A Report on Sabbatical Leave Activities

Spring Semester 1979

by

Morris Hein

Chemistry Department

Mt. San Antonio College

My wife and I are grateful to the Mt. San Antonio College School District and to the Board of Trustees for providing us with this sabbatical leave opportunity. I feel that the semester spent on leave was very worthwhile to me professionally and personally and that the College will also benefit from my experiences for years to come.

My goals during this leave were (1) to travel and to observe the culture of the people in other countries; (2) to visit, where possible, chemical manufacturing plants in various parts of the world; (3) to visit a few chemistry departments along the way and compare notes on teaching.

Prior to leaving I made several contacts in New Zealand and Australia to help me carry out my objectives. Our itinerary by country was as follows: Los Angeles to Hawaii, to New Zealand, to Australia, to Hong Kong, to Nepal, to Israel, and back to the USA. We departed from Los Angeles on February 21st and returned home on June 27, 1979.

The first stop on our trip was Hawaii where we spent five days. We spent all of our time on the island of Oahu. We visited several Hawaiian national monuments. The state capital building has some very unique architecture. The two legislative chambers are coneshaped, like volcanoes, symbolic of the origin of the islands. There are many high rise building dotting the coastline of Honolulu. However, the master planning is such that there is a corridor to the sea, that is, there is no high rise building between the capital and the sea.

I had planned to meet Jim Smith of American Chemicals/Kem Hawaii. But we could never get together. His company does not

manufacture any chemicals, but handles about 400 products specializing in water processing, insecticides, and surfactants. Jim referred me to Jake Peppers of A. C. Brewers Company, a large chemical manufacturer in Hawaii. I tried to call Jake four times but was never able to reach him on the telephone.

I visited Kapiolani Community College where I spoke with Louise Holmes and Needa Quensell who teach Microbiology and Biology in the Helalth Education and Nursing Departments. The Kapiolani campus is located in the heart of Honolulu and specializes in business education. Most of the campus is in temporary buildings. However, Business Education is located in a large two story building. They have modern equipment, a math laboratory, and an excellent placement service for their students. The chemistry department is located on the future Diamond Head campus. They are situated in old army barracks, have no fume hoods and have limited laboratory facilities. Kapiolani College reminds me of Mt. SAC in its development stages in the early 1950s. They are scheduled to move to the new campus about 1985.

Our next major stop was New Zealand. We arrived in Auckland on February 27th. New Zealand is made up of two large and several small islands. The main islands are known as the North Island and the South Island which are separated by a narrow body of water known as the Cook Strait. New Zealand is a small nation with a population just over three million people. The North Island has about 72 percent of the population. There are four major cities with populations over 100,000. Auckland is the largest with about 800,000 people. Wellington, the capital, has about 360,000 people. Auckland and Wellington are both on the North Island. Christchurch

(300,000) and Dunedin(120,000), the other two major population centers are both on the South Island.

Although New Zealand has all the various kinds of industry of a modern society, their major industry is sheep and wool. New Zealand is the fourth largest sheep producing country in the world. Australia, the Soviet Union, and China produce more sheep than New Zealand. This small nation has about 65 million sheep, including about 41 million breeding ewes. They slaughter for market about 25 to 30 million lambs and sheep a year. Sheep products represent over 50 percent of New Zealand's exports. Agricultural products are about 72 percent of New Zealand's exports. When we were in the city of Rotorua, we went to the Agrodome to see a presentation on the 19 different breeds of sheep in New Zealand. We also had the opportunity to see the training of sheep dogs and the handling of sheep by these superlative dogs.

The people of New Zealand are predominantly of British and European heritage. Their history goes back to 1642 when the islands were discovered and named by the Dutch explorer Abel Tasman. But it was the British under the direction of Captain Cook who arrived to stay and settle in the mid-nineteenth century. Prior to this time a polynesian-like tribe called Maori's inhabited the land. The Maori's signed a peace treaty with the British in 1840. In 1852 Britain granted self-government to New Zealand.

There are about 325,000 Maori's living in New Zealand today. They are well liked and still maintain their native customs and their mother language. Many of the towns and villages, the lakes, rivers, and mountains have Maori names. Most of the original Maori tribes dwelt in the North Island which they called Te Ika-a-Maui.

The country has done a good job of memorializing the life, culture, and history of the Maori's. The Department of Maori Affairs maintains 24 museums with Maori collections. Especially impressive are the carved long war canoes and the elaborately decorated meeting houses.

Getting back to Auckland where we spent two days we took two tours of the city which is built around a sparkling harbor. The Auckland War Memorial Museum has an unrivalled collection of Maori memorabilia. We also visited the Museum of Transport and Technology, which is dedicated to preserving the nation's technological achievements. It is a spacious museum and is housed in several separate areas. The museum has a collection of tramway cars, from the horse drawn variety of 1862 to the last electric tramcars which were withdrawn from service in 1964. The railway division features old steam and diesel locomotives. The aviation section shows the progression of flight technology in New Zealand. The have over 30 vintage aircraft which include the well known Lancaster bomber of World War II. Another prize attraction is the remains of the first Pearse plane in which Richard Pearse is claimed to have made his first flight in 1903, months before the Wright Brothers. The museum also has good displays of early photographic and sound recording equipment, computer development, and an excellent collection of electricity generating equipment.

We left Auckland by autobus for Rotorua. On the way we stopped at Waitomo to see the spectucular glow-worm caves. In addition to the usual stalactites, stalagmites, and other magnificient limestone formations, the Waitomo river runs through one of these caves. Tourists are conducted through the glow-worm grotto in small boats.

The feature of this trip is the observance of thousands of light-emitting glow-worms which reside on the roof of the grotto. The glow-worm starts out as a tiny larva or grub that emerges from an egg and is capable of emitting light almost at birth. The larva begins to build its nest which is a mucus structure in the form of a hollow tube which is suspended from the roof of the grotto. After building about 30 of these threads they are coated with tiny drops of acid which paralyze any insects flying into them. The light emitting organs of the glow-worm are located in the tail segment of the larva. The light process is actually the disposal of waste products by oxidation. The glow-worm light source has been compared to that of a firefly, and does in fact, have two of the same ingedients, luciferin and luciferase, which combine to produce light. To increase the intensity, the glow-worm uses the well know biological energy source adenasine triphosphate(ATP). In the chemical reaction of the glow-worm light, less than one percent of the released energy is heat, the rest is light--cold light--one of the most efficient known to man. Absolute silence must be maintained while floating through the caves as the glow-worms are sensitive to noise and will turm off their lights. The sight of these thousands of glow-worms is spectacular--like the sky full of twinkling stars.

Rotorua is the largest city in the central part of North Island. It is located on the shore of lake Rotorau and is in the heart of a vast geothermal area 150 miles long by 30 miles wide. From our hotel window we could see thermal activity all around and as close as 100 feet away. One area set aside for tourist is called "Hells Gate." It is an array of hot cauldrons, mud volcanos, sulfur crystal pools, boiling water pools, etc. It is

actually a dangerous place to walk, but visitors are continually warned to stay on the disignated paths all the time. In another area known as Geyserland there are over 120 hot springs. It is said to have the largest deposit of silica in the world.

The next day we went to the Waireki thermal energy fields. This area is part of the Waikato River Electric Power development. In these thermal energy fields they have drilled over 100 boreholes, some as deep as 2000 feet. About 80 percent(by weight)of the discharge from the bores is water. This is removed by separators at the well-head, and the remaining steam piped to the turbines in the powerhouse, which is about 1.5 miles from the center of the steamfield. There is a total of about 10 miles of large diameter pipe conducting steam from the steamfields. These steam fields generate about 8 percent of the power in New Zealand. Viewed from a high vantage point one can see a vast array of pipes with 16 to 20 foot expansion loops every 1000 feet and excess steam billowing out from all over the ground.

The chemical content of the water from a typical borehole contained in a 44 gallon drum of hot water is shown below:

Chemical	Quantity
Sodium chloride	12.8 ounces
Silica	2.4
Potassium chloride	2.3
Boric acid	0.67
Lithium chloride	0.3
Calcium sulfate	0.13
Magnesium chloride	0.0012
Sodium fluoride	0.07
Arseneous oxide	0.026
Sodium bromide	0.03
Sodium iodide	0.002
Cesium chloride	0.012
Rubidium chloride	0.016
Carbon dioxide	0.46 cu. ft.
Hydrogen sulfide	0.03 cu. ft.
Other gases	0.018 cu. ft.
Ammonia as NH_4OH	0.025 fl. ounces

On our way back to Rotorua we went to the Forest Research Institute. Located nearby is a large grove of California redwood trees. These trees were imported from California in 1910 and are amazingly tall and large, considering how slowly they grow in California. Their growth is so fast that the wood is not structurally useful for building material.

While in Rotorua we went to a Hongi, a Maori feast. The closest comparison that I can make to a Hongi is a Hawaiian Lua, but with much better food. We also went to a Maori concert which featured native dances complete with authentic costumes.. Although the prime fishing season was past I tried my hand at fishing on Lake Rotorua and managed to catch three 2.5 pound rainbow trout, one which the hotel chef fixed for our dinner. Fishing is a major sport in New Zealand and some of the finest fishing streams and lakes in the world are located in this area.

From Rotorua we flew to the South Island through beautiful mountain valleys to the Hermitage, which is located in Mt. Cook National Park. Mt. Cook is the highest(12,420 feet) and best known peak in New Zealand. It is located in the Southern Alps which also contains several large glaciers including the Tasman glacier, one of the longest glaciers in the world outside the polar regions. Our two day scheduled stay at the Hermitage was marred by two days of heavy rain and high velocity wind. We had intended to fly up to the glaciers, but were unable to do so because of the inclement weather. In fact it rained many of the days that we spent on South Island.

We travelled by bus from Mt. Cook to Queenstown on March 7th. We passed over some very rugged mountains and by many lakes and

large rivers. The countryside is beautiful with much of the land developed for sheep grazing and other agricultural uses. We stopped at an alfalfa plant where the alfalfa is dehydrated and then pressed into pellets. All the produce from this plant is shipped to Japan.

About 12 miles from Queenstown we left the main highway to see the old gold mining community of Arrowtown. On one street in particular, the old buildings are preserved as in the early days. Many of these building are built of stone with walls one meter thick. The dates on these buildings go back to 1862. Arrowtown today is a peaceful holiday village.

Queenstown is the leading tourist resort on South Island. It is nestled in a sheltered bay of Lake Wakitipu, New Zealand's third largest lake. This area is one of the most scenic that we saw on our whole trip. Queenstown is a small community, but is attracts an estimated 500,000 visitors annually. Lake Wakitipu is about 50 miles long and winds through and is surrounded by beautiful mountain ranges..We went on a cruise on the 50 year old coal-fired steamship Earnslaw. On this cruise we saw some of the most beautiful scenery to be seen anywhere. The hills are covered with a golden colored grass which is cultivated in this area. Sheep are seen everywhere--in the highlands and in the lowlands. We made one stop to see an out-of-the-way high country sheep station.

Sixty miles from Queenstown is an area known as Fiordland National Park. It is located in the southwest corner of South Island. Fiordland is covered with magnificient mountains and lakes, sharp peaks, and breathtaking steep-walled fiords that penetrate deep inland. The Norwegian word "fiord" means threshold, since the waters are deeper towards the head than at the seaward entrance

to the fiord. Captain Cook sailed past this area in the Endeavour in March of 1770. He returned three years later and moored at Pickersgill Harbor for one month while the scientists aboard his ship made astronomical observations. The first white settlers came to this area in 1792 and established a station for taking fur seals. There are two glacial lakes, Lake Manapouri and Lake Te-Anau located in Fiordland National Park.

We took a trip from Queenstown to Milford Sound, the grandest and best known of the fiords. The trip took 14 hours and went through beautiful country. We stopped first at Te-Anau then continued northwest, passing many rivers and mountain ranges. It was a misty and rainy day. The weather was quite discouraging for taking pictures and certainly hid some of the beauty of the country. On the road to Milford we went through the Homer Tunnel, carved through solid granite, 0.8 mile long, and has a drop of 1250 feet in this distance. At Milford Sound, despite the rain, we boarded the M. V. Milford Haven and travelled the full length of the sound out to the Tasman Sea. We went past the famous Mitre Peak, a triangular shaped solid rock peak that towers 5500 feet above the water. The splendor of this place is almost indescribable.

While in Queenstown we also visited an area known as Packer Arms located on the Shotover river. Gold was discovered here in 1862. This discovery created a gold rush similar to that in California in 1849.

Our scheduled trip to the west coast to see the Franz Joseph glacier had to be cancelled due to unusual large amounts of rain. The area had one meter of rain in two days and the roads into the area were literally washed away. In fact, tourists were being

evacuated from this area by helicopter.

Our stay in New Zealand was during the spring political upheaval in Iran. New Zealand was receiving all of its petroleum from Iran. At this time they had not received any oil for many weeks and supplies were running short. Purchase of gasoline for private cars was prohibited from Friday at 6:00pm to Monday at 8:00am. In addition, private cars could not be driven one day per week. The country had about a 60 day supply of gasoline on hand at this time.

We left for Christchurch on March 11, an eleven hour bus ride. The trip was uneventful. Part of the route was along the eastern coast which is not a pretty as the west. We stopped at Timaru, a very nice seaside community, passed several large lakes, and a satellite tracking station on Mr. John operated by the University of Pennsylvania. We were met in Christchurch by Marty Mendelsberg, a Professor of Art and Cantebury University. Marty is an acquaintance of ours and he and his wife booked our accomodations in Christchurch, which incidentally were very difficult to obtain. The New Zealanders are very sports-minded and three sporting events were in town at the same time as we were--Women's athletic competition, Davis Cup tennis matches, and international horse racing.

Christchurch is the Capital of South Island. It is located on the eastern edge of the area known as the Cantebury Plains. Christchurch in many ways is like a city displaced from England. In fact, it is said to be the most English community outside of England. The Avon River, crossed by many stone bridges, flows through the center of town. At the city center is Cathedral Square that has a magnificent 19th century gothic cathedral called Christchurch Cathedral. You might think that you were in jolly old England just

from thenames of the streets in the middle of town, for example, Gloucester, Worcester, Lichfield, Cambridge, and Oxford Streets. Christchurch also has many modern buildings and it is also an important industrial area.

Some of our activities in Christchurchfollow: We visited the Arts Center on the old campus of the University of Christchurch(now Cantebury University). Since this is the jumping-off point for expeditions to the Antartica, they have wonderful displays of early trips to Antartica, the people who ventured there, and some of the original equipment that they used. We had lunch and conversation with a group of faculty at the Canterbury U. Commons House. We drove around the harbor from which you can get an idea of the amount of industry here by the number of freighters constantly coming in and leaving the harbor.

On March 14 I went to Lincoln College, which is about a 30 minute bus ride from Christchurch. Prior to leaving on our trip I had been corresponding with Professor B. Howard, Chemistry Dept. Chairman of Lincoln College. We had arranged to meet and he was going to make arrangements for me to visit chemical industries when I came to Christchurch. I met Professor Howard and we talked shop and exchanged ideas about teaching chemistry. Then I met the rest of the chemistry staff. I spoke for quite awhile with Dr. J. A. Adams who is the coordinator of their first-year chemistry program. Dr. Adams showed me their general chemistry facilities(students were working in the laboratories at the time). They have about 100 students in general chemistry. He gave me an outline of the topics covered and a copy of the experiments that they do during the year. Their general chemistry course seems to more advanced than ours.

Their texts for the course include "University Chemistry" by Mahan and "Reactions of Organic Functional Groups" by Harper, et al. I was also priviledged to talk with Professor Walker who is responsible for most of the research done on soil development for pasture land in New Zealand.

My next appointment was at Kempthorne Prosser and Company. This company is a major manufacturer of chemical fertilizers in New Zealand. Their products are primarily superphosphate fertilizers which supply phosphate to plants in a utilizable form. They picked me up at Lincoln College and at the plant I met Mr. Colin Moir, plant manager, who was my host for the day. First we went to lunch and then back to the plant where Mr. Moir explaned the plant operation. We also talked at some length about the industrial setup in New Zealand. Then we went on a detailed tour of the plant.

Central to making superphosphate is the manufacture of sulfuric acid. Therefore, we first examined the sulfuric acid plant, step by step from the sulfur storage to the sulfur liquefier, burner, oxidizer, and to the storage of the finished product. They make this acid by the contact process. It is quiite gratifying to see how many of the general chemistry principles are applicable to this manufacturing process. The information and experience that I obtained here is something that I can directly apply to classes as MSAC.

It is interesting as to how fertilizers are distributed in New Zealand. Under the Department of Scientific and Industrial Research (DSIR) the six fertilizer manufacturers in New Zealand incorporate the Fertilizer Manufacturers Research Association. This central research association undertakes the necessary research for the economic and future planning of the fertilizer industry. They

currently devote 70 percent of their efforts to fertilizer production and 30 percent to fertilizer use. The research station is located in Auckland. Manufacturering plants are established in regional areas and these plants service the needs for that area. This is a major industry in New Zealand since developed grasslands are generally deficient in many minerals for proper growth and since the sheep and wool industries are fundamentally dependent on good grassland.

The next day I went to Cantebury University and met about half of the chemistry department. Dr. Peter Harland showed me around the department. They have two mass spectrographs, the large one which will determine molecular weights to two parts per million. Fortunately, one of them was torn down for servicing so I got to see all the inerts of this instrument. Dr. Robert Macglager showed my their computer assisted instruction facilities. I also saw models of a new proposed DNA structure by Dr. G. A. Rodley. It is called a side by side structure. Dr. Rodley was on leave so I could not talk with him about his new ideas on DNA.

I had another bit of good luck in Christchurch. Lord Bowden, the Head Master of the Science Institute of Manchester, England was town to give a lecture on Lord Ernest Rutherford. Rutherford was born in New Zealand and received the Nobel Prize in Chemistry in 1908. Rutherford proposed the first description of the nuclear atom as we know it today. Lord Bowden, 92 years old, was a student of Rutherford's and later worked under him. His talk was not so much about his scientific achievments, which were extraordinary, but about Rutherford the man.

We said goodbye to New Zealand and their wonderfully hospitable

people on March 16. We finally saw Mt. Cook on this flight to Melbourne, Australia. Edna has two cousins living in Melbourne who we had never seen before. Their sons met us at the airport and we stayed at one of their homes during the time we were in Melbourne. It was a wonderful family reunion with lots of reminiscing and catching up on family history. The two boys were also extremely helpful in planning our two month stay in Australia. I will not relate all the details of every place we visited in Australia, but talk only about the most outstanding ones.

A good introduction to our stay in Australia was visiting Sir Colin Mackenzie Fauna Park, commonly known as the Healsville Sanctuary. The sanctuary is located about four miles south of Melbourne. The fauna park, covering about 80 acres, maintains a collection of wildlife indigenous to Australia. The exhibits are set in natural eucalyptus bushland. The wildlife dwell in as close to their natural environment short of being in the open bush. Adjacent to the sanctuary is a 350 acre reserve eucalyptus bushland. This reserve is used by research workers for biological surveys and training courses.

Wildlife that we saw included kangaroos, which are free to wander around; wombats, a nocturnal burrowing marsupial; wallabys, closely related to the kangaroo but much smaller; dingos, a form of a wild dog; the very popular koala, also a marsupial; the platypus, a duck billed mammal that normally lives on stream banks. We also saw a large variety of very colofull bird-life--the friendly and beautiful cockatoo, highly colored parrots, owls, cranes, pelicans, ducks, and eagles. The sanctuary also has a large variety of reptiles from the different habitats of Australia. Of particular note

is the green python and the goannas lizard, a carnivorous monitor lizard. Goanna is the aboriginal name for these lizards. The emus seem to be the favorate species in the sanctuary. They are allowed to roam around at free-will and have become accustomed to people. You can walk up to them and touch them if you so desire. The emu is a large flightless bird, the Australian counterpart of the African ostrich.

Another interesting place that we visited is Phillip Island, which lies across Western Port Bay at the southern tip of Victoria. It is about 75 miles from Melbounre. This island is the nesting grounds of the world renowned Fairy Penguins. The fairy penguin, at 35 centimeters high, is the smallest of the 18 known species of penguins. It is unique in that it waits until disk before coming ashore. They are a fascinating sight to see. On returning from the sea these penguins gather into small groups before marching up the beach. They start their parade up the beach and suddenly without warning they all retreat to the waters edge. After several false starts they finally waddle up the beach to their nests.

The penguins build nests about three feet long by tunneling into the soft sand. The nests are then lined with available materials such as leaves, grasses and roots. During the breeding season the female lays two eggs which hatch in 35 to 38 days. During the first few weeks of the chicks' life the parents take turns going to sea to bring back food for their young. After eight weeks the chicks are deserted and forced by hunger and instinct to make their way to the sea to begin a life of their own.

In the Melbourne area I visited several manufacturing plants and schools during our stay in Australia. One plant that we saw

was the B. and B. Textile Mills. At this plant we got the full treatment starting with the textile fiber on spools to the finished product. The process starts at the weaving machine which has 5000 needles. Each needle has to be threaded and has to work properly or else a flaw appears in the woven fabric. In the next step the a colored pattern is transferred to the fabric from a reel of paper containing the pattern design. Close tolerances of temperature and pressure are required in this step. Finally the fabric is quilted, cut, and sewn together in separate steps to make the finished product. I also got to see inside some of the operating equipment.

Another plant that we visited is called Dycraft, Inc. This is a huge plant with many processes going on at the same time. The main work that they do here is the controlled dying of all types of textile fabric. In one process, called vat dyeing, the fabric is initially chemically treated and then tumbled in a large vat of dye solution. The dyed fabric is removed, air dried, and sent through a rolling and stretching machine to put the fabric back to its original size. Some materials such as silk and wool can be colored by simply being dipped in the dye solution. Others, including cotton and most synthetic fabrics require the use of a mordant. A mordant is a substance that combines with a dye to form an insoluble compound that produces a fixed color on a textile.

One interesting new piece of equipment that I saw operates at very high pressure and processes about 300 feet of fabric per minute. Another intersting piece of equipment is called a "cropper". It cuts(crops) the top off of the material and leaves the surface with a velour-like finish.

There is a lot chemistry involved in the processes at Dyecraft,

no only in the making of the dyes but in the application of them to the various types of fabrics. We do experiments on dyes and dyeing in my organic chemistry class. We use multifabric material in testing the application of the various types of dyes. This experience at Dycraft will be applied directly to this class.

On May 15 we visited the research laboratories of Broken Hill Propietary Company Limited(BHP). BHP is probably Australia's most successful enterprise. It is publicly owned(90% Australian) and employs more than 50,000 people. Its most important areas are mining, steel making, and oil and natural gas production. Almost all the steel in Australia is produced by BHP. Steel is the backbone of the growth of the Australian manufacturing industry. BHP operates in every state of the Australian Commonwealth.

We were given a conducted tour of the facilities by Dr. Noam White. It was by special arrangement through Dr. White, who is the executive research engineer, that we were able to visit at all. At BHP they do a lot of research on new steel alloys, and strain and stress tests of structural steel. They are doing a lot of private contract work also, so much of the work is classified and no picture taking was allowed. However, we obtained special permission to take a few photos. I saw some rather sophisticated instrumentation. They do a lot of work by atomic absorption. They have a scanning electron microscope and an electron microprobe microscope which I hadn't heard of before. Dr. White has a research pilot plant of his own design for the conversion of coal to petroleum. He has been operating this plant for a couple of years. We saw the plant and some of the products produced from it. All fractions from gasoline and light oil to heavy sludges have been

obtained. I was allowed to take a picture of his pilot plant. This was a very nice and informative visit and we were treated very cordially. Dr. white gave me a packet of informantion on BHP and the steel making industry in Australia.

I want to say a few words about the energy picture in Australia. The people are very concerned about the stoppage of oil from Iran and the subsequent delivery again at twice the price. They also seem to be disenchanted with nuclear energy since the Harrisburg, Pa. incident. These incidents have accelerated their interest in coal-to-oil technology. Australia has an abundant supply of low sulfur coal which is relatively free from pollution when burned. Eighty five percent of the country's generated power comes from this coal.

Australia also has huge deposits of low-grade coal in Victoria, New South Wales, and Queensland. It is this coal that they would like to convert to liquid fuel. They have recently entered into a two-year agreement with West Germany to study the feasibility of converting this coal to liquid fuel. West Germany has already developed the technology for coal conversion, but it has to be adapted to each type of coal. Australia is about 65 percent self-sufficient in petroleum and they are intensely searching for oil including off shore drilling. This has created a controversy between environmentalists and those seeking oil. They want to drill for oil in the great barrier reef. The people whom I talked with think that the almighty "buck" will eventually win out. I am not a strong environmentalist when it comes to energy needs, but it would be tragic to have an oil spill in the great barrier reef area and cover that natural beautiful coral and beaches with oil.

Later that afternoon we went to Monasch University, which is named after one of Australia's World War II heros. We met a Dr. Black who showed us around the chemistry department. We saw the organic chemistry laboratories and the graduate research labs. The department has four constant temperature rooms, their own library, several infrared spectrophotometers, NMR equipment, and some gas chromatographic equipment. In addition they have two mass spectrographs. I haven't seen any Beckman equipment anyplace that I visited. Most of the instruments are from Japan, Germany, and Britain.

We also visited a private day school called Mt. Scopus College. They have a faily large campus and hold classes from kindergarten through twelfth grades. We observed a physics and a chemistry class. We met and talked with the chemistry teacher, Mr. M. Burns of Sacramento who is a graduate of the U. of California at Berkeley. He gave me a copy of the chemistry exam that is given nationally to all high school graduates expecting to enter the universities.

We left Melbourne for a two week trip along the east coast to see the Great Barrier Reef. We flew to Cairns(about 1900 miles) which is one of the larger cities in Queensland and is situated close to the tropical rain forests and near some of the most spectacular sections of the barrier reef.

Our first trip out of Cairns was to Green Island located 16 miles off shore on the barrier reef. Green island is a true coral cay. It has a minimum of civilization and is mostly primitive. There is one main central path that goes through the middle of the island with several branch paths that lead to the beaches. The island is only about 32 acres. As you approach the island you can

see the coral beneath the sparkling blue water. On the island there is an underwater observatory which allows you to observe the marine life in its natural environment. From here you can see all types of multicolored tropical fish and also a lot of different coral formation. There has been found 340 different species of coral in the barrier reef. We walked around the entire island along the beach and observed the lush vegetation and also the beautiful coral formations.

The next day we went into the city of Cairns and walked around, talked with the people, and visited the shops. This is a small town with a pleasant atmosphere. We went to the Laroc Coral Factory where they study and classify the coral. They also have a film that shows how the polups produce coral. They have discovered several different species here including miniature coral and a speciman they call "star sand" whose formation they consider to be 400 million years old.

Our next excursion was inland to the Atherton Tablelands. The tablelands were formed millions of years ago by volcanic eruption, spreading lava over a very wide area. When the lava cooled, water filled in leaving a network of crater lakes. The tablelands contain some of the most fertile farmland in Australia. We started out with a train trip to Kuranda. The railway goes north along the coast through sugar cane fields and then turns inland and begins a slow climb to Kuranda, 1000 feet above sea level. It is a very scenic but steep and winding climb. We went past Barron Gorge and the spectacular Barron Falls--every turn revealed a new panarama of lovely jungle.

The station at Kuranda is a tropical delight with all kinds of

native shrub, ferns, and flowers. We continued from here by motor coach through the Tolga rain forest and cattle country to Mareeba, a large tobacco growing area. On the way we saw large, about 7 to 8 foot high mud domes. These turned out to be termite domes and when the driver-guide broke off a piece we could see hundreds of termites scurrying around. We continued on to Atherton and then to Tinaroo dam, a simple beautiful spot. We visited two volcanic lakes, Lake Barrine and Lake Eacham. Both of these lakes are completely surrounded by rain forest. Wildlife is to be seen everywhere around the lakes, There are tortoises in the lakes.

On this trip we also saw a variety of agricultural products growing. These included vast fields of sugar cane, peanut fields, maize, potatoes, avocados, grapes, and apples. We also saw one of the two airfields that the United States built during World War II when we came here to help the Australians fight and win the Battle of the Coral Sea. We also saw the spectacular curtain fig tree which is located in the jungle near Younaburra. This species of fig tree puts out long streamers from the top of the tree that normally wrap themselves around the trunk and eventually strangle the tree. This particular tree is leaning about at a 20^{o} angle. Thus the streamers have grown to the ground straight down forming a sort of curtain in frontof the tree. The curtain(and tree) I would judge are about 50 to 75 feet wide. It is so wide that it was difficult to take a picture of the entire curtain.

Our next trip to Cape Tribulation was even more spectacular than the one to the tablelands. We left very early in the morning in a minibus and traveled north along the coast to Daintree, where the road ends. We crossed the Daintree River by ferry and from

then on were on what I would call a bush road or track. We traveled through unspoiled dense rain forests and had to ford four mountain rivers, in the minibus, anyone of which could prevent us from returning if heavy rain fell in the nearby mountains. We crossed an area called razor point at which time we were riding at the tree top level of the rain forest. It looks different at the top. There is much more growth at the top compared to the floor of the forest where very little sunshine reaches. The growth is magnificient; very lush green fern trees, all types of flowers, etc. They have identified over 600 species of trees in the rain forests. We finally made an abrupt turn through the trees and onto the beach, and continued driving on the beach for awhile until we reached our destination, Cape Tribulation. The name Cape Tribulation was given to this point by Captain Cook who arrived here on Tribulation Day.

We had to carry all of our supplies, food and drink, since we were completely in the wilderness. We had our lunch on the beach, walked on the beach, but could not go in the water since this was the season for the stingers(jelly fish). The type of stingers in these waters is such that if you are attacked by one of them, there is almost no chance of saving you.

We made it back to the Daintree River before the tide went out, otherwise we could not cross on the ferry and would have to wait until the next day to cross the river. To me this was the best and most fascinating trip that we took. As I look back on it, the route we took was quite hazardous. At times we were on very narrow roads with steep caverns on both sides of us. The guide was extremely knowledgeable about the terrain, the vegetation, and the history of the area as well as very patient and courteous.

We left Cairns by Greyhound bus for Townsville, about 150 miles south. We traveled through many miles of sugar cane fields. The sugar cane is quite tall at this time, but is not yet ready for harvesting. The sugar is harvested in the spring, which is about September-October in Australia. As a result none of the mills were operating so we were not able to see a sugar mill in operation. We did visit the cane fields though. It is interesting to note that there is a network of very narrow gauge tram tracks running through the fields on which tramway trucks travel to transport the cane from the fields to the mill. I was able to acquire quite a bit of literature about the Australian sugar industry.

The trip to Townsville was pleasant and took about five hours.

Townsville is the third largest city(about 50,00 population) in Queensland and is located on the coast. The Ross River, which is a fairly large river, flows through the town and into the south pacific tropical waters of Cleveland Bay. The Great Barrier Reef is about 40 miles offshore from Townsville. On Sunday we took a motor launch to Magnetic Island. This island is much larger than Green Island, is not as tropical, and is considerably more populated. Many of the Townsville residents have a vacation home on this island, which has many recreational facilities including a golf course, picnic areas, and hotels. We spent the day here relaxing and walking on the beautiful beaches.

An optometrist who we met in Rotorua, New Zealand arranged for us to see the large copper refinery that is just outside of town. His son drove us about 20 miles to the plant and arranged for our passage back to the city. We had a private conducted tour of the refinery. Blister copper is brought in from Mt Isa, a major ore

area in Australia. The copper is further refined here to 99.97 pure. We were fortunate to be here when a 25 foot by 10 foot by 4 foot block of copper was being removed from its mold. The block is picked up by a large mechanical tongs, placed on a flat bed and cut into 9 foot lengths, which weigh about 4.5 tons each. This is the largest single block of copper made in the world. They have several unique processes which are under private license, so no picture taking was allowed. One interesting process was the making of continuous copper rod of any selected diameter and any length.

We were also allowed to see the laboratories, which is not usually allowed. They do many tests on the copper, including analysis for impurities, conductivity, spring tension, etc. They use atomic absorbtion, mass spectroscopy, and other well known methods in their testing.

Back in town we went to thank Jim Gibson(the optometrist) for his kindness and he insisted on showing un around the area. He drove us around for a couple of hours--around the esplanade, up and down the coast, and to Castle Hill which dominates the city. We also saw the hotel that Lyndon Johnson stayed in when he was in Townsville during the war.

Since there was a truckers strike in Australia and they were blocking the highways we decided to continue our journey by air. We flew to Brisbane, the capital city of Queensland. Brisbane has become a major city with a population of about one million people. In Brisbane we visited the Golden Circle Cannery, the largest cannery in Australia. They process fruits and vegetable, and fruit juices here. They make their own cans, their own corrugated boxes, blow their own plastic bottles for juices. We were able to see

all the equipment for these processes. We also saw the water treatment plant which primarily treats the water with calcium oxide to remove bad odors before sending the water down the sewer. Later in the day we stopped at Lone Pine Koala Sanctuary and we were actually allowed to hold a young koala.

At the Brisbane airport we saw the plane "Southern Cross" which is displayed in a glass walled building. This airplane is kept as a national memorial to commemorate the first air crossing of the Pacific. Sir Charles Kingsford Smith of Brisbane was a member of the four man crew on this flight.

Our next stop was Canberra, the national capital of Australia. Canberra is a magnificiently designed city. It was designed, in an international competition, by an American, Walter Burley Griffen. It is one of the worlds fully planned cities, planned purely for the function of government. The population is in excess of 200,000 and growing. There is a city center around which are government buildings and embassies and four satellite cities where most of the people live. Canberra is the seat of the federal government and the center of diplomatic life.

We took a full day tour of the city and saw many of the embassies including that of the United Statesof America. It was good to see the stars and stripes proudly flying again. We visited the National Library and the Royal Mint. We saw a very interesting small Serbian church where an old man has been painting biblical scenes on the walls and ceilings ala Michael Angelo. We talked with him for a few minutes. We also visited both houses of Parliament.

The most outstanding building we saw was the Australian War Memorial, the nation's tribute to its fallen in war. The Australians

have a very warm feeling for the men and women who gave their lives for their country. Inside are fantastic displays of equipment, guns, artillery, airplanes from World Wars I and II. They have reconstucted scenes of famous battles in three dimensional settings. Very outstanding is the Hall of Memory. The entire room with its very high dome is done with over six million pieces of mosaic tile. They have pictured in tile a member from each branch of the military at least five times life size. Outside is one of the two Japanese submarines that entered and were sunk in Sidney harbor.

On April 7 we went on a trip to the Snowy Mountain region which includes Kosciusko National Park. On this trip we saw the Snowy Mountain Hydroelectric Scheme, a gigantic engineering feat to trap the water of the various mountain streams and to generate energy. We stopped and drove through such villages as Cooma, Jindabyne, Thredbo, Smigins, and Perisher Valley. The end of the road was at Charlotte Pass where we could see Mt. Kosciusko, the highest point (7350 feet) in Australia. The flora and fauna are beautiful, especially since it was approaching autuum. We saw a tree full of pink-combed white cockatoos and a couple of small herds of wallabies. The trees in these mountains are different from our trees. Most of themare eucalyptus. The towns we passed through are alpine-like villages and we were told that they are jammed with skiers in the winter-time which is June to August.

We spent the next week in Melbourne, getting better acquainted with the city. We went to the Dandenong mountains near Melbourne. Of special interest here is the William Rickets Sanctuary. This is a forest reserve for displaying the aboriginal art of William Rickets. We talked with Rickets himself. He has been in this place

for 40 years sculpturing the life of the Aborigines. His work is difficult to describe, but he has sculpted individual Aborigines, some in groups and some in special scenarios and placed them in this native setting. I am certain that this Sanctuary is unique in the world.

One day we went to the botanical gardens and wandered around for over three hours. You have to see it to believe the beauty and the variety of the flowers, trees, and other vegetation that we saw. In fact, every place that we went in Australia they have botanical gardens.

On Sunday, April 15, we flew to Tasmania for an eight day organized tour. Tasmania is an island south of Australia across the Bass Strait and on the western side of the Tasman Sea. It is the smallest of the Australian States. We landed in Launceston and stopped at Scamander, Hobart, Port Arthur, Queenstown, and Wynyard. Tasmania is a beautiful, fairly large island, with rugged mountains and an interesting irregular coastline. It is called the "apple isle". The capital and largest city(155,000) is Hobart. The influence here is definitely British.

Tasmania was originally named Van Dieman's Land by the founder, a Dutch explorer. It began as a penal settlement at Port Authur. Prisoners were sent here from England and Ireland. We spent the better part of a day at Port Authur. The major buildings were built of stone and many of the walls and some buildings are still standing. One can see from the ruins the fine architecture and workmanship done by the prisoners who did all the construction. The first prisoners arrived in 1830 and the settlement was closed in 1877. A disastrous brush fire razed the area in 1897 and

destroyed some of the buildings. Since 1971 the prison compound has been under the mangement of the National Parks and Wildlife Service.

We saw many interesting things in Tasmania. I will relate only some of the highlights since this report is getting too voluminous. Near Launceston at the Red Feather Inn, an old stage coach stop in the early days(1845), we saw a sight and sound presentation of the pioneering days in Tasmania. Driving along the coast and through the mountains was slow due to the narrow and winding roads. We stopped to see a few magnificent old churches with their beautiful stained glass windows and interesting architecture. We had a free afternoon in Hobart so I went to see the Cadbury chocolate factory which is located nearby in the community of Claremont. We saw the entire process of making chocolate from the cocoa beans, to cocoa butter, which is pressed to remove all the liquid, finallly emerging as a disk of chocolate about 18 inches in diameter and weighing about 26 pounds. During the process the matrix is beat for many hours in a special type of conching machine which develops the flavor of the chocolate. They use a number of unique pieces of equipment to make the various chocolate products. No picture taking was allowed in the factory but we were allowed to sample the products.

We continued our journey through very mountainous terrain, stopping to see the hydroelectric plant at Tarraleah. This plant has five generators each producing 25,000 kilowatts of electricity. We stopped at Lake St. Clair where we fed and petted wild wallabies. Then on to the old mining community of Queenstown. The terrain changes drastically as you approach Queenstown. The main industry there is copper mining. In smelting the copper ore, sulfur dioxide

fumes were exhausted and over the years these fumes killed all the vegetation for miles around. The hills are absolutely barren. The town is very small with a population of about 4000. The next morning we continued north to the mining town of Zeehan. We visited the Zeehan School of Mines and Metallurgy where we saw one of the best mineral collections that I have ever seen. Continuing north we stopped at the lovely community of Wynyard located on the north coast on the Bass Straits. We drove along the coast to Boat Harbor passing some of the most fertile and richest agricultural areas that we have seen,

On our last day in Tasmania we went to see the Aboriginal Cultural Museum in Tiagarra. In the museum they show the story of the ancient Tasmanian Aborigines who lived here over 23,000 years ago. This race of aborigines is now completely extinct. We then continued on to Launceston for an evening flight back to Melbourne.

While in Melbourne this time we visited the Museum of Science and Natural History. The museum has an excellent collection of stuffed animals, both large and small; a history of transportation; a large section on the Australian Aborigines; an interesting collection of time pieces; and an actual working air pollution testing station. Melbourne is a large metropolitan city(about 2.5 million) which usually means an air pollution problem. Although I did not notice any heavy air pollution at any time. The museum also had an excellent display on Albert Einstein commemorating the centenary of his birth.

On May 3rd we flew to Sydney for a six day visit. Sydney is the largest city in Australia(about 3 million people) and is the capital of New South Wales. It is also the oldest colony, estab-

lished

lished in about 1788. It is a beautiful city with many tall, modern buildings in the downtown area. Sydney has a beautiful natural harbor and they have developed it well. We took a harbor cruise, going past the unique opera house which stands out prominently into the harbor. The opera house is so beautiful and so unique a building that we went there three times. The opera house contains four performing areas--a concert hall, an opera theatre, a drama theatre, and a music room. These in addition to reception and recording halls, two restaurants, and an exhibition hall.

An interesting trip inland from Sydney that we took was to the Blue Mountains and the Jenolan Caves. It was foggy and raining the entire day so we could not see much of the scenery on the way. But, the trip through the Jenolan Caves amply made up for all the foul weather. There are three open caves and nine "dark" or undergroung caves in this area. The caves are superb, the most spectacular ones that we have ever seen.

Prior to departing on this leave I had made arrangements to meet Mr. Mike Smith who is the Australian representative of my book publisher. We met Mike in Sydney and I was very pleased to learn that the University of New South Wales has adopted my text Foundations of College Chemistry. This is the first adoption in Australia. This pleases me a great deal because the schools here are patterned along the British system, thus making it all the more difficult to use a book like mine. We spent the entire day with Mike Smith. He had arranged for us to visit the Roche Research Institute of Marine Pharmacology(RRIMP). The Institute is located on the coast in a suburb of Sydney called Dee Why. The main pursuit of RRIMP is to do research on marine organisms to obtain new

chemicals with interesting physiological properties with the intent of applying them for use in human or veterinarian medicine, or in agriculture.

The Institute has four scientific departments: Chemistry, Marine Biology, Pharmacology, and Microbiology. They also maintain an animal breeding section. The process of obtaining new chemicals starts with the collection of marine specimens, quickly freezing them at sea to avoid deterioration and changes in composition, and bringing them back for processing. The chemistry section is divided into two groups. One group is involved in the preparation of water insoluble extracts from the marine species for microbiological tests. The second group works with water soluble extracts which show distinct biological activity. This group isolates individual compounds and determines their chemical structures. In their work they do a lot of vacuum evaporation using Rinco-type evaporators. Separation of compounds is accomplished mainly by chromatographic methods. They have two mass spectrographs, infrared, ultra violet, and nuclear magnetic resonance(NMR) equipment. They use C-13 NMR a lot in their analyses. I saw all of this equipment on my tour of the Institute.

The three sections Chemistry, Pharmacology, and Microbiology are located on three separate floors of the building. The marine specimens are stored in Pharmacology, where they determine if any of the compounds isolated have physiological properties. The Microbiology section is mainly involved in screening unknown compounds for antibiotic activity which has as its ultimate goal to improve the range of substances to treat diseases of man, animals, and plants.

It was a unique and rewarding experience visiting this Institute.

Two women who we had met earlier at the Great Synagogue in Sydney and whom we had never seen before asked if they could show us around Sydney. They picked us up at our hotel early one morning and drove us around for the entire day. We stopped at many places and saw many things that we otherwise would not have been able to see either by tour or if we had our own car. They were wonderful. This was another example of the hospitality that we experienced throughout Australia from people we never knew before. We flew back to Melbourne for the last time and made final arrangements to continue our journey.

Australia is a wonderful place to visit, and there is a great deal in this land that we didn't see. The Aussie's are very nice people, very progressive, and best of all, they like Americans. They have adopted many of their social patterns and way of living from the United States. We could see it in their television, in their mannerisms, in their factories, but much of their thinking is still tied to their motherland, Great Britain.

On May 18 we left Australia for a five day visit to Hong Kong. We have a good friend who has lived in Hong Kong for over 40 years. We met and spent a good deal of our time with her. Hong Kong is one of the busiest places in the world. With all the hotel facilities that they now have, they are building thousands of more rooms. The main difference that we could observe since we were here eight years ago is that Hong Kong is more conjested than ever. Hong Kong still remains a shoppers paradise, although prices have risen like every place else in the world. The competition for business here is very keen and that is what keeps prices and services competitive.

Our next stop was Nepal. We went by way of Bangkok where our plane to Nepal was six hours late. The flight to Katmandu was much different than all the others we took. We were surrounded by a bunch of rough looking, unkempt, men who were drinking. They did't bother us but it was scary. The airport at Katmandu was unbelievably unorganized--pure bedlam. The luggage was dumped on the ground and people and porters were climbing all over them to find their bags. Fortunately the travel agent who we had previously contacted came to meet us and took us to the hotel.

We visited three areas in the Katmandu Valley--Katmandu, Bhaktapur, and Patan. Katmandu is a medieval city at the foothills of the Himalaya mountains. It is at an elevation of 4500 feet. Our first tour was to Darbar Square in Katmandu. Most of the cities have a central square which is surrounded by temples, pagodas, and statues. There usually is a very tall pillar on top of which is a buddha. The temples are ornately sculptured with wood carvings. We drove through very narrow streets lined with people who looked as if they had sores on them, and many of them were carrying heavy loads on their shoulders. The plight of the people appears to be pitiful. Many of them were begging, especially children. We later drove to a Tibetan monastery and saw a fairly large number of monks and holy men. They are easily recognizable by the brightly colored yellow and orange habits that they wear. There were also a lot of monkeys running around loose in the area of the monastery.

Just west of Katmandu city is the Swayambhu Stupa, the principal Buddha temple in the area. A Stupa is a large domed structure capped with a square Buddha donned with an elaborate tall headress. The Stupa has four sets of eyes, one set facing in each of four

different directions. Stupas are built on a hill so that they overlook the area in all directions.

The place to see beautiful temples and classic carvings is in Patan and Bhaktapur. A good deal of this art flourished in the Malla Dynasty from the thirteenth to the eighteenth centuries. Form and style were closely linked to the religion of the time.

Bhaktapur is an ancient city dating back to 889 AD. It is one of their holy cities known as the "city of devotees". Temples abound here. Some of the outstanding carvings to see here are the exquisitely carved Peacock windows, the palace of the 55 windows, and the Golden Gate. Beyond the golden gate is a very holy temple where only Hindus can enter. We were allowed to go up to the temple but not further--it is guarded by military personnel with rifles. On our way to Bhaktapur we passed through farmland and saw the natives cutting and threshing the wheat. All the work is done by hand. Rice will be planted in these same fields when the rains come. We noted in many places they have carved or displayed six pointed stars. We later learned that this is a symbol of wisdom for the Nepalese. They also use a lot of brass bells on their temples, and in the square in Bhaktapur there is a huge bell known as the bell of the barking dogs.

Just outside of Bhaktapur we stopped at Pashupati where there is the greatest concentration of Hindu temples and shrines in the valley, indeed in all Nepal. Located here is the beautiful golden temple of Pashupati, the holiest temple in Nepal. One can see the temple from a distance in all directions. The Bagmaiti River also flows through here and on its banks is the crematorium which visitors may observe only from the opposite hill. Somehow our

driver took us right up to the crematoria and when we got out of the car and walked around we saw two pyres burning. The stench was terrible and Edna had a bad time with this sight so we hurried away and back to the hotel. Cremation is the way the Hindus dispose of their dead. This occurs along side a river so that the ashes can be thrown into the moving water.

The next day we took a short flight(125 miles) to the Pokhara Valley. The flight goes along the Himalayas and we flew past Fishtail Mountain and the Annapurna range which contains the four Annapurna peaks. Fishtail is about 23,000 feet above sea level and the highest of the Annapurna peaks is 26,600 feet. The scenery on this flight is unparalled. I took nearly a whole roll of film on this short flight.

Pokhara is a gorgeous green valley surrounded by the majestic Himalaya mountains. From here you can see Fishtail and the four Annapurna peaks as well as several other ranges. Treks to these mountains start from Pokhara. We were met by our guide and we toured the valley. We went to a Tibetan settlement where the people have a very meagre existence. The Tibetans,who are actually refugees from China across the border, were friendly and happy. They actually look more oriental than the Nepalese people. The Tibetans are known for their rug weaving and we saw them making absolutely beautiful rugs. Some of their designs remind me of the type of work that the indians in New Mexico do. We bought a small rug from them to help them out and to have a souvenir of their work.

We proceeded to Pokhara city passing over the Seti gorge in which the Seti river flows through a deep ravine about 150 feet below the bridge. It is a spectacular white water glacial river.

We went to Phewa lake and rested by a small shrine that overlooks the lake. At the lake we saw quite a few hippies swimming and bathing. It seems like this area attracts many young people(caucasians) who just wander arournd here for a couple of years and then go back home. Nepal is a monarchy and we saw the King's summer palace which is near the lake.

After visiting Pokhara village we started back to Kathmandu. The road was narrow but passable. We went through many small villages. The valley is beautiful with many fields of rice paddies, maize, and bananas. There were a lot of people walking on the road as well as cows, water buffalos and goats. Twice we stopped at a toll gate, and had to show our passports and pay a toll in order to continue on our way. We must have been quite a spectacle to these people in the country. Everywhere we stopped we were immediately surrounded by people, expecially children. The people live all over the hillsides. For those who live on the top of the hill it is a full days job just to come down to the valley, fill their jugs with water and carry them back up to their dwelling. Many of the people live a rather primitive life, relying almost totally on what they produce from the land. Our car broke down twice, but we finally made it back to Katmandu late that evening.

The next day we were scheduled to take a flight to Mt. Everest, but it was cancelled. The Royal Nepal Airline had an accident with one of its ~~two DC-9 planes and called our plane~~ into service to carry people to India and Thailand. In the evening we went to see the native cultural dances. Like so many other cultures, their costumes are unique and reflect their environment and their contact with nature.

Nepal is a country beginning to come out of its ancient shell and is classified as a developing country. Industry and commerce are beginning to open up new vistas for the people. During the time we were in Nepal(8 days) there was a two day symposium on the Geology of Nepal in which Nepalese and Soviet scientists participated. There was also a sub-regional meeting of the United Nations Conference on Technology for Development. There was also a three day exhibit of modern agro-industrial products sponsored by the Nepal-Israel Friendship Association.

There is presently about 80 percent illiteracy in Nepal. But is appears to me that they are making great efforts to rectify this situation. Libraries have been opened, 160 health laboratories have been opened in the Kathmandu district, bids for heavy equipment for road building are advertised publicly in the newspaper, and experts from other countries are presently in the country developing water and irrigation systems. There is one university in Katmandu. Our hotel, the Yak and Yeti, is located in the new part of the city. It is a very modern hotel with all the facilities that you need and want.

We left Nepal for India to catch our plane to Israel. A change in flight schedules caused us to wait at the Bombay airport for 24 hours. The airport in Bombay seems like the cross roads of the Islamic world. Only a few of the international airlines common to us are represented, while most of the airlines of the mideast and the far east countries are there. There were many flights to Abu Dabi, Kuwait, and Saudi Arabia as they have attracted many workers to the oilfields.

We finally left Bombay at 3:00 am, arriving in Tel Aviv at 6:30

am after a 6.5 hour flight. The security inspection at Bombay was the most thorough we encountered on the entire trip. Every piece of luggage and every parcel was opened, inspected, and sealed before it was put aboard the airplane. The day after we arrived in Israel we went with relatives to Arad and the Dead Sea for a couple of days of relaxation. Arad is a developing town in the Negev Desert. Most of the buildings, homes, and flats are relatively new. But it is definitely desert country surrounded by vast areas of nothing but sand and bare ground. Arad is an acient town dating back to the time the Israelites first attempted to enter the Promised Land. From Arad one can look onto the desert side of Masada, the mountain which was the last stronghold of the Israelites against the Romans in the year 70 AD. One of the paths leading to the top of Masada begins in Arad.

The Dead Sea lies 17 miles east of Arad. As you approach the Sea, the highway begins to drop sharply, winding down into the valley of Arava and the Dead Sea. The Dead Sea is the lowest spot surface of the earth--1292 feet below sea level. Its length is 48 miles and its maximum width is 11 miles; its depth is 1300 feet.

The water in the Dead Sea has an unusual amount of minerals in it, about 25 percent dissolved substances. The water in the Sea has a bitter and nauseous taste due to magnesium chloride, and a smooth and oily feeling due to dissolved calcium chloride. Fish cannot live in the Dead Sea because of the high salt content.

Many people visit the Dead Sea, both summer and winter, for its therapeutic value. There are now several large modern hotels along the seashore to accomodate tourists. At the southern tip of the Sea is the Dead Sea Chemical Works, located near the biblical town

of Sodom. Located near Sodom are two chemical factories, a potash factory and a bromine factory. It is estimated that there is one billion tons of magnesium bromide in the Dead Sea, from which bromine is made. Across the Sea lies the mountains of Transjordan. It was hot when were were there(110° to 120°F). The water was very oily and slippery but delightfully warm.

There is so much to see in Israel that one does not know where to start. In addition we have many relatives and friends living here and they all want to see us. In Tel Aviv we saw two new museums. One called Beth Hatefutsoth(Museum of the Jewish Diaspora) is particularly outstanding. The museum presents a living visual testimony of the survival of the Jewish people over the past 2500 years. Its aim is to portray visually and graphically how that miracle of survival transpired. The museum is located on the campus of Tel Aviv University. It was first conceived in 1959 and was dedicated and opened on May 15, 1978. As you enter there is a small circular hall, resembling a planetarium, where about 70 people at a time can watch a 30 minute film orienting them to the museum. There are four study areas. Each contains five booths that hold three people. Each booth contains a screen terminal to a central computer and visitors converse with the computer and request information or select films from a catalogue which are then shown on a screen in the booth. Information requested by a visitor is printed on a take-away sheet and presented to the visitor prior to leaving the museum. The museum also has a 196-seat auditorium to accomodate conferences, seminars, lectures and other special events. We spent a half day there, which was not enough time in this outstanding and unique museum.

Jerusalem is one of my favorite cities in the world. Since we saw Jerusalem eight years ago it has grown a great deal. I'm not sure I like all the growth, but some of it is beautiful. There are two high rise hotels which I think mar the skyline. Restrictions have now been put on the height of new buildings. They are rebuilding some of the sections in the old walled city--and it is being done beautifully. There is a new gorgeous area call Independence Park which is dedicated to the USA Bicentennial. In the entrance to the park is a replica of the liberty bell.

We visited several of the holy places in Jerulalem, two of which we had not seen before. The Tomb of the Virgin Mary which is in a deep grotto. You descend 47 steps into a dark subterranean Church. The tombs of Mary's parents and her husband Joseph are also here. The other place was the Chapel of the Ascension. We also visited the Gardens of Gethsemane which is next to Mary's tomb at the foot of the Mt. of Olives. In the Gardens are still some of the very old gnarled olive trees which grew in abundance in this location in biblical times. Gethsemane is a corruption of the Hebrew name Gath-Shamma, which means oil-press.

We also visited the Israel Museum with its timeless displays of ancient archaeological relics as well as modern art and design. We also went to see the Shrine of the Book which is a museum built like a scroll and which displays at its center the entire scroll of the book of Isaiah that was found in the Qumran Caves near the Dead Sea. The Shrine of the Book is a very unique building. On the outside it appears like a white flying saucer sitting on the ground. The rest of the building descends into the ground. The inside gives one the feeling of extreme peace and tranquillity.

We had a personalized tour of the Knesset, Israel's House of Parliament, arranged by a relative of mine. We met a number of Ministers, and were invited to the dining room for tea by one of them. He is a very and charming and intelligent man, named Gamel Nassar Adin. He represents the Druz who are an Arabic sect living in the northern part of Israel. We also got to see how beautiful Jerusalem looks at night when a couple we met took us for a drive in the hills above the city.

Towards the end of our stay in Israel, Lily, the English woman in whose home we were staying invited a few of her friends over to meet us. Among these guests was a man named Irv Lieberman, formerly of West Covina, California. The coincidences in this meeting are that Irv's wife Olga used to work for Evelyn Chamberlain in our Vocational Nursing Department, and their three children all went to school at MSAC. Their daughter Debbie was tremendously inspired by Colleen Tan and she now teaches English in Athens, Greece.

We cut our trip short by a couple of weeks because we were getting quite tired. We left Israel on June 27 and flew to Los Angeles with a stop in Rome and stop in New York for two hours.

In summation, I feel that I accomplished what I set out to do during my sabbatical leave. I gained some insights and feelings about the people and the lands visited that you cannot obtain except by being there in person. I saw a number of industrial and research organizations, and several universities. A good deal of what I learned in these places will be applicable to my teaching at Mt. San Antonio College.