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Tidal power may meet energy needs of the future

For centuries man has watched the ebb and flow of the tides and dreamed of tapping off the huge amounts of energy in the moving mass of water. Although modern technology derives its hydraulic power almost exclusively from the damming of rivers and streams, the "tide mill" or paddle wheel driven by tidal waters has been used in Europe since antiquity. This ancient invention (the oldest known examples date back to 1100 A.D. in Britain and France) has been neglected as a means of securing power largely because of the difficulties of expanding the simple mill into a larger power plant operation; compared to river plants, the energy output is not only intermittent (dependent on the tides) but the problems of damming estuaries and building suitable turbines are technically more difficult.

Until recently, electricity generated from dammed rivers or coal-driven thermal plants has been so cheap that the relatively high construction costs involved in tidal power development could not be economically justified. Apart from the tidal power plants at La Rance on the Brittany coast of France and in the Kislaya inlet on the shore of the Soviet Union's White Sea, the tides have not been exploited as a source of energy.

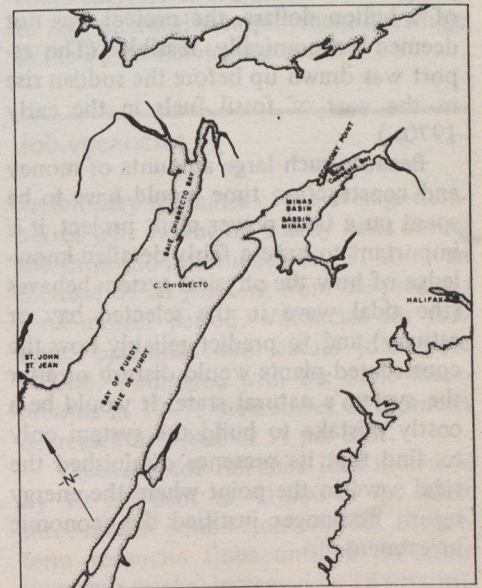
Renewable and pollution free

However, with the increasing scarcity of fossil fuels and the exploitation of many of the best river sites for hydroelectric power generation, other sources of energy have taken on increased importance. Along with the energy derived from the wind, the sun, molecular hydrogen combustion, and nuclear fusion, the tides are being seriously considered as a possible power source to meet the needs of the future. In a time of ecological sensitivity, tidal power has two very attractive characteristics, neither of which is shared by fossil or nuclear fuels: it is a constantly renewable energy source, and no pollution arises from the generation procedure.

The structure of a tidal power plant takes the form of a dam or dike across an inlet with sluice gates and turbines spaced along its length. The simplest type of operation is to admit the rising tide through the sluice gates into the basin behind the barrier and close them at high tide; when the tide falls the water is then released through the turbines with the generation of electrical power. This is known as a "single-effect" operation. Using more sophisticated two-way turbines, power can be generated in both the ebb and flow periods of the tide. This "double effect" operation is used at the La Rance power plant in France.

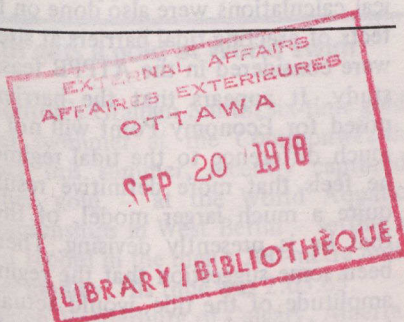
Canadian sites

Of the important sites in the world suitable for tidal power generation, several are located in Canada; examples are



Map of the Atlantic coast showing the Bay of Fundy and its two main headwaters, Chignecto Bay and the Minas Basin, separated by Cape Chignecto. Economy Point, shown on the western side of the Minas Basin, is considered one of the best sites for construction of a tidal power plant.

Sept. 13/78



Fifty-two years ago tomorrow...

William Mackenzie King led the Liberals to victory for the second time in a general election. He was re-elected in 1935. King, who was prime minister from 1921-1926, 1926-1930 and 1935-1948, held the office longer than any other Canadian prime minister.

Ungava Bay in northern Quebec, Frobisher Bay and Cumberland Sound on Baffin Island, and the Bay of Fundy in the Maritimes, an arm of the Atlantic ocean separating New Brunswick and Nova Scotia. The Fundy tidal range, that is the difference between successive high and low water marks, reaches a value of 15.9 m in the Minas Basin at the head of the Bay, making it one of the highest in the world. During the past 50 years, several schemes have been advanced to build tidal plants on Fundy, but except for one project by the Americans none has ever been attempted. During President Roosevelt's make-work program in 1933, construction was started on the Maine coast of the Bay of Fundy (in Passamaquoddy Bay), but it was never completed because of a lack of funds. In 1969, a four-year study sponsored by the Canadian Government in conjunction with the provinces of New Brunswick and Nova Scotia was published which examined all aspects of tidal power plant development in Fundy. The report of the Atlantic Tidal Power Programming Board (ATPPB) suggested the best sites for the plants to be built with predictions of the power output that could be expected from the project on completion. In view of the huge costs of construction, however, a sum that might run well in excess of a billion dollars, the project was not deemed economically feasible. (The report was drawn up before the sudden rise in the cost of fossil fuels in the early 1970s.)

Because such large amounts of money and construction time would have to be spent on a tidal power plant project, it is important to have a fairly detailed knowledge of how the physical system behaves (the tidal wave in the selected bay or estuary) and to predict reliably how the constructed plants would disturb or alter the system's natural state. It would be a costly mistake to build the system only to find that its presence diminished the tidal wave to the point where the energy return no longer justified the economic investment.

Mathematical model

One of the simplest ways of obtaining this information is to build a mathematical model that reflects the behaviour of the marine system, a set of equations that simulate the movements of the tidal waters as they ebb and flow through the Fundy basin. The proposed changes can



The Bay of Fundy tide is so powerful that it causes the water to reverse direction and run "uphill" at the mouth of the Saint John River, New Brunswick, creating the Reversing Falls (above). Some day the Fundy tide may be harnessed to produce energy.

then be made to the model (in this case the addition of the tidal barriers) and the resultant effects on the system studied. Expensive errors can therefore be avoided and the best sites for the tidal barriers chosen, the degree of confidence in the results being reflected in the precision with which the model simulates the real system.

Such a mathematical approach is being attempted by Dr. G.F.D. Duff, chairman of the University of Toronto's Mathematics Department. With the aid of a National Research Council operating grant, he is setting up a model that simulates the tidal motion of the waters from the head of the Bay of Fundy out through the Gulf of Maine and extending across the North Atlantic ocean to the coasts of Africa and South America.

Resonance likened to "swing"

Dr. Duff took all the information available on the area between the continental shelf and the headwaters of the Bay of Fundy, the geographic and oceanographic dimensions, and embodied them in a mathematical model that described the surface wave characteristics of the waters. The results showed that a factor that was unusually strong in the system was resonance, which is best understood by considering the example of a child on a swing. If an adult pushes the child at the top of each swing, the amplitude or height of the swing increases. The push

has a period or interval very close to that of the swing, and the two are said to be in resonance.

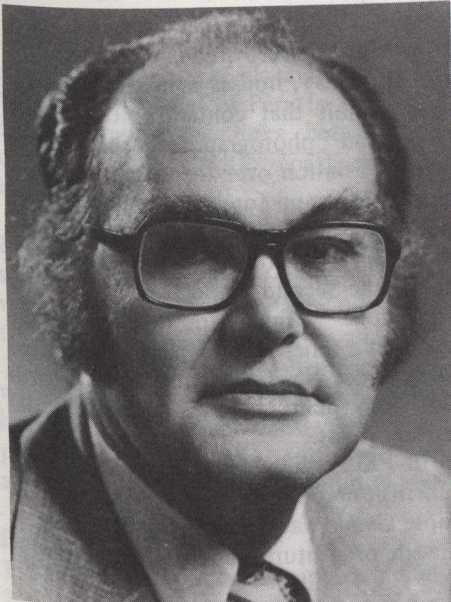
"Like the swing, each body of water has its own natural period of oscillation," says Dr. Duff, "and the mathematical model demonstrated that the waters in the Fundy system out to the continental shelf have a natural period very close to that of the lunar tides. In other words the lunar "push" on the oscillating aquatic system occurs at precisely the right time or in just the proper phase to result in a resonating system. Resonance therefore makes a significant contribution to the high tidal wave that characterizes the system."

Dr. Duff explains that detailed numerical calculations were also done on the effects of erecting tidal barriers at sites that were considered in the ATPPB feasibility study. It appears that the barrier proposed for Economy Point will not make much difference to the tidal regime, but he feels that more definitive results require a much larger model, of the sort that he is presently devising. There has been some suggestion that the regime, or amplitude of the tide, would actually be increased by a barrier at Economy Point, but Dr. Duff believes that no one model can yet be said to reflect accurately the real system and as such it is still too early to make a conclusive statement.

"The tantalizing part of this whole

(Continued on P. 8)

Canadian appointed to OECD



CMHC

Jim MacNeill (above), former secretary of the Ministry of State for Urban Affairs in Ottawa and commissioner general of Habitat, the United Nations Conference on Human Settlements, held in Vancouver in 1976, has been appointed director of the environment directorate of the Organization for Economic Co-operation and Development (OECD) in Paris. The directorate is responsible for the OECD's work in environment, urban affairs and toxic chemicals.

Mr. MacNeill, a former director-general of intergovernmental affairs for the Department of the Environment, was responsible for the department's preparations for the 1972 United Nations Conference on the Human Environment in Stockholm.

Smith gets a gold at World swim

Edmonton's Graham Smith, six-time gold medal swimmer at the Commonwealth Games this summer, recently captured another gold — at the World Aquatic Championships in West Berlin — setting a world record in the men's 200-metre individual medley. His time was 2:03.65.

Helen Vanderburg of Calgary, Alberta, won a gold medal in synchronized swimming (the first time for a Canadian swimmer in world competition) and picked up another one with Michelle Calkins, also of Calgary, in a synchronized swimming duet.

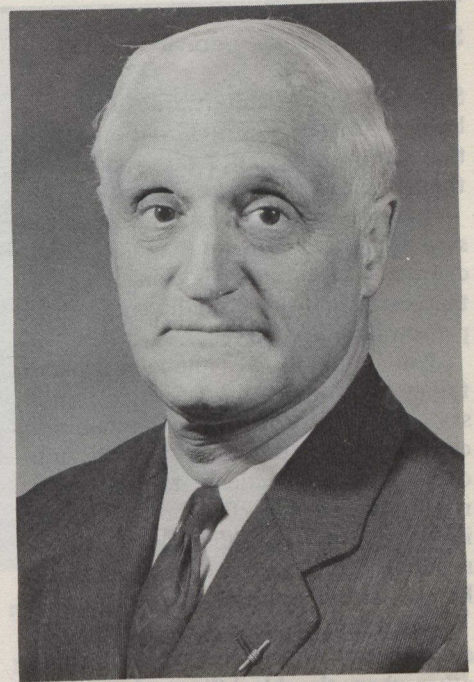
In all Canada won three gold medals, one silver and five bronze.

Mr. Cadieux to RCMP

Commissioner R.H. Simmonds of the Royal Canadian Mounted Police has announced the appointment of Marcel Cadieux (right) to be a special adviser to him and to the Director General of the Security Service.

Mr. Cadieux, who was Canadian Ambassador to the European Economic Community, has had a long career in the Public Service and in a variety of positions abroad. He was Under-Secretary of State for External Affairs from 1964 to 1970 and Canadian Ambassador to the United States from 1970 to 1975. Mr. Cadieux will provide advice on security problems in both the international and the domestic areas.

The Commissioner said that Mr. Cadieux' assignment was for an indeterminate period, but would probably be for one to two years.



Reduction in language training

Public Service Commission Chairman Edgar Gallant recently announced further details on the Government's decision to reduce the level of training in a second language to Public Service employees across Canada. The Commission has been responsible for the operation of the language training schools since 1964.

According to Mr. Gallant, the decision results from the Government's policy announced last autumn, to phase out language training for public servants after 1983. It comes after a detailed and continuing review of current and projected demands for language training for public servants from now until 1983 and is consistent with efforts to restrain the growth of Government expenditures.

Mr. Gallant noted that the relative success of the Commission's language training activities over the past ten years in bringing about a more bilingual Public Service has led to a gradual decrease in demand for language training. Another factor has been the increase in number of French-speaking employees at all levels of the Public Service. The decline in demand for training, which has been most marked over the past year, has already resulted in a reduction of 205 classrooms.

By next April, the number of classrooms engaged in centralized language

training will be reduced to 260, leading to an annual saving of \$12.5 million in salaries and related costs. It will mean, also, that some 600 employees of the Commission's Language Training Branch will become surplus. Every effort will be made to find alternative employment elsewhere in the Public Service for them.

Job vacancies

Preliminary estimates of the average number of jobs vacant on a daily basis during the three-months ended July 31 show an increase of 20 per cent from the previous three-month period. Vacancies for full-time, part-time and casual jobs were 46,000. Compared with the same three-months in 1977, the number of vacancies decreased by 5,800 or 11 per cent.

Vacancies for full-time jobs increased by 19 per cent to 41,000 in the latest three-month period from 34,500. Longer-term vacancies (jobs unfilled for more than four weeks) increased by 18 per cent.

For every 1,000 existing jobs in the latest three months, five were vacant, unchanged from the preceding period. The comparable rate a year ago was six. The highest vacancy rate was observed in Alberta (ten per 1,000). The lowest vacancy rate occurred in Newfoundland (three per 1,000).

Space-age blackfly control

Scientists at Agriculture Canada's Lethbridge, Alberta, Research Station believe that laser beams and X-rays can be used to pinpoint blackfly breeding spots.

Attacks by blackflies have become so severe in parts of Alberta and Saskatchewan that livestock is being killed by the pests. Traditional methods of control provide only limited relief.

Wib Haufe, head of the animal parasitology section at the research station, says the most effective and economical control method tested so far is the application of an insecticide to fast-flowing rivers in which blackflies breed. One test injection into the Athabaska River can result in blackfly control for almost 170 kilometres downstream.

"While this is an effective blackfly control method, it is hazardous to insects other than the blackflies unless exceptional care is used in injecting the insecti-

cide," Dr. Haufe says.

"We are hoping that laser beams or X-ray techniques will enable us to locate the precise areas of rivers where blackflies hatch. By treating the right place at the right time, we would need to use much less chemical and treat a much smaller area.

"During its development, each blackfly accumulates a certain level of different elements in its body related to its breeding environment," Dr. Haufe says. "These elements can be identified by X-rays. We can first determine the blackfly's trace-element profile, then go back to the river, locate areas with the same profile and trace not only the insects' point of origin, but also their flight path."

Another control approach being tested involves the use of laser beams, which could follow blackflies when they leave their breeding sources, providing researchers with specific information on flight paths, population densities, species and, most importantly, the areas infested.

Gander remembers aviation heroes

Newfoundland's Gander Airport, once known as the "crossroads of the world", and still busy, houses a fascinating aviation exhibit that contains models, artifacts and photographs pertaining to pioneer aviation over the Atlantic. In the nearby bogs and forest are the remains of several ill-fated bombers and other planes that failed to reach their destinations during the Second World War.

Anyone wishing to fly across the ocean at a time when planes had a limited range chose Newfoundland, closest North American point to Europe, as the departure point.

In 1935, when Newfoundland was still a British colony, the British Air Ministry chose Gander, a relatively fog-free area, as the site of a future transatlantic air base.

Heroes who knew Gander

Such famous aviation pioneers as Charles Lindbergh, Amelia Earheart, Italo Balbo and Eddie Rickenbacker have been associated with the airport.

Gander, 343 km (213 miles) from St. John's, the provincial capital, has a population of nearly 10,000, with good hotels, restaurants and shopping facilities.

Canada's tanks come off Munich assembly line



In Munich, Major-General Charles H. Belzile (right) accepts a gold key for the first C-1 Leopard tank from Colonel Dave Hampson, tank project manager from National Defence headquarters, Ottawa. The Canadian Forces have ordered 128 of the new tanks described as the most sophisticated to leave the assembly line at the Krauss-Maffei company in Munich. The Royal Canadian Dragoons based in Lahr are scheduled to receive their tanks in late autumn.

What's in a name?

Place names in the province of Newfoundland are unique. Where else could be found, for example, Right-in-the-Run Island, Sitdown Pond and Misery Point?

In the island province, which was the last to join Confederation, in 1949, are the Annieopsquotch Mountains and coves called Gripe Cove, Shoe Cove, Butter Cove, Savage Cove, Wreck Cove, Tea Cove, Flowers Cove and Bleak Joke Cove. There's even a cove named Nameless Cove.

Heart's Content, Heart's Delight and Come By Chance are some of the better known place names of Newfoundland. There's also Seldom Come By Chance, Little Paradise, Run By Guess Island, The Harbour Harbour and several Arms, including Sop's, Snooks, Toogood and Joe Batt's.

There are many more, too numerous to list. The Tourist Services Division of the Department of Tourism, Confederation Building, St. John's, Newfoundland, would welcome requests for more information.

News of the arts

Canadian expertise penetrates Peruvian jungle

A team of tough, machete-swinging Canadian engineers are blazing new trails through the jungles of Peru to build vital telecommunications links between the country's long Pacific coast and the interior.

Expansion of Peru's phone system, ENTEL-Peru, is one of 20 projects sponsored by the Canadian International Development Agency (CIDA) in that country, worth about \$40 million in all.

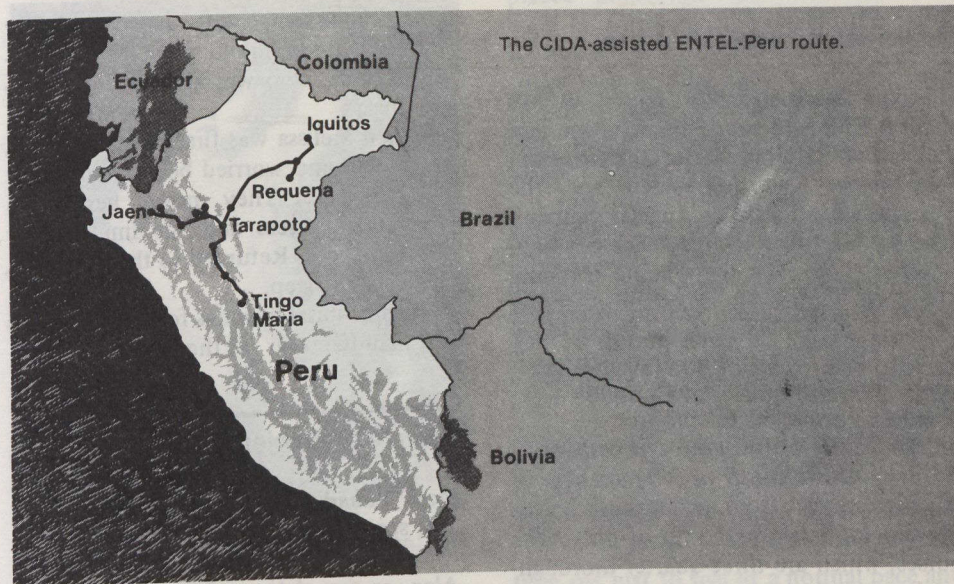
The team is locating sites for microwave towers to span the Andes. Paths have to be cut through dense under-brush populated by snakes, mosquitos and ants, and the work is hot and the humidity high.

Project takes time

The Andes Mountains, approximately 200 miles wide, occupy about 27 per cent of Peru's land area. They are the principal barrier to transportation and communications links between the coast and the interior, which has great potential for agricultural and forestry development.

The team, all employees of Bell Canada International (BCI), now under its third contract with CIDA in Peru, is led by John Tatlock of Montreal.

The first phase of the project was general telecommunications planning for a national telephone network covering all of Peru except Lima. In 1974 the second two-year phase extended the previous work and called for design of outside plants for installation of switching equip-



The CIDA-assisted ENTEL-Peru route.

*John Tatlock buys eggs in the jungle.*

ment in several northern cities.

The current phase began in November 1976 and could be finished this November. It includes design of a rural telecommunications network leading into jungle areas in the North and East. ENTEL-Peru had about 55,000 lines while the expansion plan called for an additional 60,000 lines by 1979. About 30,000 new lines have been added thus far.

Vital to development

"The phone links to the interior are vital to the safety and health of the people," says Mr. Tatlock. "There are not enough doctors, and locating one in the rural areas in a hurry is difficult without communications.

"We saw a good example of it. We were having lunch in a village when a Peruvian man walked in, saw that we had been travelling, and asked if we had seen a doctor. His little boy was dying, he said. In fact, we knew there was a doctor less than 15 kilometres away, since we had given him a lift in one of our jeeps."

Mr. Tatlock is optimistic about development of the interior once phone links are installed and especially when roads are built. Transportation is now largely by mule trail or by rivers which wind their way to the Amazon.

The long-term plan is to prevent the drift to coastal cities like Lima and to get people to work the land. "There is plenty of land in the valleys that would be good for stock-raising. A typical Alberta rancher would love the place," Mr. Tatlock said.

"Although the job is tough and challenging, it is rewarding," he said. "You don't get time to become bored."

CIDA-funded telecommunications projects

CIDA is currently funding 19 telecommunications projects having a budgetary value of \$138 million. Five projects in Asia are worth a total of \$66 million; four in francophone Africa, \$48 million; seven in Commonwealth Africa, \$17.6 million; two in the Caribbean, \$5.2 million; and one in Latin America, the Peru project, worth \$82,000.

The communications systems are used for general education, teaching family planning, health care, improved farming, and other practices that contribute to self-help.

India recently used a satellite for an educational television experiment that linked some 2.5 million people in 5,000 villages to teach family planning and boost farm production.

The Ivory Coast has an ambitious national educational television program which is aimed at benefiting 974,000 students by 1980. Canada has contributed \$6 million in grants and \$2.5 million in loans to cover technical assistance and the cost of equipment and documents.

Among other examples are assistance to educational radio broadcasting in Tanzania and expansion of the telephone system in Antigua.

Mounties' musical ride on tour

Canada's internationally famed RCMP Musical Ride will tour Saskatchewan and the western United States this autumn. Performances are scheduled for the Pomona State Fair, Los Angeles, September 16 to October 1; Fresno District Fair, October 3 to 10; the Pacific National Livestock Exposition, Portland, October 14 to 21; the Grand National Horse Show at the Cow Palace, San Francisco, October 27 to November 5, and Kansas City, Missouri, November 13 to 18.

The RCMP Musical Ride is performed by a mounted troop of 32 members of the force drawn from detachments across Canada for a two-year tour of duty. The horses, which are three-quarter thoroughbred, are raised on the force's ranch at Pakenham, Ontario, and both men and horses train together for four months before any engagements are undertaken.

The Ride is composed of a variety of intricate movements executed at the trot and canter to an appropriate musical accompaniment. The figures performed are derived from cavalry drill and demand the utmost in control, timing and co-ordination.

Although it is recorded that a North West Mounted Police musical ride was performed in 1876, it was not until 1904 that the Ride was put on public display.

In the ensuing years, mounted troops of the force journeyed abroad to participate in various functions and in recent years the RCMP Musical Ride has become a familiar sight in the United States and in Europe.

Waterbed babies

Infants are helping staff at a Sault Ste. Marie, Ontario hospital try out new waterbeds in the neonatal intensive care unit.

Doctors say the new beds, which duplicate the warm space in a mother's womb and cut down on sound and vibrations from machinery used to operate incubators, encourage babies to move less and gain weight at a fast rate.

Premature babies may be in incubators for months, and because their heads are soft, pediatricians say they have a tendency to become misshapen. Waterbeds help prevent this.

The first waterbed used by the hospi-

tal was made two years ago by a father for his two-month-old premature daughter, Melissa, who was kept on it for two months.

When Melissa was first put on the bed, nurses became worried because the baby was so quiet. They moved her to an ordinary mattress and she immediately started to cry. Returned to the waterbed, she went to sleep.

The hospital now has found a commercial manufacturer for the beds.

Beware of berries

Most Canadians are unaware that over 700 species of plant have been known to cause illness or death, says Professor Jack Alex, an associate professor of plant taxonomy (science of classification) at the University of Guelph, Ontario.

"Many poisonous plants are so common and seemingly innocuous that you don't even suspect their toxic qualities," he said. For example, the twigs and foliage of choke cherry or black cherry trees can be deadly. They contain a compound that releases cyanide when eaten.

And many people have died merely from eating steaks cooked outdoors that have been speared on oleander twigs, which contain a deadly heart stimulant.

"It's easy to be deceived by plants, for one part may be edible while another is poisonous, like the cherry tree," Professor Alex said.

Another example is the peach tree, whose leaves contain hydrocyanic acid, one of the most dangerous poisons known.

Even two of our most popular vegetables, the potato and tomato, come from plants related to the deadly nightshade. Fresh potatoes and tomatoes are harmless but the vines and foliage of both plants contain alkaloid poisons that can cause severe digestive disorder.

One of the most dangerous of all plants in the garden is rhubarb, Professor Alex said. The leaf blade contains oxalic acid, which crystallizes in the kidneys, causing severe damage.

Jimson weed, commonly called thorn apple or stinkweed, is reported to be responsible for more deaths than any other plant. All parts are poisonous.

The greatest threats to children are plants with berries. One summer, a girl prepared a play luncheon in her backyard with an apple, a radish and some berries

she picked in her mother's rock garden. About seven hours later she was dead.

An autopsy showed that the berries were from the daphne mezereum plant. They contain a corrosive poison that produces severe burns in the mouth and digestive tract.

Even more dangerous than berries are the seeds of some plants. Examples are the rosary pea and castor bean seeds, both toxic enough to be lethal.

Other common plants which can cause problems include jasmine, buttercups, iris, lily-of-the-valley, azaleas, daffodils, hyacinth and narcissus.

Professor Alex said that after working with these plants, care should be taken to wash the fingers, because juice from the plants may stick to them and inadvertently be transferred to the mouth.

Because one never knows which plants are poisonous, children should be taught to keep away from unfamiliar vegetation and very small children should be kept away from all plants so they don't put them in their mouths.

If someone does eat a poisonous plant, take the patient and a sample of the plant immediately to the nearest hospital. Never attempt home remedies.

"Only a trained doctor will know what the proper antidote must be," warned Professor Alex.

Energy monitor

An accurate, inexpensive monitor of energy that is consumed by lighting has been developed by the National Research Council. The meter records the number of hours a lighting circuit has been turned on (for a period of up to 12 months). Because it can be powered from batteries or photo-voltaic cells, the device does not use any power from the line circuit.

National figures for lighting energy consumption are based on annual lamp sales and estimates of their use. Present methods of confirming these estimates usually entail great expense, the use of electrical contractors to install in-series meters, and visually obtrusive measuring devices. The new system is inexpensive, simple to install, and requires only one device for each switching circuit.

By reading the meter daily or weekly, building owners can determine the dollar savings possible by regulating the lighting demand during peak energy consumption periods.

News of the arts

Early art at the Quebec museum

The Quebec Museum recently held an exhibition of works from its collection of eighteenth and nineteenth century art in Quebec. The paintings fell into four categories: religious works, landscapes, portraits and genre scenes. A work by Brother Luc entitled *L'Archange Raphaël guidant Tobie* (The Archangel Raphael leading Tobias), painted in about 1670, was the oldest in the exhibition.

Of particular note were Théophile



François Ranvoyzé, altar-cruets.



Louis Jobin's Saint-Marc, gilded pine statuette.



Théophile Hamel's Ernest Hamel, enfant, oil on canvas.

Hamel's portraits of children and Cornelius Krieghoff's sleigh ride scenes.

The museum chose statuettes of gilded wood by Levasseur, Jobin and others to depict the sculpture of the period, illustrating the gilding technique so characteristic of early Quebec art.

The exhibition also included elaborate examples of the gold and silver smith's art, which was of major importance in the eighteenth and nineteenth centuries. Three articles in gold by François Ranvoyzé, on loan to the museum, are the only known works of Quebec goldsmithery. The museum's most recent acquisition is a magnificent silver dish by Nicolas-Clément Vallières.

Phillips takes sabbatical

After lengthy discussions between Stratford Festival's artistic director Robin Phillips and members of the Board of Governors, Mr. Phillips, who had submitted his resignation in July, has been persuaded to take a sabbatical for one year.

Although he will not direct at the Festival in 1979, he will oversee planning and casting of the season, prior to beginning his sabbatical.

In his four seasons at Stratford, Mr. Phillips directed and co-directed 22 productions in addition to general administration of the Festival.

Referring to Phillips' desire for a rest, Festival president John Heney said there was "a growing awareness that highly

placed innovators who live and work daily under enormous pressure and whose jobs demand great creative output, need to be able to step back every few years to renew themselves if they are going to be able to continue working at their maximum over the long term".

"The staff heading the theatre's departments have my full confidence," Mr. Phillips said. "I'm certain that with guest directors and with the talented acting company we now have, the 1979 season will unfold with all the energy, excitement and professionalism that patrons have come to expect of Stratford. I have discussed this not only with members of the Board but with my associate directors and with members of the company. They were all determined that two things had to happen: first, that I should have time off just to live at a normal pace and re-acquaint myself with theatre outside Stratford and with the world at large and, secondly, that the season here should not suffer because of that. They are all committed to maintaining the quality and the standards that we've all worked hard to achieve in every area of the Festival's operation. Moreover, they're determined that the thrust and motivation of what has been started here should continue without interruption, so that on my return we can move ahead with all the drive and momentum that will be needed to carry out our plans for the future."

Arts briefs

An Anglo-Canadian film about murderer Jack the Ripper is under way on location in London, England, with several Canadian names in leading roles. Christopher Plummer portrays the famous sleuth Sherlock Holmes to British actor James Mason's Dr. Watson. Other Canadians are Donald Sutherland, Susan Clark and Geneviève Bujold. Toronto filmmaker Bob Clark is co-producer and director.

The California Shakespearean Festival, modelled very much after the Festival Theatre in Stratford, Ontario, is expected to begin operation in 1980. Tom Patterson, founder of the Canadian festival, has been made a trustee of the new complex, and Canadian actors, Lorne Greene and William Shatner, both of whom acted at Stratford in its infancy and who are now residents of the U.S., have agreed to serve as advisers to the project.

Tidal power (Continued from P. 2)

problem is the question of what is the correct region to consider," he says.

As to the extensive studies that have been done on the tidal power plants in the Bay of Fundy, Dr. Duff does not think they have been a waste of time. The ATPPB concluded that the project was not economical but that was before the steep rises in the cost of energy and the discovery that the power output from the plants may in fact be larger than that calculated in the report. Whether or not they will ever be built depends upon the availability of other forms of energy. Breakthroughs in the technology of nuclear fusion or solar energy with their promise of unlimited amounts of energy would very likely relegate tidal power to the drawing board indefinitely. For the present, it represents a good contingency plan, a ready-made, evaluated scheme waiting in the wings should technological advance not live up to expectations.

(From an article by Wayne Campbell in a special issue of Science Dimension.)

News briefs

Prime Minister Pierre Trudeau led the Canadian delegation to Rome for the coronation of Pope John Paul I on Sunday, September 3. Forty-six people, including Cabinet ministers, relatives of the new Pope, aides and reporters, accompanied Mr. Trudeau. The Prime Minister had earlier sent a message to the Pope expressing his hope that the influence of the Church would "continue to make itself felt, not only for the spiritual progress of all mankind, but also for the advancement of the great causes of the world today: peace, disarmament, human rights and social justice".

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Cette publication existe également en français sous le titre Hebdo Canada.

Algunos números de esta publicación aparecen también en español bajo el título Noticiario de Canadá.

Prime Minister Menachem Begin of Israel will make an official visit to Canada in about two months' time. The invitation to Mr. Begin was extended earlier this year, stated an announcement from Prime Minister Trudeau's office.

Defence Minister Dr. Hans Apel, of the Federal Republic of Germany, and some of his senior officials visited Canada in early September to study Canada's defence roles and facilities and visit the German Army Training Establishment at Canadian Forces Base Shilo, Manitoba. After visiting Winnipeg, Shilo and Cold Lake, Alberta, Dr. Apel stopped briefly in Montreal before completing his tour at Canadian Forces Base North Bay, Ontario, where he toured the underground twenty-second NORAD region headquarters.

Three advertising programs of Employment and Immigration Canada recently received awards from the advertising industry. *The Boxer*, a 30-second English commercial, which was part of the 1977 unemployment insurance campaign, won three Television Bureau of Canada Awards — in the areas of best of category, craft, and best cinematography. The Commission also won awards for two French print advertising campaigns at the nineteenth annual *Concours de la Publicité Française*. They were produced in support of the manpower consultative service and the 1977 hire-a-student program.

Secretary of State for External Affairs Don Jamieson represented the Canadian Government at the funeral of President Jomo Kenyatta, of Kenya in Nairobi on August 31.

Prime Minister Pierre Trudeau has called by-elections for October 16 in seven vacant federal ridings, to coincide with voting for eight other by-elections previously called. All 15 could be cancelled if Mr. Trudeau were to call a general election before that date. However, his statement appeared to eliminate that possibility. Standings in the 264-seat Commons at the moment are: Liberal 135; Progressive Conservative 87; New Democratic Party 15; Social Credit 8; Independent 4; vacant 15.

The Archbishop of Canterbury, Most Rev. Donald Coggan, visited and preached to the people of Canada's eastern Arctic recently during the four hundredth anniversary celebration of the arrival of the Anglican Church in North America. The first Holy Communion celebrated by the Church on this continent apparently took

place on August 30, 1578, on board Sir Martin Frobisher's ship, the *Gabriel*, in an area 70 kilometres south of Frobisher Bay on Baffin Island.

The first estimates of the Canadian industrial composite index of employment (1961=100) for June 1978 showed a 0.3 percent increase over May's figure. All regions participated in the increase with the exception of the Atlantic region which showed no change. Average weekly earnings rose by 1.0 per cent at the national industrial composite level in June. Gains were recorded in all industry divisions except construction, which declined in all regions.

Canadian Indians have agreed to send 300 of their chiefs to France and England next spring in a fight against proposed constitutional reforms. They plan to tell French officials, Queen Elizabeth, the British Prime Minister and the Foreign Secretary that they do not want the Constitution brought to Canadian soil.

The Canadian Corrections Service will reduce costs by eliminating 100 jobs in 1979. The service, which combines federal penitentiary and parole services, has been ordered to trim \$45 million from its budget for the fiscal year beginning April 1.

Plans for a prisoner exchange between Canada and the U.S. have been postponed until October. Approximately 200 Americans are in Canadian prisons, 150 of whom are eligible to return to the U.S. under a treaty between the two countries. More than 30 Canadians in American federal prisons are eligible to return.

Canada had a seasonally adjusted trade deficit of \$98 million in July, compared with a revised June surplus of \$38 million.

During the next four years, Alcan, the Canadian multinational company, with headquarters in Montreal, will construct an alumina plant costing \$600 million in the city of Limerick, Ireland.

Minister of State for Fitness and Amateur Sport Iona Campagnolo says the Federal Government intends to stay in the lottery business to help support Canadian amateur athletes. Her Department gets 5 per cent of profits from the federal lottery.

Toronto's Cindy Nicholas conquered the English Channel for the sixth time, on August 26. The 22-year-old swimmer, who took 12 hours and 19 minutes to make the trip, expects to be crowned Queen of the Channel for having completed the most crossings by a woman.