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Scientific research and development in Canada during 1974/75

The annual report of the National Research Council of Canada (NRC), which was published in July, lists highlights of the organization's activities during the past year. Some of these are reprinted below.

. A promising alternative method of recovering oil from tar sands, developed by the Division of Chemistry is currently taking on a special importance.

This "spherical-agglomeration" process is a means of separating suspensions of insoluble particles from liquids by adding a suitable bonding agent that causes the particles to stick together and, on agitation, to agglomerate into spheres. The spheres of material are then easily removed from the liquid. NRC scientists have shown that the process is particularly suited to recovering the oil of the Athabasca tar sands.

In this application of spherical agglomeration the tar sands are added to a light kerosene in continuous agitation, the oil allowed to dissolve, and water (the bonder) sprayed into the system. Under these conditions, the minerals and other hydrophilic materials agglomerate into spheres, a by-product that is readily separated and can find use as a gravel or fill material in the construction industry. The kerosene solvent can be recovered from the bitumen extract and recycled.

Wind turbine

. The vertical wind turbine, developed in recent years by engineers in NRC's National Aeronautical Establishment, will soon be in commercial production at Dominion Aluminum Fabricating Limited, a Canadian firm based in Toronto.

This wind turbine is totally different from the old farmyard windmills and possesses several distinctive characteristics. It is a high-speed machine that, unlike most conventional windmills, rotates about a vertical, not a horizontal axis. The rotor consists of three convex metal blades of aerofoil cross-section attached to a vertical shaft and supported on ball bearings at the top and bottom of the shaft.

The mechanical energy produced by

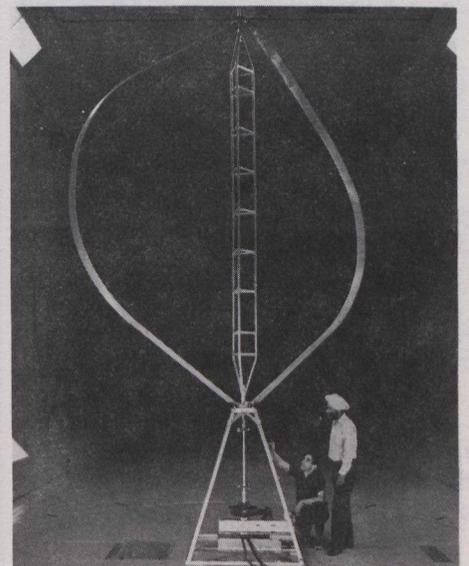
the turbine is easily converted into electrical power. Initially conceived to provide a cheap power source for developing countries to be used in irrigation or electrical power supply, the wind turbine, it was soon realized, could also have practical applications in Canada, particularly to provide electrical power in isolated regions of Northern Canada.

Canada/France telescope

. The National Research Council of Canada and the Centre national de la recherche scientifique of France (CNRS) have undertaken a joint project to establish a 3.6-m (144-inch) optical telescope on Mauna Kea, Hawaii.

The site is being provided by the University of Hawaii's Institute of Astronomy and the University is also providing support facilities. NRC, CNRS and the University have formed a non-profit corporation to build and operate the telescope.

The project is due to be completed in 1978, and work is progressing on schedule. Construction of the telescope pier and the building foundations has



NRC's wind turbine.

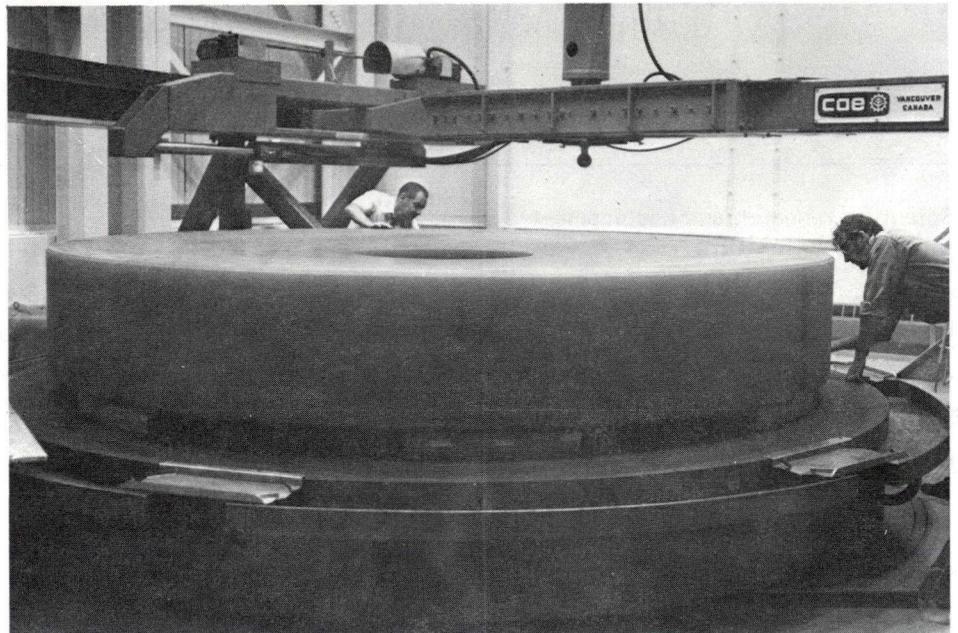
been completed on top of the mountain and the telescope's primary mirror is presently being ground and polished at the Dominion Astrophysical Observatory in Victoria, B.C., a task which should take two-and-one-half years to complete. The telescope yolk and frame support are being manufactured in France.

Mauna Kea, at an altitude of nearly 4,200 metres (13,780 ft), is one of the best sites in the northern hemisphere for optical astronomy, particularly for infrared observations.

Sewage-water purification

. With NRC support, scientists at the University of Sherbrooke have developed a method of purifying sewage waters using peat moss as a filtering or leaching agent.

A pilot plant capable of processing 20,000 gallons of sewage water a day is now in use at the University to



Preparation of lens at the Dominion Astrophysical Observatory, Victoria,

British Columbia, for the Canada/France/Hawaii telescope.

NRC – Canada's contact with an advancing scientific frontier

Since its founding in 1916, NRC has played a major role in Canada's scientific development. Today, it functions as a national science laboratory, a patron of Canadian scientific research and a vital link between the scientific interests of government, industry and universities in Canada.

The Council's laboratory activities are concentrated in ten major research divisions spanning various aspects of the life sciences, physical sciences and engineering. The newest of these, The Herzberg Institute of Astrophysics, has been named in honour of Dr. Gerhard Herzberg, distinguished NRC scientist and recipient of the 1971 Nobel Prize for his important contributions to the field of spectroscopy.

A focal point for much of the laboratory research is the 400-acre Montreal Road site on the outskirts of Ottawa. Here, an active research community involves some 550 scientists and engineers among its 2,000 employees. Other facilities include the original Sussex Drive laboratories in Ottawa, which date from 1932, as well as regional laboratories in Saskatchewan and Nova Scotia.

In addition to these, NRC also maintains numerous other scientific and technical facilities across Canada. These facilities which are in-

tended for a variety of users, are often too expensive or too specialized for most Canadian industries or scientific organizations to support on their own.

The Canada/France telescope in Hawaii, described elsewhere in this article, will be an important addition on completion in 1978, when viewing time and observational facilities will be shared by the three participating nations.

Today, applied research is focused on selected areas related to long-term problems of national concern such as energy, food, building and construction and transportation. NRC also provides research support towards social objectives such as public safety and security, protection of property, health and environmental quality.

In all of its varied research programs, the NRC acts in response to Canada's changing needs and scientific priorities.

In addition to its "in-house" research activity NRC is also closely allied with Canadian industry through co-operative research and development and through direct financial assistance. Similarly, an extensive program of grants and scholarships is the main source of direct aid to scientific research in the universities.

absorb heavy metals such as zinc, iron and lead, as well as cyanides, phosphates and organic matter such as oil, detergents and dyes. A patent has been issued for the process and Canadian industries are currently considering its use for purification of factory effluent waters.

Meat storage

. The Division of Biological Sciences' Food Technology Section has been carrying out research in an important area of the food industry, the refrigeration of meats. Microbiologists are seeking methods of increasing the "shelf life" of prepackaged beef by determining the optimal conditions of storage. At present, meat is purchased by retail stores in half-carass sizes which must be sold no later than three days after cutting and packaging.

The NRC studies are being undertaken in anticipation of an important change in the manner of this operation; in future, the packaging of consumer cuts of meat will take place in a central packaging plant or in the slaughterhouse itself. This innovation will not only increase the efficiency of the meat-distribution process but will also allow retail stores to specialize in certain cuts. This centralized packaging idea will require an extension of the present three-day limit on storage to approximately seven to ten days be-

Financing for Indonesia — memo signed during President's visit

During a state visit to Canada of President Soeharto of Indonesia and Mrs. Soeharto from July 2 to 5, a memorandum of understanding was signed whereby the two Governments will enter into negotiations to conclude agreements to establish in Canada credit facilities totalling \$200 million to assist Indonesia to purchase Canadian goods and services.

The facilities would be made available to Indonesia to the extent of \$25 million by the Canadian International Development Agency (CIDA), and to the extent of \$175 million by the Export Development Corporation and Canadian financial institutions.

While in Ottawa, President Soeharto held detailed discussions with Prime Minister Pierre Elliott Trudeau on international matters of mutual interest and on matters of bilateral concern.

Support for ASEAN

President Soeharto explained Indonesia's efforts, in co-operation with its neighbours, to promote regional

co-operation and harmony through the Association of Southeast Asian Nations (ASEAN). Mr. Trudeau expressed Canada's support for the aims of ASEAN, which he considered to be a major factor contributing to the stability, peace and development of the Southeast Asian region as a whole. They agreed that there was great potential for mutually beneficial co-operation between Canada and ASEAN in furthering the efforts of the members of ASEAN to develop their resilience, both individually and collectively.

The two heads of government agreed to strengthen trade and economic co-operation between their two countries. Prime Minister Trudeau explained the emphasis Canada was placing on its relations with the developing countries. President Soeharto welcomed Canada's policy as one fully in line with efforts to improve existing structures and, where necessary, to develop new structures for international economic co-operation and in this context, expressed his appreciation for the Canadian role in the development of Indonesia.

New strategy recommended for Canadian trade

"Canada cannot afford any longer to maintain its traditional protectionist posture in a world of trading blocs and emerging new economic powers," declared Dr. André Raynauld, the chairman of the Economic Council of Canada, in announcing the publication on July 10 of his organization's comprehensive report on Canadian commercial policy.

"The need for change is very clear," Dr. Raynauld noted. "Our present commercial policy is failing to contribute to this country's capacity for sustained and dynamic growth and is inhibiting independent national decision-making in Canada. We believe it is the Economic Council's job to initiate and foster a wide-ranging public discussion on the options before the country. That is what our report is intended to do."

The report, *Looking Outward: A New Trade Strategy for Canada*, is the result of a massive assessment undertaken by the Council over the past three-and-a-half years. Fourteen members of the Council's professional staff and 19 outside specialists carried out a large number of individual research studies as background to the project, many of which will be published separately later. From this and other work, the Council's 228-page report was developed as a consensus document carrying the backing of the group's 28 members.

Controversial reaction expected

Dr. Raynauld said that the work had been difficult and he expected the result to be controversial. "Because of its implications, this report will undoubtedly arouse emotional reactions. Our national political life has been strongly affected by commercial policy issues on many occasions in the past, essentially because of the role that has been played by import tariffs in shaping an extensive Canadian industrial complex as part of an independent and self-reliant nation."

He stressed that the document was not an argument for free trade with the United States, as had been reported in one newspaper story some months ago. "We have sought to go back to first principles, assessing Canada's con-



Nine pilots of the Royal Netherlands Air Force show off their Canadian and Dutch wings after graduation from Canadian Forces Flying Training School

at Cold Lake, Alberta. The group spent 18 months in Canada learning to fly Tudor trainer planes and CF-5 jet fighters.

temporary needs and seeing how well they can be reconciled with our existing trade and industrial policies; our conclusion is that they do not fit with those policies very well. Then we look at the alternatives that might suit our requirements better – including Canada/U.S. free trade along with many other possibilities – and try to rank them by means of an evaluation of economic costs and benefits. Free trade with the United States comes quite a way down the list, in fact, although we treat it very seriously because of the relevance it has to so many of Canada's most deep-seated economic and political difficulties."

"Our whole objective is to open up the issue to fundamental reappraisal," Dr. Raynauld indicates, "much in the way that the Gray Report opened up the foreign investment question and the recent Green Paper on Immigration brought that subject into the light of public attention." He suggested that the parallel with those two areas of interest was indeed significant, since a protectionist policy for Canadian secondary industry had from the outset been closely bound up with national goals – notably independence and unity – to which such matters as foreign investment and immigration are related in major respects.

Urban demonstration program postponed indefinitely

As part of the Government's effort to restrain spending, further action under the Canadian Urban Demonstration Program is suspended indefinitely, with a savings of close to \$100 million, over five years, Urban Affairs Minister Barney Danson announced recently.

Mr. Danson stated that the 14 urban demonstration proposals already announced will go forward as planned.

Nearly 200 other proposals, at various stages of examination, will be returned to the sponsors.

Motorized wheelchairs on loan

Manitoba's motorized wheelchair-loan program, which will make wheelchairs available on loan to eligible quadriplegics, is now in operation, the Province's Health and Social Development Minister Laurent L. Desjardins announced in July.

Quadriplegics registered with the Manitoba Health Services Commission, resident in Manitoba for at least one year and meeting other criteria, may apply for a motorized wheelchair on prescription from a physician. While no financial needs or means test is used, a medical and social assessment is made for applicants.

Persons owning their own wheelchairs may have them repaired under the program, and they can also have wheelchairs replaced providing they meet the priority criteria.

Bill of rights for hospital patients

A *Patient's Bill of Rights* has recently been published by the Royal Ottawa Hospital, an institution for psychiatric care. Twelve items appear in a small pamphlet, ranging from the patient's right to be involved, to refuse treatment, to receive an explanation of his bill.

With text in English and French, this pamphlet plays something of the advocacy role, so often missing in the dealings between individuals and institutions and, in fact, gives telephone numbers of the hospital ombudsman.

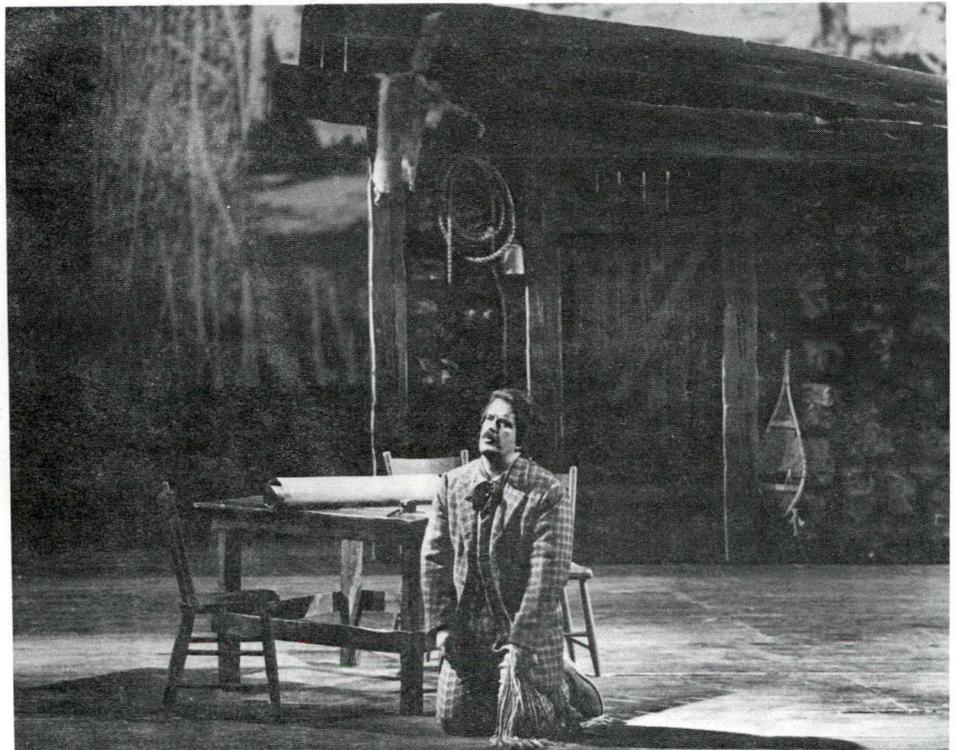
Canadian festival in Washington salutes U.S. bicentennial

Some of the most talented Canadian performing artists and companies will go to the United States in autumn to take part in the two-hundredth anniversary of American independence. The bicentennial celebrations, which have already begun, will continue until the end of 1976.

One of the major events will be a Festival of Canadian Arts to be held in Washington at the John F. Kennedy Centre for the Performing Arts, Octo-

ber 13-26, 1975, under the Cultural Relations Program of the Department of External Affairs, with the assistance of the Touring Office of the Canada Council.

Representing Canada at this Festival will be Maureen Forrester, Oscar Peterson and Monique Leyrac; Louis Quilico, guest soloist with the National Arts Centre Orchestra, conducted by Mario Bernardi; the Royal Winnipeg Ballet; and the Toronto



Bernard Turgeon as Riel in the Canadian Opera Company's production *Louis Riel*.



Oscar Peterson

Mendelssohn Choir, conducted by Elmer Iseler, featuring the Festival Singers of Canada and the Canadian Brass.

The Shaw Festival Company from Niagara-on-the-Lake will present a special production of *The Devil's Disciple*, in which a contingent from Kingston's Fort Henry Guards will take part.

A Canadian opera that has been acclaimed, *Louis Riel*, (words by Mavor Moore and Jacques Languirand, music by Harry Somers) will be presented by the Canadian Opera Company, conducted by Victor Feldbrill. Bernard Turgeon will play Riel. The National Arts Centre company is re-staging its production of Offenbach's comic opera,

La Belle Hélène, conducted by Pierre Hétu.

In addition, a Canadian Film Festival will be presented at the Kennedy Centre as well as an exhibition of prints under the title *Canadian Landscapes*.

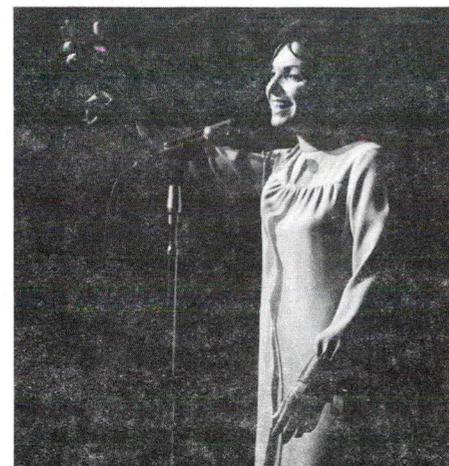
Other Canadian productions which will take place throughout the United States during the bicentennial include performances by the Montreal and National Arts Centre Orchestras, the Festival Singers of Canada, le Théâtre du Nouveau Monde, the Vancouver Playhouse, the Stratford Festival Company, the National Ballet, the Codco Theatre Company from Newfoundland and the Charlottetown Festival production of *Kronburg*.



Maureen Forrester



Mario Bernardi conducts the National Arts Centre Orchestra.



Monique Leyrac



Dancers of The Royal Winnipeg Ballet in Rondo – Part II of John Neumeier's evening-length ballet trilogy Pictures.

Alberta oil reserves drop

Alberta's conventional crude oil reserves, representing the bulk of proved domestic oil supplies, declined by 255 million barrels in 1974, leaving less than 13 years' supply in the ground, at present rates of consumption, according to the Alberta Energy Resources Conservation Board. Alberta had 6.3 billion barrels of available oil supplies remaining at December 31, after producing 497 million last year.

The tabulations, which are expected to influence the current assessment of Canadian oil supplies and requirements by the National Energy Board, confirm unofficial estimates of falling oil reserves. Alberta government and petroleum industry officials regard 13 years as the minimum time needed to permit the development of alternative supply sources, whether conventional or synthetic.

Two-price wheat payment

Agriculture Minister Eugene Whelan recently announced that a cheque for \$16.3 million had been sent to the Ontario Wheat Producers' Marketing Board as payment to farmers under the recently enacted "two-price wheat" legislation.

"The payment, which will be passed on to Ontario wheat growers with the final payment for their 1974 crop, is in fact a subsidy to consumers to keep down the price of bakery products," Mr. Whelan said.

Canadian millers buying Ontario wheat pay \$3.25 a bushel. Under this legislation the Federal Government is committed to paying producers the difference between this base price and the world price, up to a maximum payment of \$1.75 a bushel. The world price for wheat remained above \$5 a

bushel for most of the period when the 1974 wheat crop was sold.

The recent payment includes nearly \$790,000 in interest accumulated on this amount since the Ontario Wheat Producers' Marketing Board sold the wheat to millers.

"Without the two-price wheat agreement, millers would be paying more for wheat, and bread and bakery goods would cost more at the store," Mr. Whelan said.

Happy as a pig

Sixteen porkers used as "guinea pigs" in experiments at Ottawa's Carleton University have probably proved that the drug methadone does not stimulate the consumption of alcohol.

The research, directed by psychologist Peter Fried, an associate professor, was undertaken to discover why so many heroin addicts turn to alcohol when they are weaned away from heroin by the use of methadone.

Eight animals were given injections of heroin, the other eight methadone, or a solution of salt and water. The drink of alcohol and apple juice that was made available to all the pigs was used mainly by the heroin addicts. When heroin was replaced by methadone, the animals drank less alcohol.

"We're fairly confident that an addict's drinking is not due to the introduction of methadone," Dr. Fried said. "It's related to something else — perhaps his background, his earlier life."

The professor believes that his findings should have the effect of lessening criticism of programs involving the use of methadone treatment.

Scientific research and development

(Continued from P. 2)

cause of the time needed for transportation to the stores; hence there is a requirement for a more efficient means of preservation, a way of maintaining the meat's colour and preventing bacterial attack.

Of the several variables that might affect the preservation of meats, the investigators are particularly interested in the temperature and gaseous composition of the storage rooms and

gaseous composition in the packages. They are looking for a temperature and gas composition that will both inhibit bacterial growth and preserve the meat's attractive natural colour.

Dulse-processing industry

. North America's first commercial seaweed cultivation unit began operations in November 1974 on Grand Manan Island, in the province of New Brunswick. It is part of a modern new seaweed processing plant operated by Atlantic Mariculture Ltd.

The cultivation unit represents the first commercial use of a technique developed over the years at the Atlantic Regional Laboratory's Sandy Cove Seaweed Culture Station. The thermal effluent from the Grand Manan power plant will be used to stimulate growth and extend the growing season to a year-round operation.

This plant marks the beginning of New Brunswick as a dulse processor and the beginning of seaweed as a secondary industry in Canada. (See *Canada Weekly* dated July 16, 1975, page 5.)

Plastics

. With NRC support, research at the University of Toronto in polymer chemistry over the past five years has led to the development of numerous plastic products such as treated containers which decompose over a period of weeks by reaction with sunlight. Similar exposure to ordinary interior lighting produces no such degradation.

Although it was originally shown that polystyrene and polyethylene could degrade in this manner, subsequent experiments have proven that polyvinyl chloride, acrylate resins, nylon and polyesters could also react in a similar way.

Furthermore, it has been found that the initial photodegradation of polystyrene and polyethylene samples into small particles was followed by a biological degradation into carbon dioxide and water. In other words, the plastic material would break down to non-polluting volatile products.

Patents for the processes and compositions have been filed in 30 countries and commercial production of the Ecolyte (treated) polymers has begun in Canada and Europe.

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