

# Canada Weekly

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## Canada's National Research Council: research on a global scale



*The NRC headquarters in Ottawa. The large stainless steel sphere in front of the main building symbolizes the scientific activities of NRC and its influence across the world.*

When production of tapioca, an important food staple in Africa, India and South America, began to decline because of a plant disease, international authorities asked the National Research Council of Canada (NRC) for help.

Not only did NRC find a way of producing healthy plants from the infected stock, it also perfected a freezing technique that reduced costs of maintaining healthy reproductive stock. It then passed along the information on how to use these techniques to the countries involved.

The NRC has been filling such a role ever since it was created by the Canadian government in 1916. It was originally set up to carry out research in the field of science and engineering, in order to stimulate Canada's economic and social development. However, other countries often benefit from its work, either directly (when a request for assistance has been made) or indirectly, in the course of its routine work.

The NRC plays an important role in the general development of technology in Canada. Over 2 000 scientists and

engineers are specialized in a wide range of disciplines. In addition to carrying out many theoretical and applied research projects of their own, they also stimulate research and development activities in universities, industry and in government organizations.

Financed by the government but administered independently by its own board of directors, the NRC co-operates with the various sectors in different ways. Federal government departments which do not have laboratories or which have special research needs will often turn to the NRC for help.

In many cases, the NRC undertakes projects requiring scientific and technical facilities that are too costly or too specialized for industry to afford.

They will then provide financial aid or specialized research assistance to promising companies in the private sector to help them to solve difficult technical problems. They might also carry out work on some advanced technological project, the potential of which is not immediately apparent, until a company



*NRC scientists are studying air-cushion vehicles to determine why they can break ice more easily and economically than conventional icebreakers. Air-cushion vehicles were developed mainly for carrying cargo over rough terrain.*

realizes its value and agrees to take over the final development and applications.

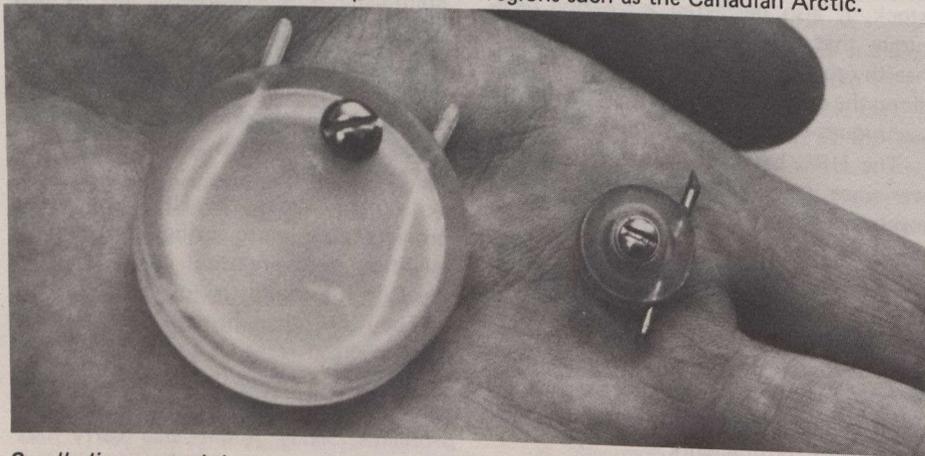
#### Basic research

Much of the NRC's work concerns basic and exploratory research designed to broaden our knowledge of the sciences in general and to develop new and promising applications. For example, geneticists are seeking to discover the reason why a protein-rich edible red algae eaten in the Atlantic provinces produces only male plants and never females, a mystery that has eluded scientists for 150 years.

Chemists are also trying to find a more effective and more economical means of extracting deuterium from hydrogenated compounds. This process is important for the manufacture of heavy water, an essential ingredient in the production of nuclear power.

#### Technological assistance

The NRC also carries out research of a more practical nature. It provides



*Small discs containing pancreatic tissue can be implanted in diabetics to eliminate the need for daily injections of insulin. These implants were developed by the Connaught Laboratories in Toronto with the assistance of the National Research Council.*

technological assistance for social objectives such as public safety or the protection of property, health and the environment; it seeks solutions to long-term problems of our society, such as energy, food, transportation and construction; and it is participating actively in transforming Canada, traditionally an exporter of raw materials, into a world supplier of manufactured products.

#### Marine research

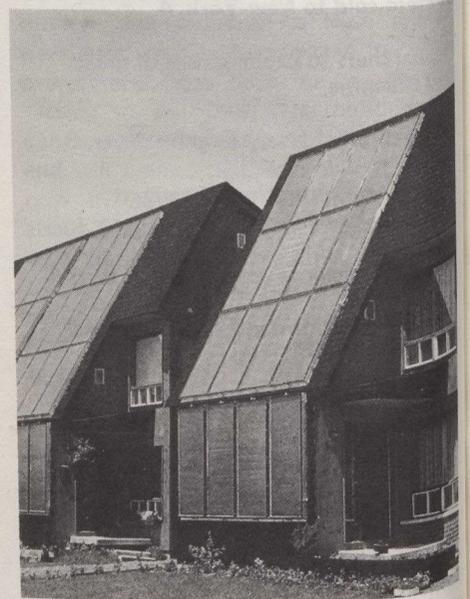
Canada is bounded by three oceans, has nine of the world's largest lakes and two of its largest rivers. NRC scientists are therefore in a good position to develop systems of maritime transportation.

More and more offshore drilling is being done for petroleum and natural gas reserves. The NRC and Canadian industry are together developing advanced glacial technology to make possible year-round exploration and development in the country's outlying regions such as the Canadian Arctic.

There are also several research projects underway, including remote-controlled submarines for the excavation of trenches and laying of pipelines in the seabed; vessels capable of sailing in water covered with more than three metres of ice; marine structures that can protect a drilling platform from ice floes and icebergs; and highly developed air-cushion vehicles capable of transporting heavy loads on water or on ice too thin for normal vehicles.

#### Air transportation

In the field of aeronautics, the NRC has played a large role in the development of sections for the new supercritical wings, so called because they allow aircraft to fly closer to the speed of sound than conventional wings. The



*New methods of building construction are being tested to store solar energy.*

supercritical wing is used on the *Challenger*, a Canadian-made jet aircraft that has been widely acclaimed.

#### Energy

In the field of energy, the NRC is working on the saving, storage and transport of energy, on fossil fuels and nuclear techniques, and on the development of renewable energy sources.

Solar facilities (in single-family homes and in commercial structures) are being tested, and development is proceeding on improved components for solar heating, new methods of storing heat and better configurations for solar panels.

Houses have been built to test new methods of construction designed to conserve energy. Various materials and dif-



Mike Beedell

Old egg-beater style of windmill revived by NRC engineers. Tests revealed this was an efficient way of harnessing energy.

ferent types of windows, insulation and air conditioning, ventilation and lighting systems are all being tested.

A few years ago NRC engineers revived an old egg-beater style of windmill with blades which rotate around a vertical axis. Wind tunnel testing revealed that this was an efficient way of harnessing energy, and a full-scale windmill was made. Two models have been connected to an electrical system and are producing electricity. A number of companies have built commercial models along the same pattern.

Hydrogen is a very important substitute for our rapidly depleting oil and natural gas resources, but at present it is both dangerous and difficult to use. NRC chemists are studying its thermodynamic properties and developing solid compounds in which it can be stored and used more safely and easily than in the gaseous form.

The NRC is also co-ordinating a national program of technological development geared toward controlled nuclear fusion, which would guarantee an inexhaustible supply of energy.

### Environment

Among its achievements relating to the surveillance of environmental contamination is the NRC's precise technique by which airborne lasers are used to detect oil spills. The laser beam sweeps the terrain under the flight path, and the instruments on the aircraft analyze the reflected beam and determine what kind of substance has been spilt. This technique holds great promise for oil

exploration, and for controlling the spread of oil spills at sea.

Some of NRC's research projects have developed to the point where they have given birth to separate organizations as important as the NRC itself. For example, Atomic Energy of Canada Limited, the creator of the CANDU reactor, was formed in 1952 as a result of an NRC-co-ordinated nuclear project during the Second World War.

### Medicine

Many NRC initiatives have a direct influence on the individual. For example, patients suffering from structural abnormalities of the ear can now be examined by means of an instrument developed with the financial assistance of the NRC. It enables physicians to obtain certain information without surgery.

The NRC also assisted in the invention of small discs containing pancreatic tissue that can be implanted in diabetics to eliminate the need for daily injections of insulin.

Finally, the motors in many of the cars driven by today's drivers were checked on the assembly line by laser and optical inspection systems developed with NRC assistance.

*For further information, please contact National Research Council, Public Relations and Information Services, Building M-58, Montreal Road, Ottawa, Ontario, Canada. K1A 0R6.*

### Environmental plan aids Indonesia

A project for environmental human resource development in Indonesia, to be co-ordinated through Dalhousie University in Halifax, Nova Scotia, will be funded by the Canadian International Development Agency (CIDA). The total cost is estimated at over \$5 million, of which CIDA will contribute \$2 516 704 and the government of Indonesia \$2 480 000.

The undertaking is unique in two respects: this is the first purely environmental program of such scope and size; and Canada is the first donor country to respond to the government of Indonesia's major program for environmental planning and management. Its objective is to expand the numbers and capabilities of Indonesians required for environmental management.

In the first place, a corps of university, government and private sector personnel

will be trained and licensed in environmental impact assessment. Over the three-year phase, links will be formed between Canadian universities and Indonesia university environmental study centres.

Dalhousie University has been instrumental in the planning and pilot phases of several Indonesian centres. A special feature of the program will be the training of environmental lawyers to administer new Indonesian environmental laws. Other activities include graduate education for Indonesians at Canadian universities, assistance to non-governmental organizations in Indonesia for environmental education, and a national meeting to bring together key Indonesian and Canadian environmental leaders.

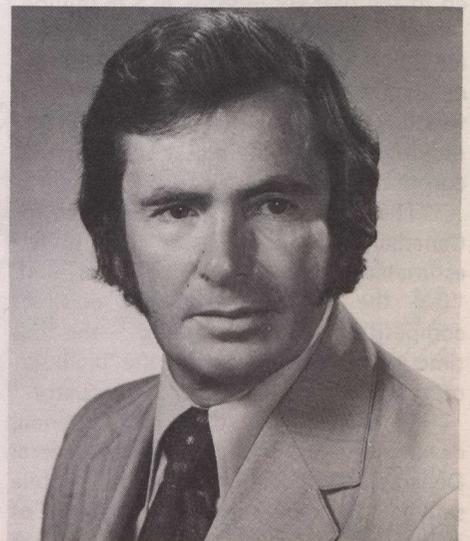
### Order of Canada awards

Canada's disarmament ambassador, two former Cabinet ministers and a painter are among 68 Canadians appointed by the governor general to the Order of Canada, the country's highest distinction.

J. Alan Beesley, Canada's ambassador and permanent representative to the United Nations Committee on Disarmament in Geneva, will be invested as an officer of the order at a ceremony in April.

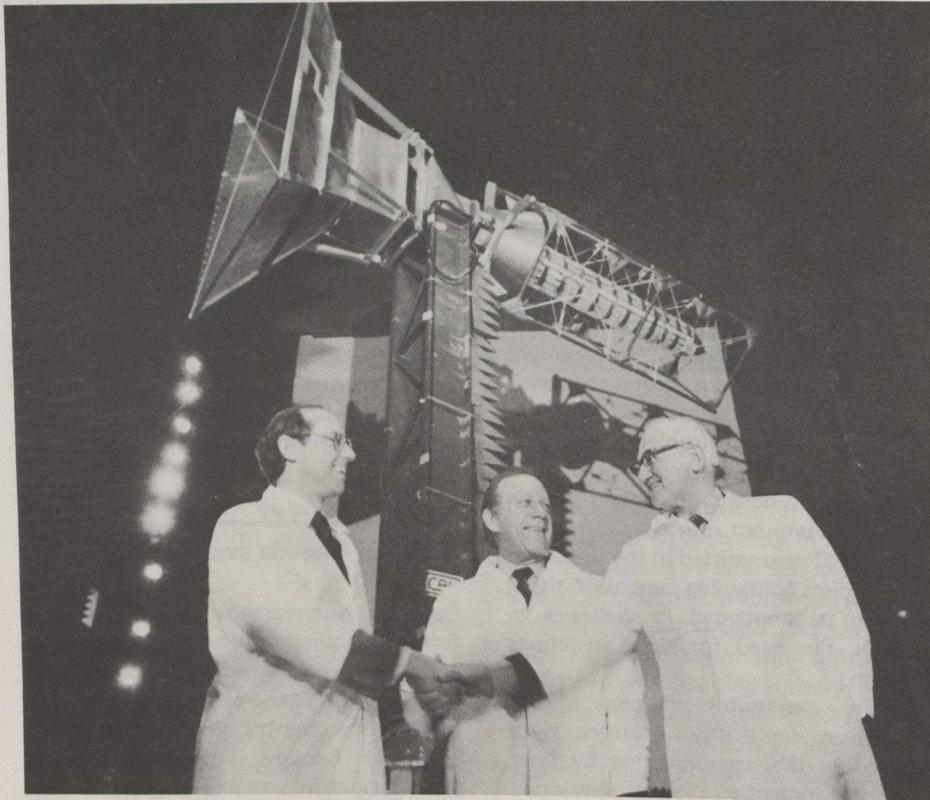
Gordon Bennet, a former Cabinet minister in the Prince Edward Island government, Mitchell Sharp, a former Liberal Cabinet minister, and wildlife artist Robert Bateman have also been appointed officers of the order.

Lorraine Monk of Toronto, a photographer and David Macdonald Stewart of Montreal have been elevated within the order from members to officers.



J. Alan Beesley

## Canadian firm snaps up British satellite contract



Canadian Astronautics Ltd. president Jim Taylor (left), London West Member of Parliament Jack Burghardt and head of Marconi's space division Peter Anson shake on the deal in front of a CAL antenna mounted on a test rig.

Canadian Astronautics Ltd, an Ottawa aerospace company, has won a \$2-million contract with Marconi Space and Defence Systems of Portsmouth, England, to design and build an antenna for the British SKYNET 4 military communications satellite.

This brings the total amount of contracts Canadian Astronautics has landed in the past six months to \$25 million.

Canadian Astronautics won the SKYNET contract over three other aerospace companies, including US giant TRW Inc., which ranks sixty-sixth in the Fortune 500 rankings of the 500 largest US industrial corporations.

"The importance of this contract for Canadian Astronautics can't be underestimated," president Jim Taylor said. "It's the first international contract competition we have entered — the first time we've gone up against the 'big boys' of the international aerospace industry."

The Canadian Astronautics antenna, developed during studies for the federal Department of Communications' mobile satellite program, was chosen because of its ability to handle the satellite's high output, its innovative design and its com-

pact size (about 2.5 metres long), which will be an advantage when the SKYNET 4 satellite is launched early in 1985.

It will be tested at the Department of Communications' David Florida Laboratory at Shirley Bay, west of Ottawa. Canadian Astronautics is also negotiating for other parts of the SKYNET satellite to be tested at the laboratory.

The SKYNET 4 is to replace the SKYNET 2 satellite, which has been in space since 1974.

The SKYNET project is the latest in a series of contracts for Canadian Astronautics in the last six months.

Recent deals for the nine-year-old company include two contracts worth \$3.9 million for airborne radar systems to help ships travelling in Canadian waters avoid icebergs and ice blockages. (See *Canada Weekly*, Vol. 11, No. 45, December 14, 1983.)

Last June, the company landed a \$10-million federal government contract to investigate the effect of the ionosphere — the region between the earth's atmosphere and space — on the earth's climate. That contract was part of Canada's contribution to the space shuttle program.

## System sold to New York

Project Ida, a communications system developed by Manitoba at a cost of \$2.2 million, has been sold to the Jerrold division of General Instrument Corp. of New York for \$250 000 (US).

A spokesman for the Manitoba Telephone System said General Instrument would buy the equipment, called Omnitel, and market rights for the United States and Europe. The agreement also gives Manitoba a 2.5 per cent sales royalty, to a maximum of \$5 million (US).

Project Ida, which delivers telephone, television, alarm signals and other communications services through an integrated network, wound up in December 1981. A spokesman for General Instrument Corp. said the firm would market equipment for a second phase of cable television equipment by 1985, which would be two-way rather than primarily a one-way system. If the market develops, millions of units could be sold.

## Researchers to probe senses of man and machine

Researchers at the University of Toronto, the University of British Columbia in Vancouver and McGill University in Montreal are collaborating on a multidisciplinary project to investigate the sensory perception aspect of artificial intelligence.

The effort, initiated by the Canadian Institute for Advanced Research, will involve a total of eight or ten electrical engineers, perceptual psychologists, neuroscientists and computer scientists from the three universities.

Social sciences and humanities researchers will also be involved, studying the effects of artificial intelligence technology on human beings.

Other Canadian researchers are seeking to develop problem-solving software and methods of communicating directly with computers — both important aspects of artificial intelligence — but the co-operative effort will concentrate on a third aspect: basic research into the nature of sight in human beings and machines.

Spar Aerospace Ltd. of Toronto will send two or three of its researchers to work for at least six months with the research fellows of the institute. Spar has contributed \$750 000 to the institute over three years.

## Microchip holds key to grain dryer

Canadian Farm Tec Systems, a small electronics company in Waterloo, Ontario believes it has come up with a computerized control system to dry grain more efficiently than anything available.



Dave Cyr gets a load of corn ready for Hensall Co-op's computerized grain dryer. Canadian Farm Tec, which developed the new dryer technology, has high hopes for export sales.

North America produces billions of tonnes of grain a year which all has to be dried. Allan Niziol, part owner of Farm Tec, figures there are at least 6 000 commercial grain dryers in North America. If the new system sells at an average price of about \$40 000, there is a potential \$240-million market to be exploited.

There is also the possibility of overseas sales if the new technology is used to dry Asia's huge rice crop.

Grain needs to be dried because it comes in from the field with a high, and greatly varying, moisture content. Corn, for example, usually sells on the market at 15.5 per cent moisture. But when it is harvested, it may contain as much as 35 per cent moisture.

The grain is dumped into the top of a tall silo through which hot air is blown from two to three hours. But the dryer

may be filled with a dozen or more truck-loads of grain, each with a different moisture level. And, up to now, there has been no way of adjusting the heat and rate of flow inside it to allow for the moisture variation.

### Wasted energy

Inevitably, some grain gets over-dried, which means energy has been wasted, the grain loses weight and so the seller has less to sell.

Farm Tec concluded that it needed a series of sensors located at different stages in the dryer to measure temperature and moisture content. Information would flow into a computer, which would adjust temperatures and the rate of movement through the dryer to allow for varying moisture levels.

The sensors were no problem; they

had already been invented. All that was needed was the computer program, and that took two years to devise.

### Burnt on microchip

The program is burnt on a new microchip that fits a standard IBM micro-computer. The computer analyzes information constantly, adjusting the dryer's performance as necessary.

Farm Tec's first working system is running in a grain dryer at the Hensall District Co-op near London, Ontario. Mr. Niziol says preliminary results indicate the system should pay for itself within the year.

Co-op operations manager Paul Ducharme calculates the co-op's dryer is putting grain through 10 to 12 per cent faster than before. It is also hitting moisture contents more accurately.

## Offshores exploration agreement approves Maritime drilling

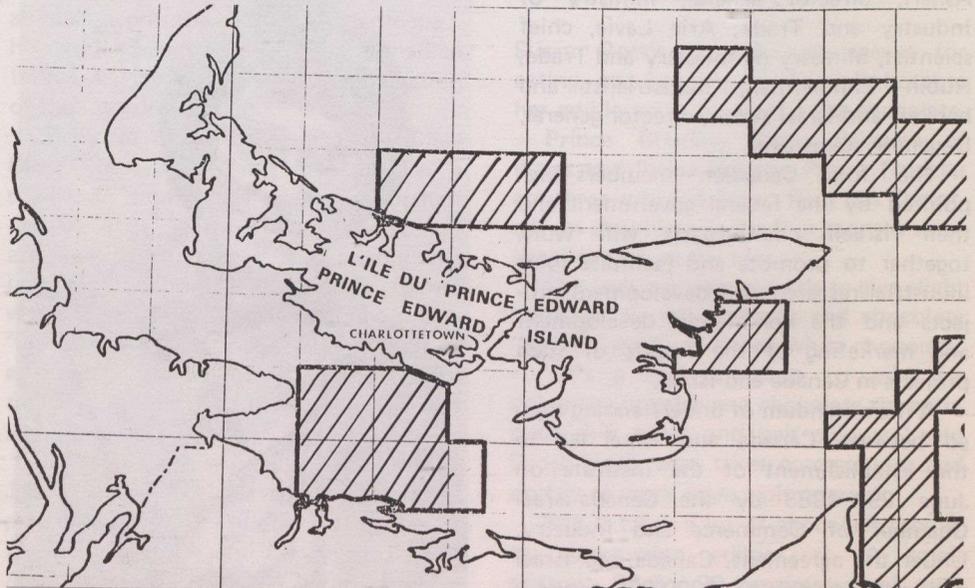
An exploration agreement with Dome Petroleum Limited and partners for lands offshore Nova Scotia, New Brunswick and Prince Edward Island was announced recently.

The agreement, covering 589 000 hectares, has a term of two and one-half years and calls for one well to be drilled by a 12-member consortium at an estimated cost of \$14.25 million. Half of the land will be relinquished to the Crown by the end of January.

The agreement, negotiated through the Canada Oil and Gas Lands Administration (COGLA), was concluded in consultation with the governments of Nova Scotia,

New Brunswick and Prince Edward Island. The Canada-Nova Scotia Offshore Oil and Gas Board approved the portion of the agreement involving the Nova Scotia offshore region.

Partners in the agreement are Dome, the operator, TCPL Resources Limited, Dome Canada Limited, Tripet Resources Limited, Dynamar Energy Limited, American Petrofina Exploration Inc., la Société québécoise d'initiatives pétrolières, Columbia Gas Development of Canada Limited, DEB Canadian Explorations Limited, Conventures Limited, Getty Oil (Canada) Limited and Petro-Canada Exploration Inc.



Striped areas show lands covered by new exploration agreement.

The Toronto Star

## Computer science accreditation

Accreditation by computer may soon be required for the best jobs in data processing. Six Canadian universities, including the influential University of Waterloo and the Canadian Information Processing Society have developed what they say is the first computer science accreditation program in Canada and probably in North America.

This voluntary program will allow potential employers to identify students who have graduated from curricula judged to be suitable for the profession.

Mandatory courses include computer hardware, operating systems, logic circuits and several programming languages.

## Canadians appointed to Canada-Israel Institute

Four Canadians have recently been named directors of the Canada-Israel Institute for Industrial Research and Development. The new members are: Ray Wolfe of Toronto, chairman and president of the Oshawa Group Limited; Richard Kroft of Winnipeg, Manitoba, president of Tryton Investment Co. Ltd.; Steven Dorsey of Montreal, president of Micom Canada Ltd.; and Dennis De Melto, director general of DRIE's Office of Industrial Innovation, who will represent the federal government.

The Israeli members appointed to the board of directors by the Minister of Industry and Trade of Israel are: Avraham Asheri, director general, Ministry of Industry and Trade; Arie Lavie, chief scientist, Ministry of Industry and Trade; Rubin Zimmerman, industrialist and banker; and Israel Asher, director general, Degem Systems Ltd.

The four Canadian members appointed by the federal government and their Israeli counterparts will work together to promote and facilitate joint industrial research and development projects and the commercial development and marketing of the results of such projects in Canada and Israel.

A memorandum of understanding signed between Canada and Israel led to the establishment of the institute on June 29, 1983 by the Canada-Israel Chamber of Commerce and Industry. Under the agreement, Canada and Israel will each contribute \$200 000 towards its establishment.

## Franco-Ontarians featured

A recent book exploring the history and culture of the Franco-Ontarians is an important contribution to information about the French identity in Canada. The book is called *Voices from French Ontario*, by Sheila McLeod Arnopoulos and is published in paper-back by McGill-Queen's University Press.

The author was born in Montreal and has personal knowledge of the social and cultural problems of minorities within a large society, having grown up in the English-speaking minority of Quebec. Her first book, *The French Fact in Quebec*, won a Governor General's award for non-fiction.

For her study of the Franco-Ontarians, Miss Arnopoulos travelled extensively in the area of northern Ontario, from Sault Ste. Marie, Sudbury and Pembroke in the south to Timmins and Hearst in the north. About 300 000 French-speaking people live in this area, and Miss Arnopoulos looked into how they retained their language and culture, surrounded by an English-speaking society.

The French character of the region began about a century ago, after the Canadian Pacific Railway opened up the country. French-Canadians moved in, taking jobs in the forest industry, the mines and on farms. They were largely isolated, and developed a strong identity before the opening of the Sudbury mines which brought about an increasing urbanization. This book outlines how the Franco-Ontarians managed to resist assimilation.



Sheila McLeod Arnopoulos

## Film series explores technology

TV Ontario, the Toronto-based public service broadcasting station — an agency of the Ontario government — is joining with VISNews Productions of London, England in a new co-production series of 13 television programs budgeted at \$1.3 million.

Wally Lougul, TVO producer, said that 75 per cent of *The Real Story* — an entertaining and informative way of helping people understand changes being brought about by the revolution in technology — will be shot in Ontario.

The series should be completed by January 1985. So far, marketing response for the series has been favourable, and Mr. Lougul says there are good possibilities for a pre-sale series on the 200 to 300 US public service stations.

## Canadian poets reach wide audiences

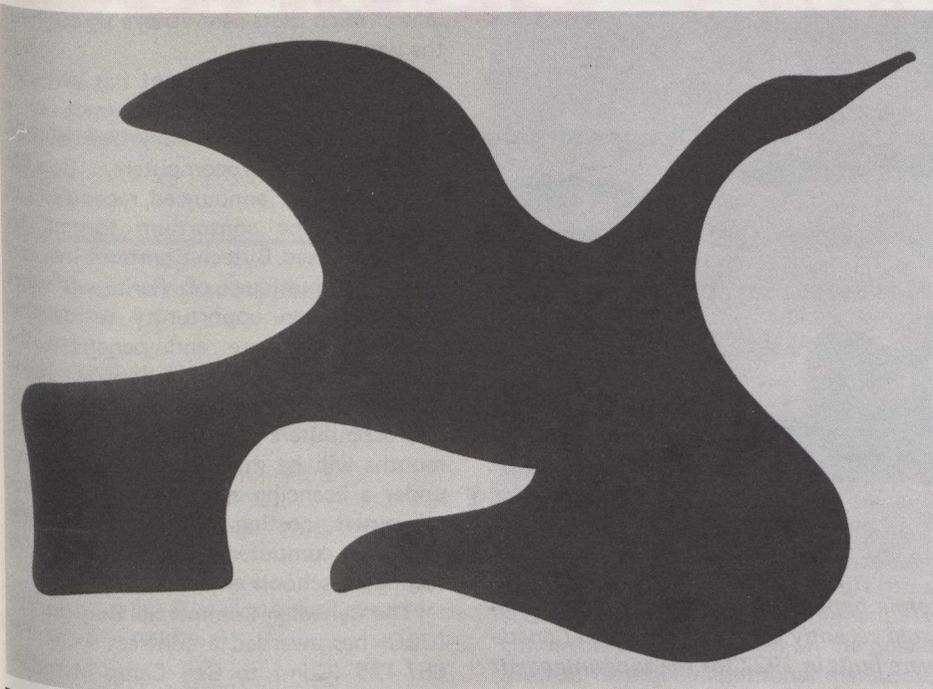
For some reason Canadians appear to be poetry addicts. More poetry books are sold *per capita* in Canada than in any other country, and many critics consider that contemporary Canadian verse is one of the most vital bodies of poetry in the English-speaking world.

It is not surprising, therefore, that Canadian poets are reaching world markets. Margaret Atwood recently received the International Writers' Prize conferred by the Welsh Arts Council. Earle Birney's poetry has been translated into Russian, Hungarian and French. Irving Layton, who was born in Romania and came to Canada with his parents at the age of one, has been translated into Hungarian, Italian and Spanish.

The name Leonard Cohen is known throughout the world and his verse appears in magazines as far afield as Chile, India, Romania and Italy. Michael Ondaatje, who was born in Sri Lanka and educated in England, has had his work published in the United States, Mexico and the Soviet Union. Al Purdy, the most down-to-earth of Canadian poets, has won literary prizes in the United States. And Dorothy Livesay, Tom Wayman, to name only two, are frequently invited to read their poems in Australia, Denmark and Norway.

While many Canadians wonder and worry about their identity, our poets have made Canada and the Canadian scene familiar to readers in many corners of the world.

## Benjamin Chee Chee: young Ojibwa artist marked by talent and tragedy



Bird in flight (1977) acrylic on paper by Benjamin Chee Chee.

The National Exhibition Centre and Centre for Indian Art in Thunder Bay, Ontario is currently showing a unique collection of works by Ojibwa artist, Benjamin Chee Chee. The 49 paintings and five prints span a period from 1973 to 1977.

Born in Temagami, Ontario, Mr. Chee Chee largely taught himself to draw and paint. His father died when he was two months old and he lost track of his mother. One reason behind his drive for success as a painter was his ambition to be reunited with her.

### Woodland Indian painters

He was a prominent member of the second generation of Woodland Indian painters, a native art movement that began in the early 1960s and has since become one of the important art schools in Canada. Unlike many of his contemporaries, he painted in a style influenced by modern abstraction.

While most of the young Woodland Indian artists were content to follow the style of the movement's founder, Norval Morrisseau, in depicting myths and legends by direct and "primitive" narrative means, Mr. Chee Chee pursued a more economical graphic style, a reduction of line and image more in keeping with the mainstream of international modern art.

Benjamin Chee Chee wanted his work

to be accepted on its own terms, not as "Indian art", and he proceeded to break the mould of what Indian art was thought to be. His life was filled with ironic and frequently tragic twists of fate, often reflected in his art, culminating in his suicide in 1977, shortly before his thirty-third birthday.

In describing the artist's work, Elizabeth McLuhan, curator of the Thunder Bay National Exhibition Centre and Centre for Indian Art, says "Chee Chee evolved a lyrical, expressive line to depict, in a few strokes, the essence of birds and animals from the Canadian landscape... his work changed the look of Canadian Indian art and captured the imagination of the Canadian public."

Many of the examples of Mr. Chee Chee's best known style as well as a significant number of powerful abstract designs little known by viewers today are included in what is probably the largest collection of Mr. Chee Chee's work in existence. Miss McLuhan says "Benjamin Chee Chee's life and work epitomizes much of the talent and tragedy inseparable in today's Indian life."

The collection will be on display until January 29. For further information, please contact the Thunder Bay National Exhibition Centre and Centre for Indian Art, P.O. Box 1193, Thunder Bay, Ontario, Canada P7C 4X9.

R. Spooner

## Cinema academy head named

Quebec movie producer Denis Héroux will become the new chairman of the Academy of Canadian Cinema, it was announced recently.

Mr. Héroux, a former history professor, began his film-making career with such popular Quebec movies as *Valerie* before moving on to international movie co-productions including *Violette Nozière*, *Atlantic City* and *Quest for Fire*.

Mr. Héroux becomes the academy's third chairman, taking over from Toronto music score composer Paul Hoffert.

## Actress to join Yellowknife anniversary festivities

Canadian actress Margot Kidder will be guest of honour in the city of her birth next summer, Yellowknife's fiftieth Anniversary Committee has announced. Miss Kidder was once famous as reporter Lois Lane in the *Superman* movies.

Miss Kidder's father Kendall was a gold miner and later manager of the Yellowknife Telephone Co. in the 1940s. Her mother, Jill, was a volunteer announcer at the community radio station. Miss Kidder herself left the north as an infant and now lives in California.

Activities celebrating Yellowknife's fiftieth anniversary will take place from June 23 to July 7, 1984.

## Art good enough to eat

Susan Rott's portraits are meant for eating, not hanging on the wall, because her edible art is made of solid chocolate.

Prince Charles, Diana Princess of Wales and Prime Minister Pierre Trudeau are three subjects Susan Rott has "painted" in chocolate in the four months since she dreamed up the idea.

She uses her own moulds to give slight contours to the portraits and chocolate "paints" made of tinted white chocolate.

"It's a real challenge to mix the colouring powder and chocolate to reproduce skin tones and hair colours," said Susan Rott, who takes commissions and prefers to work from a photograph.

But it takes a lot of chocolate money to commission edible art. A small portrait, 22 by 22 centimetres of two-tone, multi-hued chocolate costs \$75.

## There goes the neighbourhood



Headed for Saltspring Island in the Gulf of Georgia between Vancouver Island and the British Columbia mainland, these houses were sold recently by Public Works of Canada for \$100 to an undisclosed bidder. The houses were built in 1927 for the superintendent of the Esquimalt graving dock and his assistant.

### News briefs

Jean Marchand has been appointed to the post of president of the Canadian Transport Commission. Prior to his appointment, Mr. Marchand was Speaker of the Senate.

CN Railways sees a \$16-billion expansion for Canada's railways in the next decade, and has announced its \$35-million start, for railway ties. Twice as many hardwood ties will be bought in eastern Canada — 1.3 million — and a third more softwood ties from the west — 2.1 million — all of which will need \$14 million of chemical treatment.

Domtar will spend \$912 million on re-building and modernizing. The fine paper mill near Sherbrooke, Quebec will get a \$773-million rebuild over the next six years, and a \$139-million modernization is scheduled for the other fine paper mill at Cornwall, Ontario. The decision followed years of study, and was conditional on the availability of government grants, wood supply and environmental agreements. Domtar is Canada's largest fine paper producer, with major exports. 1982 sales were \$466 million.

New beers are good for Carling O'Keefe and profits have risen 74 per cent in the past 18 months. The rise began last year with the introduction of three new Carlsberg beers and accelerated after May 1983

when Miller beer took 10 per cent of the market in its trial period, despite a low beer market. Corporate profits were up 74 per cent to \$38 million on sales of \$784 million in the latest fiscal year. A \$150-million building program has begun and new operations will come on-stream in Calgary, Alberta and Vancouver, British Columbia by mid-1984.

Export Development Corporation (EDC) has signed a \$110.5-million (US) loan agreement to support a sale to Turkey by Northern Telecom Limited of Mississauga, Ontario. The sale involves the supply of telephone switching equipment, telephone sets and related engineering and technical services to the General Directorate of The Post, Telegraph and Telephone Administration of the Republic of Turkey. The contract will provide smaller centres in Turkey with rapid communications with major cities, including Ankara, Istanbul and Izmir, and with telephone users in other countries.

ROLM Canada Inc. of Toronto has announced the IBM Telephone Message Management System, which enables businesses to provide callers with information about an employee who is out of the office. The system is among the first products to result from an agreement last June of International Business Machines Corp. of Armonk, New York and ROLM Corp. of Santa Clara, California to en-

hance their respective product lines. The system attendant can also enter messages, which users can retrieve throughout the work site.

The Quebec government has awarded a \$30-million five-year contract to a Quebec-France consortium for 45 000 educational microcomputers, Premier René Lévesque announced recently. The deal with the consortium formed by Montreal-based Bytech-Comterm Inc. and Matra-Informatique of Paris will give Quebecers an opportunity to develop computer software and penetrate the international market. The contract specifies that 51 per cent of the first 10 000 microcomputers to be delivered within 18 months will be manufactured in Quebec under a licencing agreement. The microcomputers, costing \$3 000 each, will be used by computer science students at secondary schools and colleges.

The Canadian Commercial Corporation (CCC) has awarded a contract valued at \$67 125 (Cdn.) to Bell Camp Manufacturing Ltd., Ingersoll, Ontario for liquid manure spreaders to be supplied to Agrotek, a Hungarian-owned trading company. Bell Camp Manufacturing Limited, a Canadian-owned company, has sold 50 such spreaders this year, both to the domestic market and abroad. This is the first time Bell Camp has contracted to sell to Hungary and the first time it has been awarded a contract by CCC.

December 1983, equalled December 1933, as the coldest of the twentieth century, the Winnipeg weather office says. The mean temperature for the month was minus 20.3 degrees Celsius, more than six degrees below normal. The coldest day of the month, and the coldest for all of 1983, was December 19, when the temperature fell to minus 33 degrees Celsius.

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