cruddy particulate matter. Distillation is a

very useful process and it is also interesting to watch.

One final job I have been doing is cleaning the XAD resin so it may be used at the plant. This is a very long and slow process because it involves a lot of time and waiting. First you must soak the resin in water ten times and wait until the resin has settled each time. Then after the resin has settled you must dump the layer of water and all the crud that has floated to the top. Once the water washing is finished, you the soak the resin in acetone, dichloromethane, and hexane. You have to soak it twice with each solvent. After all of this it is finally ready to be stored in acetone until it is to be used at the plant.

Although I have not mentioned everything I have been working on, you can see the there is much to be done involving the treatment of water. I really enjoy the work I do and the people are great also. I am learning about a variety of things and I find it very interesting.

Brenda Campbell

The Department of Mechanical Engineering

For the past six weeks in this program I have been working in the Department of Mechanical Engineering. Before starting this program I had no idea of what to expect of the work I would be doing. Now after finishing the six weeks I would never have guessed I would get to do some of the things I have been able to do. But I am very glad to have been able to do them and I have really enjoyed these six weeks.

The work I have been doing has varied greatly since my supervisor has given me a variety of jobs to do in order to give me a good idea of what is involved in this Department. In helping some of the grad students I did some of the more routine work involved in taking University courses. I typed in some reports and programs on the computer and I went to the Library to get some books and periodicals. The first project I was involved in was building an insulator box for a heat exchanger. For this project I worked with Tuula, the only woman technician in the department. In this project a styrofoam box had to be constructed, then a metal stand had to be welded for the box to set on. In doing this project I learned how to weld and use some of the machinery, the table saw, belt sander, and the horizontal band saw. Once the box and everything was completed it was put in the air conditioning lab holding the heat exchanger.

I then began working on an adhesive test for plexiglass. The first thing that had to be done for this test was to cut 60 blocks of plexiglass with the table saw. Once the blocks were cut they then had to be milled which takes a small bit of the plexiglass off the top to make the ends of the blocks smooth and square. Something then had to be con-

Brenda Campbell

structed to put an even pressure on all the blocks while the glue dried. So I worked with another of the technicians to make this apparatus which took about three days. But when I tried to use it after it was finished I discovered that it was to awkward to get the blocks in and that once the blocks were in they could not be kept aligned. So this apparatus could not be used. I ended up using the Instron testing machine to hold the blocks together with a load of 25 pounds. When gluing the blocks together I tried six different methods of gluing them, M.D.C. (methyldichloride), M.D.C. and a fiber glass mat, crazy glue, five minute epoxy, polyester resin, and polyester resin and mat. Once all of the samples were glued together, I then began to break them apart also using the Instron testing machine and a three point bending jig. The glue that turned out to be the strongest was M.D.C. which had one block break at 1650 pounds, which broke the block itself not the bond. The next best two were polyester resin and mat and then just the polyester resin. I then used these three glues in another test, where I cut groves into the ends of the blocks to see which glue would hold better on a rougher surface. The results of this second test were almost the same for all three glues.

The next project I did involved silicone that they use for making molds and which is also used for chaulking. I did an experiment to see whether or not silicone could be sprayed because if it could it would make it a lot easier to make molds since they were previously brushing the silicone on. In order to do this experiment the silicone had to be diluted with touluene to the point where it is very thin so that it can easily be sprayed. The results of this experiment was that when the silicone is thin enough it can be sprayed.

Brenda Campbell

I also spent some time in the Dark Room where I learned how to develop black and white film and do black and white reprints. I have also learned how to use some of the audio visual equipment. With this equipment I then tried to record a projector film strip on the video and was able to do it while getting a fairly good picture with good sound.

During the past six weeks I have learned a lot of new and interesting things and I am very glad I was able to have this opportunity. Working in this department has given me a good idea of some of the things involved in Mechanical Engineering, and has helped me in deciding to go into engineering in University.

W.I.S.E.S.T REPORT BY MIKE CHIASSON

I believe one of the largest impressions people receive about the area of Home Economics is cooking and sewing. I must admit that I was one of the believers of this theory before I experienced the W.I.S.E.S.T program. During that time, I have learned that this department involves much, much more interesting and scientific studies which are important to society. In this report, I will give an explanation of the Home Economics Department focusing in on Family Studies, and the situations which I experienced during this unforgettable summer.

My first day was very tense because of the uncertainty of my situation. I was supposed to meet somewhere on the third floor of the Chemistry building of which the location was still unknown to myself. When I arrived on the third floor, there was a lady standing by the rooms to my right as I came off the elevator. She looked to be around my age, but I didn't think that she was in the same program as I. Naturally, to avoid any encounters, I turned left instead of right. I walked almost 3/4 of the way down the hall looking for 25 when I finally realized that the numbers were increasing to 50. Then, I whirled around, and walked straight back to where the lady was standing. I passed, and she smiled pleasantly as I walked by. I was 3/4 of the way down the hallway when I realized that the numbers were decreasing from 10 downward. Finally, reality struck me and where that lady was standing must have been where I was supposed to have gone. I walked back slowly, examining my present situation. This girl must think I am either crazy, or have lost all orientation completely. When I was only a few feet from her, I studied her for the first time instead of scurrying by as before. She had dark red hair, light green pants, a white blouse, and a pleasant smile which still lit her expression. I smiled weakly as I slumped against the wall while realaxing. After several minutes, I decided to take a chance. I---I---I---I-----um-----are you in the W.I.S.E.S.T program? I asked. She then smiled brightly and said "yes!" So that was basically the start of my new friendship. I had firmly planted my foot into my summer job be meeting this person and not being a total stranger to the other students who would arrive later.

Later on that day, I met my supervisors who greeted me pleasantly and explained the research project I was to be working on this summer. This study was attempting to reveal how families with a diabetic, solve problems compared to a normal family. Also, I met the graduates and undergraduates who I was to be working during the summer. Amy, Sue, Julie, Dixie, and the other student with me, Derren, were the nicest people you could ever meet anywhere. Also my professors: Dianne, Nancy, Norah, Jason, and Fred all gave me encouragement and support in my activities. And lastly, the staff which included Karen, Anna, and Judy who were all

M Quasson

kind to me during my stay. In my mind, I wished the entire world could act like the organization they had established. Already, they had shattered my theory of Home Economics.

It wasn't until several days later when I finally realized the full extent of the Faculty of Home Economics. I could not believe how scientifically orientated this faculty was. To begin with the cooking aspect of this area, they do not teach you how to cook with certain ingredients, they test ingredients together to examine if they create a better taste or not. Different mixtures are produced in a belief that they will sell more or develop a larger business. Such products like the new taste of Coke or Pepsi were prepared by people from Home Economics.

As well, clothing and textiles is a major part of Home Economics, but it is not not just in the areas of designing clothes. A current project at the U of A involves a collection of fabrics of clothes from different countries and eras. Also, the testing of fabric for safety purposes and the designing of clothes for handi-capped people.

One of the most interesting studies being done is that in the area of cancer. Rats are being injected with tumor causing agents around their stomach. Once these tumors have been formed, they are treated with nutrients for a cure. This would be a tremendous discovery because it could eliminate the the use of chemo-therapy to treat patients.

In the areas of Family Studies, projects ranging from family problem solving, to the effects of aging and drugs on memory are being studied and researched. My job, if it were to be summed up in a few words, is data analysis. I change data into numbers for computers, I transcribe dialogue of taped families, I tape actual sessions of the families themselves, I work on cataloging references, etc. etc. Mainly our project believes in the theory that when a diabetic enters the family, they will warp and change the way the family solves problem. This occurs because of the unusual problems diabetics face which other people will never experience. When a diabetic enters the family, it is also noticed that the parents may crowd around the diabetic and completely over-protect the child. One case was discovered where the mother actually slept with the child because of her fear that the child might have an insulin reaction during the night; a condition all diabetics encounter. This type of behavior will inevitably cause marital problems in the future. In other cases, the parents might reject the child, believing that they are not perfect anymore.

In conclusion, this was an experience in which I will never forget. The Family Studies department and the W.I.S.E.S.T program opened my eyes to something that was unique which illustrated the Home Economics department's diversity. A giant step in the right direction towards the acceptance of males and females into every aspect of society.

Rshmi Khurana

The experiment which I am working on at the Department of Microbiology, is concerned with the infectious pancreatic necrosis virus (IPNV), a virus that attacks salmonoids such as rainbow trout and arctic char. The virus is of great economic inporatnce to fish hatcheries in Canada and throughout the world, because it can be the cause of a one hundred percent mortality rate. The purpose of this experiment is to determine the absorptive site of IPNV and the route of viral transfer in fish.

To achieve this objective, fish (brook trout) are immersed in water infected with IPNV, and groups of fish are taken out after twenty minutes, forty minutes, sixty minutes, two hours, five hours, ten hours, twenty-four hours, forty-eight hours, and seventy-two hours. The fish are then washed in virus-free water, and anesthetized. Blood samples are taken from the fish which are then dissected The different tissues or organs are separately made into homogenous mixtures with the addition of some liquid medium.

Several methods are then used to determine the concentration of IPNV in the different organs and blood at the different time intervals. When this is determined, the data is interpreted to surmise where the virus is absorbed in the fish, and its route through the fish.

One of the tests used to obtain this data involves infecting the fish with radioactive IPNV The different tissues are then tested for radiation levels. One drawback to this test is that it only indicates where the original virus is in the fish. The daughter virus are not radioactive, and therefore, not detected.

Another test, and the one I am most involved in is called plaque assaying. For this test, single layers of cells (monolayers) have to be grown in small plastic, six-welled dishes. Each well is infected with the different tissues from the fish, and then covered with a thin layer of agarose gel which is allowed to solidify. After a few days of incubation, the agarose layer is removed, and the cells are stained with crystal violet. If IPNV is present in the tissue, it destroys parts of the cell monolayer These destroyed areas are called plaques. The damaged cells have to be examined under the light microscope to determine whether the destroyed area was actually caused by the virus, or some other agent. The plaques are counted to determine the concentration of IPNV in the tissue

Although I assisted with most parts of the experiment, my major involvementwas with growing the cell layers, infecting the fish, preparing the homogenous mixture out of the infected tissues, and examining and counting plaques

GAINING INSIGHT INTO WHAT RESEARCH SCIENCE IS ALL ABOUT

By Cathy Moltzan

For a period of six weeks this summer, I have had the opportunity to work in the Department of Physics. It has been a unique learning experience for me, because I have gained some insight into what research science is all about. All that the average person ever hears about this field is the occasional discovery that is deemed important enough for the public to hear about. But what few people don't seem to realize is the many years of hard dedication that must go into such a discovery.

However, research science is by no means boring. In my case, I was working with a research group that is presently carrying out experiments with the semiconductor gallium arsenide (GaAs). Depending on how many impurities are present in this substance, it is possible to vary the rate of electron mobility. This is not possible in conductors or non-conductors. Thus, GaAs has become increasingly important in the commercial marketplace, because they are materials from which active electronic devices are made, such as lasers (light amplification by the stimulated emission of radiation).

Silicon, which is a better known semiconductor, cannot be used in electronic devices such as lasers because it can only absorb light, it cannot emit it. GaAs on the other hand, is able to do both. Even in computer technology, where silicon is widely used, GaAs is slowly making a breakthrough. This is because GaAs transistors would be able to transmit information at a faster rate than is presently possible. However, impurities which are most often present in GaAs are difficult to control in the crystal growing process. So the

purpose of these experiments is to "develop expertise in the identification of the defects of GaAs and other III-V* compounds, and to correlate the defects with the suitability of the material for eventual device manufacture."[1]

In an attempt to achieve this main abjective, several different tests are being conducted within this particular research group. But the two tests that I had the chance to personally carry out were resistivity and Hall Effect measurements on GaAs at different absolute temperatures. Resistivity, to put it simply, is the inverse of the conductivity of a substance, while the Hall Effect is a measure of the effect a magnetic field has upon the various properties of the substance. Then, by using these two values in computer calculation and graphing, a mobility factor is determined, whose value indicates the extent that impurities may affect the performance of GaAs in electronic devices.

This is where experimental physics is quite different from theoretical physics. For example, the theoretical relationship between the natural logarithm of the resistivity and one thousand over the absolute temperature at which it was measured is supposed to be a line with a positive slope. But experimental data has often produced curves, broken lines, or even points scattered all over the graph. It is by studying these deviations from theoretical behavior that physicists hope to gain a better understanding about the performance of GaAs in electronic devices.

*III-V compounds refer to the families of which the composing elements belong on the periodic table. It is the molecular structure which gives these substances various properties.

1Taken from a research paper on this topic

But these deviations may come from external sources as well. To explain them all would be beyond the scope of this paper, but there are a few obvious examples. First of all, the sample must be placed under near-vacuum conditions, particularly at the temperature extremes. At times, this is difficult to maintain. Another problem is the instruments, such as the electrometer and the multimeters, because they might not be reading correctly. Then there is the problem of transmitting information between the instruments and the computer, because even if the instruments are working properly, the misplacement of one tiny little wire can prevent the computer from receiving the correct signal. As well, there is the question of whether the temperature recorded by the computer is the actual temperature of the GaAs in the vacuum, because there is always a reaction time involved between either the heater or the liquid nitrogen(for cooling) and the GaAs. Finally, on top of all that, there is the more basic problems of forgetting to turn switches, or feeding the wrong information into the computer(as I learned the hard way!).

Therefore, even though the measurements that I made seem to be routine on the surface, they are anything but that in reality. This, I have concluded, is because physicists must spend most of their time trying to figure out where they went wrong. They never know what will malfunction next! At first I found that to be quite fustrating, but I now know that this is one of the most interesting components of research science --- the anticipation of the unknown. This is why I can honestly say that I have not only learned alot, I enjoyed it too.

DEPARMENT OF BOTANY
Louise Kalantar

The Women In Scholarship, Engineering, Science and Technology (WISEST) sponsors a six week summer program for grade eleven students. Its purpose is to encourage high school students to participate in non-traditional roles--girls are encouraged to pursue careers in science and engineering while boys are encouraged to pursue careers in nursing and home economics. During the school year, I heard about the program and my parents and teachers encouraged me to apply. A list of projects from which I was to choose my top three preferences came with the application. In accordance with the three projects in which I had shown interest, the preferences of the other applicants and a teacher reference, I was chosen to work in the Department of Botany for Mrs. Cairine Miner over the course of the summer.

In Botany, I did the laboratory exercises--eleven in total--for Botany 205, a new introductory plant biology course at the University. Cairine, the lecturer, gave me a copy of the lab manual and explained to me that I would do the exercises like the students would be doing in September, making recommendations and, in particular, assessing each lab according to the length of time required to complete it and the lab's degree of difficulty. Before starting each lab, I read them, made any spelling (typo) or sentence structure corrections as well as attempted to make the instructions easier to understand. If something did not work, Cairine found replacement activities. Thus, come September when the students attempt to do the lab exercises, time will not be wasted on exercises that do not work.

Most of the labs involved looking at structures of different plants under the compound microscope, drawing diagrams, and answering questions. The first lab was an orientation to microscopes and techniques, such as preparing microscope slides and staining them. Next, I completed labs about leaf and stem structure and function. Finally, the labs progressed from algae through fungi and bryophytes to ferns.

In addition to my work in the Botany Department, all twenty WISEST students gathered together every Wednesday of the six week period, to share our work experiences. We also attended sessions on stereotyping, career planning, met with several women scientists and toured the Mechanical Engineering Building and Botany Phytotrons. Because of the importance of encouraging careers in non-traditional roles, many students were interviewed by the media (including newspaper, TV and radio).

Although I am not enthusiastic about a career in science or engineering, this program has given me an

opportunity to gain work experience for future references, to learn skills that I may need in University and, most importantly, to gain insight about work and areas of study at the University.

Jean Cheung

Through the WISEST program, I have been given the opportunity to work in a microbiology research laboratory under the supervision of Dr. Page. The laboratory work that I have been performing has dealt with a type of bacteria called Azotobacter chroococcum. This particular bacteria is found in Alberta soil, but from his research, Dr. Page has found that the bacteria is dependent on sodium to grow. This sodium-dependency is a characteristic of marine bacteria, not soil bacteria.

It is believed that millions of years ago, this part of the world was covered with salt water. Based on this, it is possible that A. chroococcum was once a marine bacteria, but through many years of evolution, it has adapted to a soil environment. Through the experiments that I have been performing, it is hoped that some experimental data can be found to show the behavior of A. chroococcum under different conditions.

During these few weeks, I have been growing different strains of bacteria in various media and monitoring the amount of growth of each. The bacteria were inoculated (grown) in a liquid medium containing enough sodium chloride (salt) for abundant growth (50 ug NaCl/mL), in a medium containing less salt which limits or prohibits growth (20 ug NaCl/mL), in a medium containing the limiting amount of salt and $MgCl_2$, and in a medium containing the limiting salt and LiCl.

From the experimental data, it was found that in an abundant source of sodium the bacteria consistently grew better than in a poor source of sodium. It was also found that in a poor source of sodium plus a supply of magnesium or lithium ions, the bacteria were also able to grow abundantly. From these results, it can be seen that magnesium and lithium ions can be used in some way by the bacteria's metabolism to grow. The precise part of its metabolism which is capable of this is unknown at this point.

After being grown in the liquid media, the cells were separated from the liquid through centrifuging. A centrifuge is a machine which spins a solution at very high speeds. This results in the heavier material, in this case the cells of bacteria, to settle to the bottom in the form of a pellet. After the cells were separated, the liquid was poured out and the cells were resuspended in a solution of sodium hydroxide. The resuspended cells were then placed in an eighty degrees Celsius bath to digest the proteins. The proteins of the bacteria were analyzed to measure the amount of growth of the bacteria.

This process of growing, centrifuging, resuspending, digesting, and analyzing is basically what I am doing for the six weeks. Though this process may sound repititious and boring, I have found the work to be quite challenging because new techniques were presented to me and I was able to operate machines which I had only been able to see through filmstrips in school.

Verren Newell

In the faculty of Home Economics, Department of Family Studies there was many studies taking place. They varied greatly in what was studied, however it all pertained to how the family works and operates together. While working for Dr. Nancy Herbert, I was able to work on two studies. The first was one of her own where elderly people's memories were studied, the other was one about family problem solving, and how it differed between families with out a diabetic and one with a diabetic in it.

The first project studying the metamemory of elderly people and how they could be affected by a stroy involved the following things: The subjects were all over sixty-five years old, The subjects in the study were all read numbers which they had to write down after a short period of time, then the subjects went through a self explantory booklet. The booklet contained essays, ~~and~~ puzzles, and logic questions which forced the subjects to use their memories. My part of the study was to research all the drugs which these people took to see if they had any effect on their memories as well their health conditions had to be researched to see if these conditions had any effect on their memories. When these two things were entered in on a microcomputer. Then I was responsible for recheking the questionares the subjects did and turning these ~~numbers~~ answers into numbers known as codeny. These numbers were then entered in on a microcompiter so they could be sent to the MTS system, so Dr. Herbert could then analize the results of the study. Once this was done she could write the paper of the study. I also had to research journals for artiles pertaining to the memory and cognition of humans. Then

the articles which Dr. Hurlbut wanted them had to be photocopied so she could have them on file to use.

The other project about family problem solving was one which I only worked on for a few days on coding information from questionaires and diaries. The projects complete details were not fully explained to me so I'm not sure exactly what it was about, however if you refer to the report by Mike Chiasson you should get a better understanding. The information which I coded had to go on the microcomputer so that it could be transfered to the university manframe computer. This project was run by Dr. Diane Kieren and also had Dr. Hurlbut working on it.

The Department of Family Studies is not a very large department though they are considered one of the best departments of family Studies in North America. This is the type of department you would enter if you were unsure of the job you would like to do though you are interested in social science. Especially if you like to help families. The jobs vary greatly and are very interesting if you like helping people.

The Faculty of Home Economics is not the same as you are led to believe in high school. The kitchens which you would expect to find are few and surrounded by everything from rats which have been injected with carcinogens to machines that measure the toughness of any type of food that you would like to measure. On the tour of Home Economics building we saw machines to measure color, acidity, toughness, texture and almost anything else that you would like measured. This faculty is very science orientated and not at all like the ideas you receive in high school.

The time which was spent working on Family Studies was quite enjoyable. It both opened my eyes as to what Home Economics is, and to the extent it is constantly working. It also showed me the long and hard working hours that are needed to do even a small pilot study. I would like to thank Dr. Harbut and Dr. Kreon for allowing me the opportunity to work with them during the summer.

August 15, 1985

From July 9 to August 16, 1985, I worked in the Department of Zoology at the University of Alberta under Dr. E.E. Prepas. Her specialty is limnology, the study of lakes, and consequently my work concerned lake samples as well.

At the University I analyzed samples for ammonia, nitrate, and total Kjeldahl nitrogen (TKN) from lakes near the Meanook Biological Station and Peace River. By adding certain reagents, according to chemical 'recipes', and then reading the result on a spectrophotometer (spec.), the amount of nitrogen in the water can be determined.

I also visited the Meanook Station (1½ hours north-east of Edmonton), where I helped in sampling and in phosphorus analysis. The sampling is done by boating to designated stations on the lake and dropping a metal water bottle to trap water. Because water is taken from various depths and studied, the scientists need to be sure that the sample is actually from a certain depth. The water bottle is dropped along a marked rope then a 'messenger' (a weight) is dropped. It hits the bottle knocking out two clips which shuts the bottle. The water from the bottle is used to determine a lake profile including dissolved oxygen, soluble and total phosphorus,

as well as the various forms of nitrogen that I mentioned. Light and temperature readings are taken from the surface to lake bottom. A fluorometer is used to determine the amount of algae at various depths through the lake. It is a long hose which, attached to a pump, must be pulled up through the water at one metre per minute. While in the field, I also timed for a 'phosphorus uptake' experiment. Algae are collected in lake samples, then on shore, to prevent too much stress from a longer journey, they are given radioactive phosphorus. The rate at which they absorb the phosphorus shows how badly they need this nutrient.

The purpose for learning so much about these lakes varies — depending on who one asks. The graduate students and professors are basically just interested in learning about their field. The people who supply the grant money are interested in how they can make the lakes more productive (ie. make larger, faster-growing fish) for game fishing, and possibly as a worldwide food source. By stimulating algal growth, the whole food chain up to fish can be stimulated. If the reasons why there is little algae can be determined, they can be altered. On Narrow Lake, six 'limnocorrals' have been set up (giant plastic bags) to which fertilizer is being added. By experimenting in as lake-like an environment as possible, without

contaminating the whole lake, Dr. Prepas hopes to determine what the algae need and how best to supply it on a lake-wide scale.

Sandra Shayler

The genetics lab that I have been involved with is researching DNA replication and its process during mutation. They are interested in discovering why DNA makes few mistakes during replication resulting in almost identical organisms for generation. This does not imply that there are no differences between offspring and parent but rather, there are no mutations causing a major change in the lifestyle of the organism. A bacterio phage is the virus picked for study. Wildtype (T4B+) is one type of phage known to replicate DNA quite accurately and was used as a standard for comparison in most experiments. The first step is to find a mutant phage, one that replicates DNA inaccurately, and then study why and how mutations are caused.

Basic skills had to be learned before I could partake in any experiments. Phage form plaques by causing lysis in bacteria cells. Therefore it was necessary that I know how to make master plates and overnight cultures of

bacteria in order to have it fresh each morning. The bacteria predominantly used throughout my lab work was C600 and CR63. Another procedure used extensively was serial diluting a phage stock. This entailed diluting a stock to a desired concentration, possibly from a concentration of 10^{11} ø/ml (phage/ml) to 10^{2} ø/ml. Sterile technique was stressed at all times to avoid contamination.

My experiment involved the double mutant AmB-22 mel88, meaning the DNA had two mutations on it. The hypothesis was that fewer replication errors are produced when the double mutant is grown on CR63 than when on C600. In order to detect mutations being made, a chemical called acriflavin was used. Ordinarily phage does not grow on acriflavin, but if a mutation occurs, the phage may become acriflavin resistant and plaques appear. The result supported the hypothesis showing that AmB-22 Mel88 makes more errors on C600 than on CR63. The reason the type of bacteria

can make a difference is because CR63 inserts the amino acid serine at the amB-22 codon while C600 produces glutamine at amB-22 site. One conclusion that can be drawn from this is that serine has a more advanced nuclease proofreading mechanism than does glutamine. This mechanism can pick out mistakes in the DNA sequence and either stop the production of the protein or correct it to avoid mutation. Mel 88, Mel 63, J4B^{+}, and Mel 63 AmB-22, were also tested in the manner described previously. Executing this experiment involved plating for single plaques, plaque purifications, dilutions, and then growing the phage on different bacteria and mediums.

Although six weeks is a relatively short period of time to really get involved in research, the experience brought much to my attention. I found research to be a fairly repetitive process and in some cases, a slow one. If I had more background in genetics and a greater understanding of the projects underway in the lab

I may have gotten more involved in the research process. Even so, there were valuable benefits received from working in the lab and I appreciate the chance to partake in the project. Perhaps in the future, I will be able to apply the experience gained from working in the genetics lab, and utilise it to upmost advantage.

Colleen O'Brien
Louis St. Laurent.

Liz Newton

My job in the Wisest program is in the department of Chemistry. In this research project, people are working on various things. There are some people working on breaking down and disposing of hazardous chemicals while others are recycling chemicals for undergrad use. ~~It~~ ~~The~~ I am working on revising an experiment in the Chemistry 250 lab manual.

The first week I spent my time doing the first few labs in the Chem 250 manual, just to get used to the various procedures that I'd be using later. All the labs worked out well although I hope to get slightly better results when I actually take the course.

For the next few weeks I was working on improving the Friedel-Crafts reaction in the lab manual. In this reaction, benzene is mixed with t-butyl-chloride and using $AlCl_3$ as a catalyst it produces p-di-t-butylbenzene. The problem with this reaction is that the $AlCl_3$ must be very fresh or it won't work. I have been trying this reaction using toluene instead of benzene. Toluene is more reactive than benzene so the $AlCl_3$ doesn't have to be as fresh for it to work. Every time I do

the reaction, I change one condition and see how it changes my results.

I've been having a great time at this job. The work is very interesting, I've learned a lot and I've met some really nice people. It is different from school in that I learn because I want to not because I have to. I'm glad that I'm involved in the Wisest program and would strongly recommend it to anyone who has the chance to get into it.

Summary of Job
for E. McClintock.
from Brian Hartley
(Clothing and Textiles).

The fact ~~that~~ I found most interesting about my 6 week job in clothing & textiles, was its close relationship to the ~~the~~ chemistry we are taking in High school. All the experiments I did in the six week period involved only a few new skills that had to be learned. My first experiments included quantitative analyses of polyester / cotton blends, (65/35 & 50/50) and then work with lint samples from the University Hospital. With regards to the former, I was completing the experiments repeatedly so that I could design a data sheet that clothing & textile students could use in completing the experiment and ~~also~~ I was also adding to the procedure various suggestions, comments and diagrams that, I felt, made the experiment easier to complete and understand but were not already included in the test method instructions.

The skills that I learned completing those experiments I then put to use in six quantitative analyses of lint samples that had been brought to the department in hopes of being able to find where this lint was coming from after identifying all of its components. The first two lint samples, which were brought in off of the air filters of two intensive care machines, were composed almost entirely of cellulose and/or cotton fibers. But some traces of rabbit and human hair were found in the samples. The ~~four~~ following four samples that were brought in, were again composed mainly of cellulose and/or

I have spent the past few weeks working in the Department of microbiology, on a research project concerned with diseases in pigs. Basically, the ultimate goal of the project is to devise a method for screening pigs that will enable one to separate the infected pigs from the healthy ones. In this case, the disease affecting the pigs is a type of pneumonia contracted in the lungs of the pigs. a problem arises in that there are three different types of pneumonia that can infect the pigs but, we are only concerned with one particular type called mycoplasma hyopneumonia.

We began our experiments by taking some serum (liquid part of the blood) from the infected pigs. In the serum were a number of proteins containing antibodies to the hyopneumonia. Through a series of steps we were able to fractionate out a number of different proteins that did not contain any antibodies. Afterwards, we were left with a serum in which approximately one in every twenty proteins contained some antibodies. We then took some of this serum and reacted it with some antigens (foreign substances to the pig's body - in this case the disease causing mycoplasma hyopneumonia) that had been grown on a bacteria culture. If the antibodies in the serum reacted with the antigens, we knew that

the infected pig had indeed contracted the hyopneumonia. However, if there appeared to be no reaction between the two we then assumed that the pig had been infected with one of the other two possible diseases.

Another experiment, called a crossed immunoelectrophoresis, involves the preparation of a special gel that contains both the antibodies and the antigens of the hyopneumonia. The gel is placed in a special piece of apparatus called an electrophoresis. The electrophoresis passes a current of electricity through the gel causing the antibodies and the antigens to migrate to different areas of the gel. As they are moving through the gel, the antibodies and antigens will often collide with one another and react. Gradually, as more and more antibodies react with the antigens, a precipitate is formed on the gel. After staining the gel with a special staining solution, the precipitate becomes more visible. The precipitate forms a wave-like pattern on the gel. By measuring the area of these waves, it is possible to determine the concentration of a particular protein in a serum that had been added to the gel.

Apart from working on a number of different experiments, I have also done some work in the library, trying to find some information specifically

related to the experiments we are doing.

Working in a lab for the past few weeks has helped me to develop a better understanding of the kinds of things that are involved in research. It has also given me a relatively good idea of what it would be like to have a career in science.

By: Heather Swanson
School: Louis St. Laurent

Tom Pinnington
Dept. of Clothing
and Textiles
Home Economics Bldg.

Although my work assignments in the program are extremely varied - I am rarely occupied with one assignment for more than a few hours at a time - it is possible to group them under two categories: computer data entry/file editing and general maintenance and upkeep of the historic costume collection.

My first computer project involved obtaining printout listings of research documentations concerning artifacts in the collection. I was responsible for checking each listing with the actual documentation for discrepencies in data (ie. spelling errors, incorrect accession numbering, differences in item description, etc.). After learning the program operation, I then entered, along with the appropriate corrections, all the unentered documentation projects I had found onto the file. I also made folders for, accessioned, and inputed new documentations as they appeared.

Other computer-oriented work included entering reference books into a bibliographic file, recording information of costume donations onto the donor file, and editing data in an accessions record. Firstly, the bibliographic file required assigning to the various references descriptors with which students could obtain listings of related texts. The donor file involved locating such information as 'name of donor' and 'items donated' from the documents of donation themselves. While editing the accessions record, I was required to physically search for the artifacts, record their locations, locate their negatives, and edit their descriptions by checking with documentation projects. This resulted in lengthy searches, not only in the Home Economics Building, but around Campus as well - photographs, for example, were located in the Printing Services Building.

T. Pinnington

In addition to locating and entering data, I took on many different projects related to the historic costume collection itself. This collection, incidentally, is operated much like a museum and as such requires continuous maintenance. One assignment involved cutting aluminum dowels to replace wooden ones which had warped. These dowels are used to hang rolls of historic textiles and are therefore washed and dried before use. Storage of the textiles consists of a special unit which is usually compacted to protect the garments but opens to allow entry for exhibition or study.

Similar upkeep and improvement projects include creating labels for stored items, arranging storage cabinets, and silicone-spraying the tracks of droors containing historic clothing. Label-making requires the use of a mechanical lettering machine. Currently I am experimenting with various methods of attaching the labels to the shelves to allow easy removal. Silicone-spraying must be done with stringent safety procedures as the garments in the room are valuable.

Recently I have begun work on two clothing exhibitions. An Art-Nouveau project for which I am doing carpentry work will be on display at the Ring House Gallery on Campus. I will be helping with the construction of display panels next week. They will be used as part of the Winter Cities '86 Cold Weather Clothing Project occurring next February at the Convention Center.

Jana Pivecky

As part of the W.I.S.E.S.T. summer program, 1985, I had the opportunity to work in the Genetics department of the university of Alberta, in Dr. Hastings microbial lab. The lab specializes in Genetic recombination and at the present time was working with the chromosome of ØX147 phage.

As I was involved in all stages of the phage growth, D.N.A. extraction, recombination and testing, describing my job is not easy. A great deal of it involved chemical procedures: The rest, procedures for testing and preparation of DNA. Though a chemical/factual explanation likely wouldn't clarify what I spent my summer doing, what I learned and the range of experiences I encountered, probably would.

I learned a great deal during the course of the six weeks. Some of it, took the form of theory, in text book reading, informal quicky course lectures and play by play commentaries. This theory, helped form the connections between the genetics taken in school and the specialized area in which our work was based. It also helped put in perspective the limited knowledge high school provides, even the limited, ever growing knowledge of man in such newer scientific fields as genetics.

Practical knowledge was likly my greatest gain. Though I only vaguly understood the theoretical laws or reasoning behind tetrad disection, I learned how to chop up and move these microscopic particles. I learned how to seal a gel trough well enough to

to keep gel from spilling onto the floor. I had access to, and regularly used instruments from autoclaves and centrifuges to pipettemen, ethedium bromide gels and electrocurrents. I worked with sizes from litres to micrometres, and even learned to use a pipette without getting a mouthful of bacteria.

On a more personal level, I gained knowledge which will help me in my life, whether it includes genetics or not. A sense of orientation on campus was for me a monumental acheivement and helps to put to ease some of the worries of the transition to university. Through gab sessions with my "bosses" in the lab, not only did I find out more about scholarships, campus life, other faculties, and other careers, but they instilled in me some self confidence

as to my future, provided some role models, and hopefully, became my friends.

Though I have discovered that microbial genetic research is likely not the career I wish to persue, because of the individualistic aspect of the work and continual frustration and setbacks, I am glad I had the opportunity to spend my summer working there. I learned more about myself and my career priorities in six weeks, than I have in three years of career guidance and numerous aptitude tests.

PROJECT
SUMMARY

For: Elizabeth McClintock

By: Dean Mayo
Date: 85 08 15

Dear Mayo

There are few summer pastimes which I enjoy more than writing countless revisions of summer project summaries. In fact, it is one of my all-time favorites, along with some of my other activities such as getting run down by buses, being shot at by Cuban guerillas, getting caught in thunderstorms, catching Bangkok flu, and especially being stranded in the downtown area at night. Unfortunately, I have only been able to participate in a token few of these activities this summer, due to lack of time. However, I have still found enough time to continue my utmost favorite activity, essay writing, although I am currently doing it under duress. Since I believe I am being paid to do so, however, I do not mind writing a few lines to satisfy my critics.

All joking aside, the project I worked on with the Faculty of Nursing was quite interesting. The work I did was on a survey of nursing techniques in the field of postpartum care, the care of mother and child after birth. My part in the survey was data entry, in the course of which I spent coding questionnaires, entering the information into a computer, and mailing questionnaires. The main part of the work involved tasks such as these which required little actual brain work, but I also spent a small amount of time revising the coding scheme for the questionnaires, analyzing some of the data, ~~and~~ taking tours of different areas of various hospitals, and conducting interviews with some staff members.

Revising the coding system involved learning how to code the questionnaires, and then finding and fixing mistakes in the original system which would result in improper analysis of the data. For each answer on the questionnaire, a number was

assigned. These answers were then grouped by the computer by a special program and analyzed statistically. The data was organized so that several different programs could be used on the computer for different types of analysis. Since the computer did all of the actual work, the only thing that could be done by the staff was the initial instructions to the programs.

The tours of the hospital were quite interesting as well. I ended up doing four different tours: a general tour of the Royal Alexandra Hospital, a tour of the University Hospital's neonatal intensive care unit, an observation of a response test for newborn babies, and an interview with a psychiatric unit supervisor. The Royal Alexandra tour acquainted me with a general idea of how a hospital was run as well as a tour of several specialized units such as intensive care, nuclear medicine, physiotherapy, and occupational therapy. It also involved making rounds with the student nurses on a specified ward, in which I observed the students as they went about their jobs. The neonatal I.C.U. tour at the U of A Hospital involved a tour of the unit with a member of a rural transport unit. Rural transport involves sending a team of doctors and nurses to rural areas to care for critically-ill babies and to bring them back to Edmonton by plane to the intensive care unit. The tour also involved an informal interview with the transport team nurse, during which I learned, along with other things, that the cost for the team to fly by chartered plane to any location was over $10,000 per flight. This fact, needless to say, promptly discouraged me from asking

to accompany the team on one of their flights.

The third tour involved my observation of a response test for newborn babies, called a Brazelton test. This test is given to three day old babies both as a method of instruction for the mothers and a method of testing the babies' responses to various stimuli. The stimuli were used to evaluate a baby's responses to light and sound, its ability to calm itself down, reflex actions, natural defenses, and alertness. The test was also a method of teaching mothers about how individual each child is at even its early stages of life. The fourth tour was actually an interview with a male staff supervisor about nursing and hospital administration. We discussed areas such as the different stages of hospital administration, the differences between nursing and administration, the actual different types of nurses, differences in pay, and the benefits of post-graduate degrees in nursing. The final part of the interview involved, somewhat accidentally, following an escaped psychiatric patient and reporting her whereabouts to security. We were not allowed to restrain the patient ourselves, as there is no clause in our contracts which allow such an action, and therefore we could have been sued had we taken action against the escaped patient.

My work on the summer project with WISEST was a rewarding one, however routine the work may have been. I learned a great deal about the future of men in nursing and about several alternate career choices for the future. I also met several interesting people both in and outside the program (including two very attractive nursing students). Overall, the program in general was informative, as well as enjoyable. As for the

project summary, I would still have enjoyed being run over by a bus a great deal more than I enjoyed being persuaded to write it.