MY SUMMER AS AN ENGINEER

BY
SHARON ENG

TWO MONTHS AGO, I DID NOT HAVE ANY IDEA AT ALL HOW MY JOB WAS GOING TO BE LIKE. I WAS AFRAID THAT I MIGHT DISAPPOINT MY BOSS BECAUSE ENGINEERING WAS NOT ANY OF MY CHOICES AND I KNEW VERY LITTLE ABOUT ENGINEERING. NOW IT'S ALL DIFFERENT, I HAVE CONFIDENCE IN MYSELF. I KNOW WHAT I'M DOING, AND FURTHERMORE, I CAN DO THE JOB WELL.

THIS SUMMER, I WORKED FIVE DAYS A WEEK FOR THE PAST SIX WEEKS IN THE MECHANICAL ENGINEERING BUILDING. I WAS INVOLVED IN A PROJECT DR. BELLOW AND HIS ASSISTANT, CRAIG OWENS WERE DOING WHICH WAS TO FIND OUT THE EFFECT OF POST HEAT TREATMENT ON SUCKER RODS. FOR THIS PROJECT, I DID SOME METALLURGICAL PREPARATIONS WHICH INCLUDE MOUNTING, GRINDING, AND POLISHING SPECIMENS. I ALSO HELPED IN ETCHING THE SPECIMENS FOR MICROSCOPIC EXAMINATIONS. I PREPARED AROUND 30 SPECIMENS, AND THEY TURNED OUT PRETTY WELL, EVEN DR. VITOVEC SAID SO.

METALLURGICAL PREPARATION WAS NOT THE ONLY THING I DID. THERE WERE MANY MORE. I WAS ALSO INVOLVED IN TESTING THE FATIGUE STRENGTH OF SUCKER RODS. I GOT TO SEE HOW THE BIG FATIGUE TESTING MACHINE WORKED. CRAIG EVEN SHOWED ME HOW TO OPERATE IT, IT WAS NOT THAT COMPLICATED. BEFORE THE SUCKER RODS WERE PUT INTO THE MACHINE, I DID SOME STRAIGHTNESS MEASUREMENTS WITH THE DIGIMATIC INDICATOR, SO I KNOW HOW TO USE THAT EQUIPMENT NOW.

IT WAS NOT ALL PHYSICAL WORKS IN THE SIX WEEKS THAT I WAS THERE. I DID SOME READINGS THERE AS WELL. BOTH TOM AND CRAIG LENT ME SOME BOOKS RELATING TO WHAT I WAS DOING SO I HAD A BETTER UNDERSTANDING OF THAT PARTICULAR FIELD. SOMETIMES, CRAIG AND I WOULD GO OVER THE THE CAMERON LIBRARY AND DO SOME RESEARCH THERE. VERY OFTEN, WE WOULD CARRY MANY BOOKS BACK TO THE BUILDING AND DO SOME PHOTOCOPYING. I WENT TO A SEMINAR ABOUT CONVECTION AND HEAT TRANSFER ON THE FIRST WEEK I WAS THERE. IT WAS VERY INTERESTING, BUT I COULD NOT UNDERSTAND VERY MUCH. ON THE FOURTH WEEK I WAS THERE, CRAIG TOOK ME TO STELCO TO PICK UP SOME SUCKER RODS. THERE, I WAS GIVEN A BRIEF TRIP AROUND THE PLACE AND A BRIEF EXPLANATION OF THE PROCESSES GOING ON THERE. EVERY WEDNESDAY AFTERNOON, I WOULD TAKE AN HOUR OFF EARLIER TO GO TO THE MEETINGS WITH THE OTHER MSEGT STUDENTS. I ENJOYED THESE MEETINGS BECAUSE EVERYONE THERE SHARED THEIR EXPERIENCES.

THIS SUMMER, NOT ONLY HAVE I LEARNED ALOT THERE IN MECHANICAL ENGINEERING BUILDING, I ALSO MET MANY FRIENDLY, HELPFUL PEOPLE. ALL THE PEOPLE THERE ARE VERY NICE, PARTICULARLY PEOPLE LIKE TOM, CRAIG, JOHN, CARL, AND IAN. TOGETHER, THEY MADE MY SUMMER AN UNFORGETTABLE ONE. IF I HAVE A CHANCE, I WOULD LOVE TO WORK IN THAT BUILDING WITH THOSE PEOPLE AGAIN.

THIS SUMMER IS THE BEST SUMMER I HAVE EVER HAD. I HAVE GAINED SO MUCH THANKS TO THE MSEGT PROGRAM. I THINK THE MSEGT PROGRAM IS AN EXCELLENT PROGRAM. IT GIVES PEOPLE LIKE ME THE CHANCE TO FIND OUT THINGS THAT I NEED TO KNOW. ALTHOUGH I'M STILL UNSURE WHAT I'LL BE GOING INTO IN UNIVERSITY, BUT NOW I HAVE SOME IDEA WHAT ENGINEERING IS ALL ABOUT.

Six weeks of Everything
(Summary)

Madhu Jawanda
Wisest Summer Program
Linda Hall
August 15, 1986.

The Wisest Research Program helped me to understand science more realistically and truthfully. Science is not the amalgamation of mad scientists with cackling laughs, white lab coats and desires to rule the world. Instead it is a frustrating and continual search for questions and answers relating to processes which will hopefully improve the present state of mankind.

For example in the physics lab where I work, we ran combinations of tests as one single experiment to discover and better understand the electrical properties of gallium arsenide. Gallium and arsenic are 2 naturally-occuring elements with extremly high purities. The Cominco chemical plant brings these two elements together under special conditions at very high temperatures since gallium arsenide as a compound does not occur naturally. Cominco then sends slices of the compound to us in the form of monocrystals. The Graduate students then prepare small-spider-like samples for me to perform the experiment upon. Before performing the experiment, I must take the machinery apart and place the sample on the beriliium oxide plate of the sample holder. I then solder the wires of the sample, (the wires are either copper or platinum) to their posts on the sample holder. After doing so I lower the sample holder into the brass can and

reassemble the machinery.

Afterwards I apply heat to the sample and raise its temperature close to 120°C. I then cut off the heat supply in order to cool the sample and I take readings every 5°C as the sample cools. After I achieve my results to the lowest temperature, around 0°C, I plot three graphs and a few summary sheets etc. and put them on file.

In addition to running experiments I help the graduate students and others in the lab doing odd little jobs. I've experienced a little of everything and I believe that I have quite successfully managed the actual operation of my experiment.

Furthermore, this summer Dr. Hulicius came from Czechoslovakia to work in our lab. He too brought gallium arsenide samples. We are comparing the results of his samples and those from the Cominco plant. So far the "Cominco results" have been far better.

By now you are probably wondering what exactly it is about gallium arsenide that makes us want to know so much about it. Well, right now in the industrial mode of society, the silicon chip has been making

industrial progress at an enormous pace (something like penicillin was to medicine - nothing short of a miracle). With this progression we need faster methods of getting things done and we also need to expand our technological and industrial applications. Some of this can be achieved through gallium arsenide because in gallium arsenide electrons tend upto about five to six times faster. Therefore, this compound is more compatible with today's pace of change. Gallium arsenide is able to replace silicon in some of its present applications. It's creating a new generation of technology. It has proven to be a godsend to the area of telecommunications. The only problem is - we do not know enough about gallium arsenide to be fully aware of its properties.

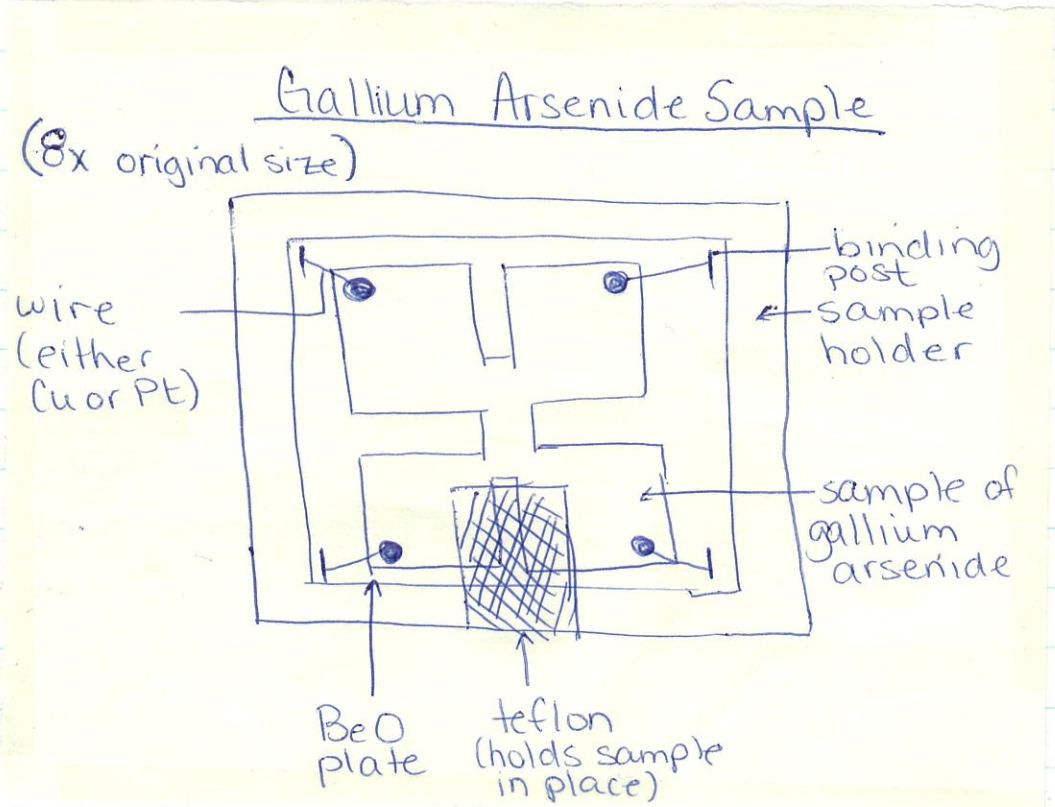
My specific job was to perform experiments on the sample and study the electrical behaviour of gallium arsenide. I found this extremely awarding and benifitial, not only academically but also emotionally.

My whole outlook about science has changed. The Wisest Program allowed me to achieve an answer to one of my many questions - How does science really apply itself in day-to-day life? I achieved the answer to this question through our weekly meetings, my experience

in my lab and perhaps most obviously by talking to people.

The Wisest Program is an absolute must for students interested in science, in people, in learning and in improving. I met people, I familiarized myself with the campus, I made great friends and most importantly I learned more about myself.

Before I give my pen and my hand a rest I would like to thank the founders of the Wisest program and the funders of the program and especially Linda Hall for a wonderful experience. Thank You!!



Aug 15 /86

Organic Chemistry Project

Nancy - Lee

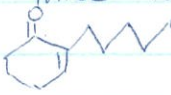
My name is NANCY-LEE. I am one of the chosen students for the Wisest Summer Program. I am working in the Chemistry Building on the project of making perfumes. This is as interesting as it sounds to everybody.

Generally from the beginning, I will talk about my feelings, my interest and my job.

Actually, the first time I walked into my lab, I guess my feelings were the same as other members of the program: nervous, confused and scared of everything. I was very afraid that my supervisor will acquire me to do something that is out of my knowledge. But to my surprise, he gave me the job that I could fully understand and do at my level.

After the first week, I started to get along with people in and around my lab. They were very friendly and helpful. They volunteeringly taught me how to use the machines around my lab, where to find things that I need for my experiment, how to set up the apparatus etc. However, I especially am very grateful to my supervisor, Dr. Clive, that he always gives me something interesting to do within my knowledge and made me feel comfortable at my job.

The best thing I like about this job is that there is no pressure. I can come at any time I prefer and go home at any time I want as long as I finish my job of the day. Everyday, I work leisurely on my experiments. However, the worst thing is that I have to smell different chemicals everyday and some of them are awful.

So far over the six weeks I have done three kinds of perfumes which are  ,  , and  . They all smell very fruity. The purpose of this project is to see which one of them has the longest lasting smell. They do take a lot of time to make but success depends on your patience.

Now, my supervisor is very impressed at the way I worked; he, therefore, let me to come back next year and work for him again.

Thanks to the Wisest Summer Program that gave me the opportunity to learn a lot of things through out this summer and also a job for next year. I hope that the people who will be chosen for this program next year and the years after will enjoy their jobs like the way I did.

Rana
Saglalsingh

My department was the department of Mathematics. On the first day my supervisor, Dr Rogers, gave me the key to my office and took me to the bookstore. There we got two Schaum books: Finite Mathematics and Plane Creometry. In the mornings I would work on the computer until about 11:00 [redacted]. Then I would spend the rest of the day working on the Schaum's Outline books.

The program I was working through was on calculus. At first I thought I could figure it out, but then I realized it was hopeless. When I told Dr. Rogers that I did not know calculus and could not use the program, he said to just work on the books. He also said that if I found a suitable program I could use it and show it to him. So I called a friend who works in Education. He got me a copy of a program called MacMath. This program can perform almost any type of mathematical equation.

I spent the mornings working through the program and figuring out how to use it, and the afternoons with the books. I never fully understood how to use the program, but I found it interesting. As for the books, I finished Finite Mathematics and got well into Plane Creometry.

My project was not very complicated or interesting. This was not my Supervisor's fault, though. There are few math projects you can give to someone who has only had Math 20. I feel that a student must have a genuine interest in math [redacted] for this project to be challenging.

Still, I found the program rewarding in many ways. I have become comfortable in the University. I have met many people who I think I'll be friends with for a long time. Most importantly, though, I learned of many career options I never knew I had. This program has inspired me to explore many careers to find one for me.

Jenny E. Mancenido.

A WISEST Report

I can truly say that this summer has been the most interesting & most rewarding experience I have ever encountered. This program has been beneficial for me in terms of working daily with a MacIntosh computer. Because I have not worked with the MacIntosh in the past or had any prior knowledge of Microsoft Basic & assembler language, this project has been a great learning experience. By reading the MacIntosh manuals & having a hands-on experience with a computer, I became comfortable working on it. Also, I had a wonderful time with MacWrite & MacPaint. Because I like to draw, I found MacPaint especially useful because of its many features

Also, this program gave me a greater knowledge of campus life. Many lunch hours were spent getting to know other WISEST students & what they were doing & exploring all of campus. This "exploring" was very rewarding to me because I plan to go to the U of A, thus with a knowledge of campus, I probably would not be as prone to getting lost. I also found the Wednesday activities & lectures quite interesting & informative

This summer has been unlike other summers: it has been both mentally & physically stimulating. Lunch hours were also spent on the badminton courts. I think Wendy Kwong & I are going to join the "badminton Olympics"! This program has enriched my life. It gave me a positive outlook on University life & women in traditionally male

What I did this summer . . .

When we first arrived, Don explained to Carolyn and I about drinking water, the filtration, coagulation, etc processes and about their Rossdale Pilot Plant which was built just like the Rossdale Water Treatment Plant with some additional processes like using GAC (Granular Activated Carbon) to remove organic compounds from the water. The next two weeks were spent doing references for their paper and reading through approximately 55 papers (both Carolyn and I) for data. Although the papers seemed boring at the time, they really helped me to understand the water treatment process and what I would be testing for. The next week I spent working on a TOX (Total Organic Halide) machine which is the only one in Western Canada and valued at $30,000. The first step is to let the water drip through packed GAC columns so that all the organics from the various water samples, such as raw river water, after chlorination after GAC, etc. were collected on the carbon. Then the inorganics were removed by dripping nitrate through the columns. The carbon was placed in the actual TOX machine and burned at an approximate temperature of 794 °C. The millivolt reading required to stabilize the concentration of an acetic acid sol'n is the reading that to tells the number of organics in the water sample with halides, such as fluorine, chlorine and bromine.

However, the following week, the TOX machine proved to be a very touchy and delicate piece of machinery. After many rinsings of the $600 cell, the machine began to work. It worked with an inconsistency and took a long time to stabilize between running samples. It still does not work well to date. Thus I resigned to doing dishes (beakers, volumetric flasks, and resin cylinders), photocopying, a little typing and homogenizing water samples. Homogenizing is the process of thoroughly mixing a sample and filtering it to remove big pieces of organics to prevent an exceptionally high reading in the TOC.

SALIM REMTULLA.
Aug. 11, 1986.

WISEST REPORT.

بسم الله

It's incredible how time flies, even when you're not working too hard. In just six weeks the WISEST program has allowed me to experience working in a field which I may have overlooked, and in doing so, has helped me clarify my ideas about future careers. Furthermore, my sense of direction in life and on campus has greatly improved!!

As far as my actual work was concerned the great people I worked with have helped me learn a lot about geriatric patients. The experiment part we worked on dealt with 2 patients, and how their behaviour is effected before and after the use of restraints. We were to record and code behaviour at certain time intervals, and also to determine the total nursing time spent on each patient. These patients had been filmed, and therefore all the data was obtained by analyzing video tapes. I was not in direct contact with any of the two patients. However, after having seen other patients' conditions in real life, during a visit at the Aberhart hospital, I feel I had learned and experienced something truly unique - this is why I found the program so worthwhile.

Although the WISEST program provided a priceless experience for me, I only wish I had worked in a Hospital or Laboratory - for me this would have proved more exciting - I suppose research in an office is not my cup of tea!

Thank you WISEST and THANKS LINDA for a great job opportunity and an AWESOME work experience!!!

Paula R. Schermann
Department of Botany
Project Name: Acid Rain bio-monitoring

MY WISEST SUMMER AT THE UNIVERSITY OF ALBERTA

From the period of July 7, to August 15, 1986, I worked in the Biological Sciences Building in the Department of Botany with Cynthia Marsh (Research Technician) and Line (lynn) Rochefort (Graduate Student). During this time I was given numerous tasks to perform which are briefly described below.

The majority of my time went to working on the research site near Calahoo where Line Rochefort presently has an experiment going on. This task included both work at the site and laboratory work here in Edmonton. At the site, some of my duties were to spray the designated plots with either acid rain or rain water. I collected moss,plants, and water samples, and in my last week of work, we did a vegetation analysis of the site. My duties here in the lab were to prepare the solutions of acid rain and rain water for the field, filtering and acidification of the water samples, chlorophyll analysis of the moss, and pressing and mounting plants. The last of my duties for this experiment was to take the data collected and figure out the chlorophyll amounts and drawing graphs showing the results.

I also spent time setting up 2 more experiments for Line Rochefort in the growth chamber in our building. Here, I helped prepare the mosses for the experiment by cutting some and planting others. I also participated in preparing the special solutions that are to be used in this experiment, and during the last week of my employment, we started the project by pouring these solutions on the mosses.

The rest of my time went to such tasks as researching books in the library, photocopying, and cleaning up our work area in the lab. All in all, I feel I have learned a great deal from this summer and am pleased with it. It has given me a better understanding of the amount of work required in researching and diagnosing specific experiments.

Paula R. Schermann

Wisest Summer Program Report

Theressa Kunyk

Electrical Engineering

I believe that I entered the WISEST summer Program with reasonable expectations of what my summer would be like. What I didn't expect was almost total chaos for the first two weeks! My supervisor in electrical engineering Jim George had left for holidays; I've heard from a former WISEST student in my department that he does this every year, but he manages to appear for the formal luncheon. True to rumors, he was there, and turned out to be a very pleasant gentleman! To say the least, though, my initial reaction to this absence was a dismal feeling of rejection!

For the first three days I observed my co-workers and performed odd-jobs. Interestingly enough I was able to observe canine colon analysis in bio-mechanical engineering because of the former WISEST student's involvement! On the fourth day, I started working for Steve Drake, a graduate student, who apparently has been a supervisor for WISEST students in this department in previous years. He introduced me to UNIX, a computer filing system on the Hewlett Packard-Sun terminals. My job was to created an accounting program usng "C" language and various editors. Since I didn't understand what I was doing, this proved to be a rather awkward situation!

Finally after wrecking my brains and acquiring courage, I informed Steve of my situation! He and another graduate

student decided to let me work on CADDS or Computer Aided Drafting Design System. My project like that of WISEST students before me would be to create an updated Schematic and CVX.PCB Components Catalog which will be used by computer and electrical engineers working on CADDS as a reference when inserting previously designed circuit board parts.

This has been my work for the past three weeks. It's basically quite easy once the forms for the pages are prepared. The forms accommodate parts of various sizes. On these forms, text size and appearence may be predesignated at various points. I then created a layout which is 34" x 22" to accommodate eight 8½" x 11" pages with various forms. Once I finished these tasks. Steve showed me how to insert the parts and extract information from them pertinent to the catalog.

Once the Schematic portion of the catalog consisting of 98 pages was complete. I plotted the layouts using a VERSATEC Electrostatic Plotter. Then I cut out the pages which resulted in the formation of a master copy of this catalog to be latter photocopied. I followed the same procedure for the CVX.PCB portion consisting of 71 pages. Currently, Steve has assigned me the task of creating a Component File Library for CVX.PCB parts which is also to be used as a reference for engineers.

The WISEST program has aided me considerably in my decision for my future choice! My knowledge of the sciences and technology has grown immensely. Of all my experiences, the most useful was the acquisition of information about the University of Alberta necessary for all future students.

Hopefully this program will allow me to more easily acquire future jobs on campus. the WISEST program is wonderful and very successful. Keep up the great work!

Dear WISEST,

When I first came here this summer I was very nervous because I expected to be driven like a slave with loads of work. I expected a very strict environment because "University" scared me.

I first began to change my mind at our first WISEST meeting because they said that we would be expected to work but could also have fun. My attitude really changed when I got to the Family Studies Dept. Everybody there has their job to do or their goal to reach and they work hard at it but at the same time there is a very relaxed atmosphere. I really liked the working environment.

When I started working I never really had a specific job to do. I came into a research project and had to help a graduate studentwho was also working on the project. The project was on memory problems in the aging process. My tasks were related to the interviewing of study subjects. I had to set up the interview room before the interviews and clean up after the interviews. Then I would set up parking for them, confirm the appointment the day before, and prepare their interview files. Then my jobs changed a bit. I then had to do library research which consisted of looking up abstracts in the Psychological Abstracts' Subject Index. Then I switched again to scoring the interview files and preparing files for the young subjects in the fall.

One thing I realised after a tour through Home Economics was that it wasn't as simple as I was led to believe up to now. I had thought that it was just cooking and sewing. I had never heard of Family Studies or how complicated it is. Ialso didn't know how scientific cooking and sewing were.

I really liked the WISEST meetings because Igot to hearwhat the other students were doing. I was really interested in what the people at Alberta Manpower had to say. I think the meetings were quite informative and fun.

All in all I would say Ilearned quite a lot about research in general, home economics, and the university. I would also like to say thank you very much for a fantastic experience.

Sincerely Lorey Matchett

Jacqueline Lee
15/8/86

Stelco Research Project

This project is dealing with the ancient Chinese bronzes which has the mysterious black coating when the metallurgists discover them. In this project I am assigned to contribute a research relating to why the Chinese bronze is black in color. During my six weeks here, I have made a bronze, an alloy of copper, tin, and lead, used the cutting machine to slide this bronze into small pieces, and gave these small samples the heat treatment at various temperature and at certain amount of time. After these samples have been heated, I mount, grind, and polish them to get a scratch-free surface of the specimens, and then put them under the image analyser to calculate the size of the lead particles and the area of lead on the surface of specimens. Finally I photograph these specimens to see the shape of the lead particles and then do the chemical analysis on copper, tin, and lead. Actually the work are very interesting at first but because I need to compare the results of these specimens at various temperature and at certain amount of time, it becomes the routine. However, I always eagerly want to see the result, therefore, this routine does not bore me at all. Besides, I am allowed to listen to the music while I am working.

To me this jobs has benefited me in many respects. The first thing is I have gained more chemistry knowledge, the second thing is it is a chance for me to apply my Physics and chemistry knowledge into the lab work, and the third thing is it is an opportunity for me to meet many friendly people. Therefore, I wish that next year or in the future I will have a chance to work in this mineral engineering building again.

HAZCHEM

To: Linda Hall

From: Chantelle Sedgwic

The summer of 1986 was spent working in the HAZCHEM Resource Center.

Before work could begin certain lab techniques had to be learned: taking a melting point, recrystalization, and vacuum filtration. For practice three Chemistry 250 labs were done.

1. Purification of Benzoic Acid
2. Production of Soap from Nutmeg
3. Separation of Napthalene, Benzoic Acid and p-Chloroaniline

For the remaining five weeks samples of semicarbazones and oximes were made. Semicarbazones and oximes are derivatives of ketones and aldehydes.

Chemistry 250 - Production of Semicarbazones

3-pentanone

3-methyl-2-butanone

acetone

350 Practical Examination - Production of Oximes

camphor

benzoin

p-bromoacetophenone

p-hydroxyacetophenone

cyclhexanone

benzalacetone

p-nitrobenzaldehyde

4-methylacetophenone

Chemistry 451 - Production of Semicarbazones

acetophenone

4-chloroacetophenone

4-methylacetophenone

4-methoxyacetophenone

2,4-dimethylacetophenone

2,5-dimethylacetophenone

3,4-dimethylacetophenone

4-ethylacetophenone

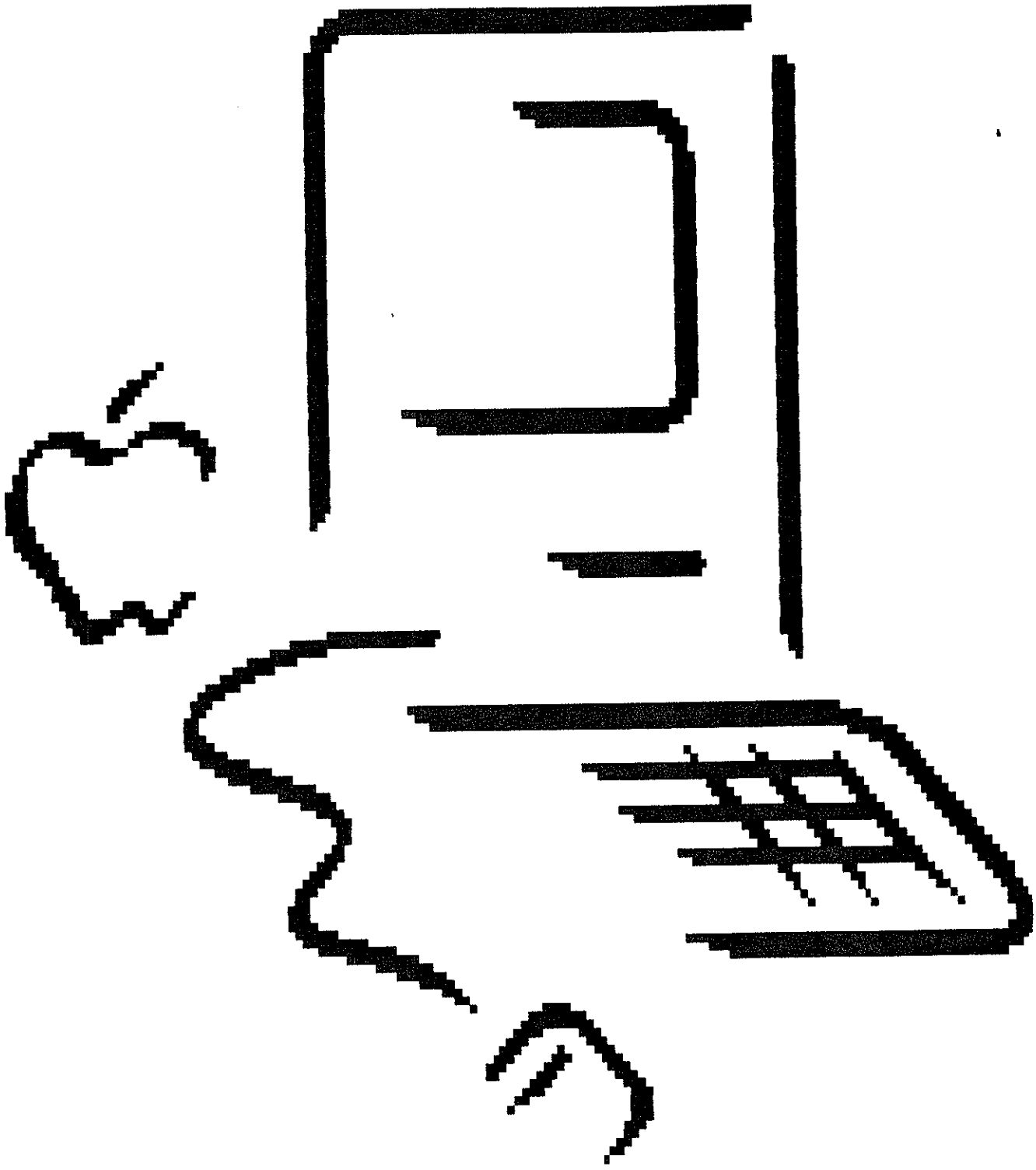
Progress was reported and discussed at weekly department meetings.

The six week program gave direct insight into possible career choices.

It was great!

Linda Hall.

APPLE BYTES :



A Summer with a Mac

Computing Science

This summer we worked for Dr. Adams in the Department of Computing Science. During the six weeks, we learned to use an Apple MacIntosh and then used our skills to improve and refine a program on the Mac for our supervisor. This program was a simulation designed to help students to understand how a computer operates.

We started by exploring the MacIntosh, using Dr. Adams' personal computer. After looking through various manuals, we tried out some of the Mac's functions and software through two "guided" tours. We soon became comfortable working with MacWrite and MacPaint, as well as the mouse and the electronic desktop. MacBillboard, an extension of MacPaint, was given to us by a friendly staff member. We were soon drawing *beautiful* pictures.

However, we ran into trouble when we forced the ejection of the MacWrite disk and subsituted the MacPaint disk. This resulted in a transfer of phantom MacWrite files onto the MacPaint disk. Everything on the MacPaint disk was lost. We solved this by copying the MacPaint program from the tour disk and the system from MacBillboard. The only file impossible to replace was the copyright. Oh well.

When we took our first look at MacHyne (the simulation program), we were totally confused. In order to even begin to understand it, we experimented with Microsoft Basic, the language in which it was written. We wrote several short programs to test the uses of various built-in functions including the logic and graphics commands. Microsoft Basic also makes use of the Mac system's functions, such as the pull down menus and the use of windows and buttons. We discovered, though, that some of these functions were frustrating and required a lot of extra work to accommodate their use. This especially

included the rather useless output windows and the close boxes, the latter of which could be used at any time and could result in completely hanging the computer. We arrived at the conclusion that the MacIntosh is designed for the benefit of the software user, not the programmer. The Mac is certainly not designed for Basic to be used. Another limitation of the Mac is its constant need to read from the system disk. Without a second disk drive, we soon became t i r e d of continuously tranferring disks in and out of our one built-in drive.

Armed with our understanding of Microsoft Basic, we looked at MacHyne again. This time we also had the program listing and explanations and instructions as to its use. MacHyne (a misspelling of machine) is a simulation of the internal workings of a computer, and is designed to teach the use of machine code and assembler. It has its own limited set of 10 operating codes (Jump, Jump if Accumulator is Negative, No Operation, Beep, Input, Output, Load, Store, Add, Subtract). Before we could improve it, we had to look at it from a user's point of view. To this end we wrote various simple programs in MacHyne's simulated assembler and ran them on the simulated machine. The limited number of operations made some rather complicated procedures necessary. Counting loops while performing operations meant that numbers had to be almost constantly j u g g l e d in and out of the accumulator, the only place where arithmetic could be done.

The first change we made was restructuring half of the listing, replacing all the line numbers with subroutine titles, thereby making the listing easier for the user to understand. The first half of the listing had already been restructured by Dr. Adams. We then eliminated the frustration caused by using the close box and hanging the computer. To do this, we used a simple test to check if the close box had been pressed, and rerouted the program execution to the exit into Basic. We added a user prompt (message) to indicate what to do at the first beep. We also renamed the menu containing the operating codes (viewing only) and called it "Commands" instead of the misleading "Help". The button which exited from the machine into the assembler was changed from "Stop" to "Exit", while a

new Stop button was created, which stopped the running of the simulated machine code program.

Dr. Adams also lent us various games and utilities to experiment with, including MusicWorks, **Dungeon of Doom**, *SmoothTalker*, and Life. Utilities included a desk accessory sampler,a font mover, an icon designer, and many more.

As a whole, we found our experience working in Computing Science at the University of Alberta interesting and encouraging.

Our thanks to Dr. Adams, Linda Hall, and the WISEST committee for making this experience possible.

Patricia Evans

Jenny Mancenido

WISEST PROGRAM

In the last six weeks I had a lot of fun and learned a lot about the university.The people I worked with were great and were very informative when I had questions.

The main thing I did here was library research.They had me researching the complications of diabetes,insulin,and adolescent problems in which I wrote a reports on and presented them at the meetings we had every week.Dr. Kieren was also writing abook on sex and had me finish off the glossary.Doing research I learned my way around the university pretty quick and how to get where I was going to fast.

I sorted out a lot of Home Economics books that were to be sent to Printing Services to be bound and found some missing.I went to the Home Economics building to see Mrs. Kernaleguen to get the missing Journals and then photocopied them.

Dr. Kieren gave me a list of sources for me to find and photocopy for her,which was an easy but very time-consuming job.Some of the books were not in the libraries so I made a list telling which ones were not available,which ones were not there at all,and which ones I finished.

There were a lot of files that had to be switched around and I helped to do that.Some of the files didn't have either dates,authors,publishers,etc. or a combination of them on the file's source card (like a bibliography),so I went to the different libraries and tried to find what they needed.That was another easy but time-consuming job.

This program was very good and gave an interesting inside look at the varios departments of the university.It prepared me somewhat about what university life is all about and I recommend it to anyone who is thinking about attending university in the future.

Sincerely,

Frank Piorkowski

Frank Piorkowski

1986

UNIVERSITY OF ALBERTA

WISEST SUMMER PROGRAM REPORT

by

GREGORY YOUNG

INTRODUCTION

After a surface cut is completely healed, it is often quite difficult to locate where the wound existed. This is because the skin cells surrounding the area are perfecly replicated to seal the wound. Why do the neighboring cells, or any cells, make such faithful copies of themselves? That is the question my lab group is trying to answer. The solution is found at the DNA level. The DNA provides all the information to synthesize a cell's division. For the cell to divide, however, the DNA must be copied. Incorrect DNA copies, called mutations, may result in a non-viable or altered cell. Therefore the enzymes responsible for the synthesis of new DNA copies must be accurate.

A genetic approach is being used to solve the question. This means that the mutants are isolated. From understanding why mutants cause mistakes we can hopefully backtrack and discover why mutations do not often occur. Mutations are spontaneous or environmentally induced. Usually, they are undesirable. Mutations are defined as changes in any of the four DNA bases: adenosine, thymine, guanine, and cytosine. The rearrangments in the DNA sequence can occur by a deletion, substitution, or addition of a base or bases. Fortunately, mutations only occur at a rate[1] of 10^{-7}.

One reason for the mutation rate being so low is the existance of DNA polymerases. Polymerases are proteins which copy the DNA template during replication. Polymerases are one of the main enzymes responsible for the correct pairing of DNA bases. L.J. Reha-Krantz, my supervisor, is specifically researching why DNA polymerases work so well during replication. The experimental organism for her studies is the bacteriophage T-4.

T-4 viruses are called bacteriophages because their hosts are bacteria. A T-4 consists of a six-sided head containing nucleic acid, a hollow protein tail attached to the head, and six legs located at he end of the tail. Like other viruses, the T-4 must infect a host before it can reproduce. To infect, the T-4 fastens its legs to the outer wall of an E. coli. It then drills its tail into the E. coli and injects its nucleic acid from its head via its hollow tail. The T-4's nucleic acid then takes control ot the E. coli's life functions and causes the E. coli to reproduce T-4

viruses until the cell bursts open.

My own research project was testing to see if a certain T-4 polymerase, called tsL141, can reduce the level of mutation at a marker site in T-4 called x655op. To do so, it was first necessary to construct the double mutant tsL141-x655op. To constuct the double mutant, I infected the host E. coli with two types of T-4 viruses: tsL141 and x655op. The double mutant is produced by recombination between the two infected viruses. I then proved that I had isolated the tsL141-x655op double mutation.

The second part of my project was to test to see if the tsL141 DNA polymerase mutation reduces the mutation events at the x655op site. This was done by what is called a fluctuation test. A fluctuation test was done by making lysates from purified plaques. The lysates were then diluted and grown on permissive and non-permissive hosts. The median mutation rate is then calculated from the amount of growth. Unfortunately, the reductions caused by tsL141 were not as great as hoped for.

MATERIALS AND METHODS

Phage and E. Coli Strains

The phage strains used were x655op, tsL141, and RUV199. The host E. coli strains provided were CR63, CRλ, optA, KB, CA167, and E. coli B. CR63 was the permissive host, CRλ and KB restricted x655op and RUV199 growth, and optA at 43° suppresses growth of tsL141. The E. coli B strain was used to observe the rII(x655op, RUV199) mutant plaque morphology. CA167 was used to locate ochre mutations.

Preparation of Overnights

Overnights were made by placing single isolated colonies of desired strains into 10 ml of Hershey Broth in 20 ml tubes. The tubes were then incubated overnight at 30° in an incubator shaker.

Lysates

Lysates were made by mixing 2 ml of CR63 overnight in 50 ml of $m9^+$, a minimal medium solution. The mixture was then incubated for three hours in a 30° incubator shaker. After the incubation period, purified plaques were placed in 20 ml tubes with 5 ml of the $m9^+$/CR63 solution. The tubes were then put in an incubator shaker at 30° overnight. A few drops of chloroform were added to the tubes the following day in order to complete lysis.

Reversion Rates

Reversion frequencies were calculated by fluctuation analysis. T-4 lysates were plated on permissive and non-permissive hosts at desired dilutions. The number of revertants, eg. x655op revertants, was determined on the non-permissive λlysogenic host. The plates were then incubated at 30^{o} overnight. The next day, the plaques were counted and the median reversion frequency was calculated from the nine lysates.

tsL141-x655op Phage Cross

The phage cross was performed by incubating 2 ml of a CR63 overnight in 50 ml of HB for two hours and fifteen minutes. A multiplicity of infection of five for the two phage were calculated and added to 1 ml of HB. One ml of CR63/HB solution, at 2×10^{8} bacteria/ml, was then added in a 20 ml tube. The tube was then incubated for 10-12 minutes in an incubator shaker at 30^{o}. A 1/1000 dilution was then taken from the tube and incubated for an additional hour in an incubator shaker at 30^{o}. After the hour, chloroform was added to complete lysis and for sterilization. From the tube, dilutions were made and the phage cross was plated on the E. coli B strain. The plates were incubated overnight at 30^{o}. The next day, replica plating was done on CR63, CRλ, and the optA E. coli strains. Double mutants which grew CR63 but not on CRλ or on optA (at 43^{o}) were selected to make isolated plaques. From the isolated plaques, high titre lysates were made which were diluted and plated.

Backcross

A backcross was performed by incubating 2 ml of CR63 overnight in 50 ml of HB for two hours and fifteen minutes in a 30^{o} incubator shaker. A multiplicity of infection of five for x655op, tsL141, and tsL141-x655op was calculated. In 20 ml tubes, 1 ml of the CR63/HB mixture was added to each of the phages: X655op, tsL141, x655op-tsL141, x655op-tsL141 X x655op, x655op-tsL141 X tsL141. The tubes were then placed in an incubator shaker at 30^{o} for 10-12 minutes. After that time, 1/1000 dilutions were done which were incubated for one hour. Chloroform was then added. Dilutions from the tubes were plated on permissive hosts to find the total growth and on the non-permissive hosts to find the reversion frequencies.

REFERENCES

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WISEST SUMMER PROGRAM 1986

When I first heard about the WISEST program, I thought it would be a really great program to get invoved with. Few high school students are given the opprotunity to work on the University of Alberta campus for the summer. When I was called by Linda Hall, the programs co-ordinator, explaining I had the job, I felt estatic!!

After surviving the expirience of finding the Chemistry Building and correct room number, I met other members of the WISEST program. Proceding the introductions, we were led down to the CAB cafeteria, where we waited for Linda to escort us to our various job sites.

Upon arrival to the lab in the Home Economics Building, I met Catherine Field, who is a graduate student. Cathy gave me a tour of the lab that I was to work in and introduced me to her fellow co-workers. At the time Cathy was mixing up a diet for the animals. She instructed me to go for lunch and then return and help her complete the task. I found my way back to CAB and ate lunch with fellow grade 11 students in a pre-arranged area. Upon returning to the lab, Cathy led to a room, called the "Diet Room." This is the room where the animals food is prepared. All the components of the diet had to be measured out percisely and then mixed together. It makes an awful mess to clean up. I was then put in charge of feeding the animals.

After learnig my way around the lab a bit, I was asked to help Kathy Hargreaves methylate samples. This is used to help determine the amount of lipid (fat) in the sample. Measurements and timing had to be accurate. I labeled and cleaned used test tubes. Kathy had many samples to test.

I later was asked to go over to the Health Sciences Library to find various material. I was either to photocopy or sign the material out. It was a good experience in learning how to use the library system, even though we had a few scares losing student and copy cards. They were all found though. I had an opprotunity to work in a couple of campus libraries.

Kathy wanted me to prepare standards for a Lowry Assay test a few days later. After explaing the procedure once, she wanted me to perform the test. I nearly dropped my pants! She told me that she wanted me to learn through experience. I finally completed the test properly on the third try. The Lowry Assay Test measures the amount of light that passes through the sample using a spectrophotometer. This in turn tells you how much protien is in the sample.

During part of the program, I was allowed to work one morning a week on the second floor in preparing meals for male subjects particapting in a study. There was one person named Joe, who had just come from another country. He had to learn what each of the utensils were used for and when to use them. He also had to learn about our "western" style of food. We had to duplicate the meals he ate and turn them into a compost using a blender. Urine samples were taken and were later used in the lab, as well as the compost.

I assisted in taking blood samples from the diabetic and non-diabetic rats. We were measuring the amount of glucose in

the blood using a Glucoscan meter. My project was suppose to be working on insulin receptors and how diet affects them, but I went from one end of the lab to the other working on various projects. I have met Dr. Clandinin a few times but he is a very busy man and was not directly involved in guiding me through the project.

I feel that the daily and weekly gatherings of the group were really benefical in getting to know the peple in the program. It also enabled us to discuss important issues. I feel that a person should be allowed to choose any proffession he or she wants to get in to, without having to worry about discrimination from ignorant people. I am proud to say I am member of this program.

This program has really opened my eyes in what a career in the sciences would be like. Before I thought of the sciences as an exciting occupation, but it has many tedious tasks as well. I plan to come back in a couple of years and take courses that will allow me to become a dietician in the medical field. I would like to take this opprotunity to thank everyone who made this project such a memorable experience and especially to the people whom I worked with.