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Sixty years of science: Canada's National Research Council

In early December 1916, 11 men representing the scientific, technical and industrial interests of Canada met in Ottawa for the first time. On June 6 of that year, a sub-committee of the Privy Council had formed the Honorary Committee for Scientific and Industrial Research, the earliest ancestor in the genealogy of the National Research Council of Canada.

Today, 60 years later, NRC continues as a major force in Canada's scientific development. The modern-day Council 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.

Ten main areas

Laboratory activities are now concentrated into 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 Canada's first Nobel Prize winner in the natural sciences. Other scientific and technical facilities, which are unique or too specialized for individual Canadian industries or scientific organizations to support on their own, are maintained all across Canada.

In its research programs, NRC acts in response to Canada's changing needs and scientific priorities. Currently, applied research is focused on certain areas related to long-term problems of national concern — energy, food, building and construction, and transportation. The Council also provides research support towards social objectives — public safety and security, protection of property, health and environmental quality. A significant part of present-day laboratory work centres on basic or exploratory research aimed at the creation and application of new knowledge. The results of such fundamental studies ultimately fulfil some practical need in society.

NRC's extensive research facilities

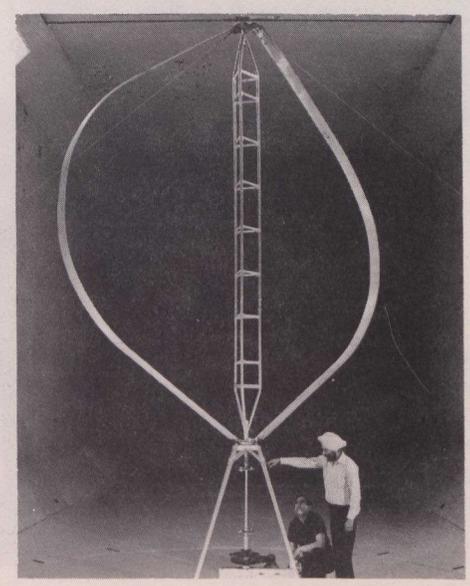
complement its role as custodian of Canada's primary physical standards which include measurements of such quantities as length, mass, heat, electricity and time. Because of this involvement, the Council acts for Canada in international agreements concerning weights and measures.

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

Although space does not permit coverage of the many research projects engaged in by the National Research Council, following are some of the highlights as published in the President's Report for 1975-1976:

Wind turbine

With the successful development of its vertical-axis wind turbine, NRC's National Aeronautical Establishment is now carrying out a detailed examination of all aspects of wind power (especially in conjunction with conventional diesel-electric supply systems).



NRC's wind turbine.

EXTERNAL AFFAIRS
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Immediate plans include a large (200 kw) wind machine to be erected on Quebec's Magdalen Islands in the Gulf of St. Lawrence, where the power generated will augment electricity produced by conventional diesel-electric generators.

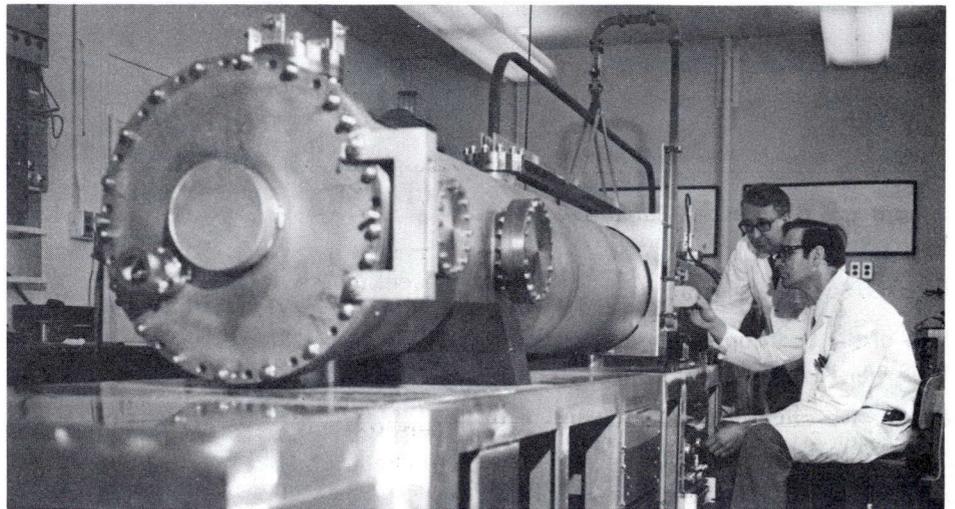
Atomic clock

Transition of Cs V (Canada's newest time and frequency standard) to continuous operation has been carried out successfully and scientists have obtained a good measure of its performance. The four-metre-long instrument is believed to be the world's most accurate and stable clock, off by no more than three seconds in one million years. Scientists in the Time and Frequency Section of NRC's Division of Physics have also made advances in the dissemination of precise time by telephone for digital clock systems. One system will enable a user anywhere in Canada to link a commercial secondary clock with the NRC laboratory by telephone line. The distant clock's time will then be corrected automatically to within one millisecond *via* an electronic time code.

Solar energy for heating

A major NRC responsibility within the framework of the interdepartmental panel on energy research and development is the co-ordination of all programs on renewable energy resources, one of the most promising of which is solar energy.

The Division of Building Research, as part of its investigation into the use of solar energy for heating buildings, has developed apparatus to measure the performance of the solar-



Atomic clock at the National Research Council in Ottawa.

collector panels installed on a demonstration house situated in Mississauga, Ontario. It has been calculated that enough energy can be collected from sunlight in Canada to make a significant contribution to the heating of homes and commercial buildings.

Ultrasonics in eye surgery

An alternative method has been developed to determine accurately the axial length of the eye in cases when diseased lenses have become opaque and optical techniques cannot be used.

Implantation of lenses in defective human eyes is now an established technique for the restoration of sight and, in order to ensure proper vision, it is important that an artificial lens of the correct power be used; it is for this reason that the axial length of the eye must be accurately determined before the operation. The new technique, which works like an echo chamber, uses ultrasonic vibrations which

bounce from the back of the eye to give accurate information of the distance between front and back.

Computer speech

A system being developed at the Division of Electrical Engineering will serve as a valuable aid to people with visual or speech handicaps. This addition to the Division's complement of man-machine interactive systems converts typewritten or stored sentence structures into artificial speech.

Under computer control, a synthesizer combines phonemes of English into recognizable speech, the handicapped person merely feeding the sentences into the machine *via* a typewriter keyboard. In addition to storage and execution of commands for speech, the computer must deal with the task of interpreting the erratic rules of the English pronunciation system. An example of the effectiveness with which the instrument carries out its task is demonstrated by its ability to pronounce correctly such sentences as: "The boy sitting on the bough ought not to cough."

Re-refined oil

The Fuels and Lubricants Laboratory is investigating methods of re-refining used lubricating oils, procedures which will become of progressively greater significance as the world's petroleum resources decrease.

Used motor oil is acid-treated to remove additives and contaminants and the resulting "re-refined" base oil receives additive treatment (in the same way as virgin base oil) appropriate to its intended application.



Demonstration house heated by solar energy at Mississauga, Ontario.

Canada/Soviet economic pact

A new long-term economic agreement between Canada and the U.S.S.R. and an extension of the existing bilateral trade agreement was signed in Ottawa July 14 by Industry, Trade and Commerce Minister Don Jamieson and Soviet Foreign Trade Minister N.S. Patolichev. Mr. Jamieson announced also on July 14 that he would visit the Soviet Union later this year.

The new economic agreement, which will remain in force for ten years, will provide a framework for co-operation, Mr. Jamieson said. The establishment of a mixed commission will incorporate both the Canada/U.S.S.R. Agreement on the Industrial Application of Science and Technology, established five years ago, and the Consultative Trade Committee established under the bilateral trade agreement.

Mr. Jamieson said the many meetings held by the sub-committees set up under the science and technology agreement had resulted in a greater understanding of the industrial capabilities of both countries.

"I am looking for more tangible trade development as the result of this new economic agreement," he stated.

"This agreement is similar to agreements the U.S.S.R. has signed with other trading partners and we have seen the improvement in exports from those countries to the Soviet Union.

"I expect to see a similar improvement in Canada's export performance and this will depend on the full co-operation of the private sector," he added. "The agreement provides a framework for negotiation with the Soviet state trading agencies and I urge Canadian exporters to make available the goods and services which can compete with the rest of the world on the basis of quality, reliability, price and delivery."

The Minister said he would make a more complete report to the business community after his visit to the U.S.S.R. in the autumn. "At that time we will have a better understanding of the challenges and opportunities that face Canadians in this market," he said.

The existing bilateral trade agreement was extended for five years and Mr. Jamieson said he hoped this, together with the new economic agreement, would further stimulate the already

well developed trade and economic links between Canada and the U.S.S.R.

Canada's exports to the U.S.S.R. totalled \$408.9 million during 1975, of which more than \$350 million was in grains. Soviet exports to Canada in the same year totalled \$28.5 million.

Law of the Sea Conference summer session

The Secretary of State for External Affairs, Allan J. MacEachen, together with Ronald Basford, Minister of Justice and Attorney General of Canada, and Roméo LeBlanc, Minister of State (Fisheries) and Acting Minister of Environment, head the Canadian delegation to the fifth session of the United Nations Law of the Sea Conference being held in New York from August 2 to September 17. J. Alan Beesley, special adviser to the Secretary of State for External Affairs on law of the sea, is deputy head of the delegation.

The Canadian delegation is composed of Members of Parliament, advisers from the provincial governments, representatives of the fisheries and mining industries and fishermen's unions, and officials of the interested federal departments.

Canadian delegates hope that the summer session of the Law of the Sea Conference, which is being reconvened after only a brief recess, will maintain the momentum developed at the spring session. The revised single negotiating text, which emerged from the spring session, represents a considerable improvement on many important issues over the text which had emerged from the previous session.

Revised text

The revised text reconfirmed the 200-mile economic zone as a central element of the proposed convention. The part of the revised text dealing with the international seabed area now contains many of the basic elements necessary for a workable accommodation of interests between developing and technologically-advanced countries.

The summer session will concentrate on trying to resolve the major outstanding issues in the proposed convention. One of these is the question of whether land-locked and "geographically disadvantaged" states will have certain

special rights to the fisheries resources in the economic zones of neighbouring states or states in the same region. The summer session is also considering the details of the system for the settlement of disputes that will arise after the proposed convention comes into force. There will also be a general debate on the contents of the preamble and final clauses of the proposed convention.

Canada Keystone in Washington Cathedral

One of the highlights of the United States Bicentennial celebrations was the dedication of the Washington Cathedral on July 8, when President Gerald Ford, Queen Elizabeth, Prince Philip and some 4,500 people filled the majestic church in the capital of the United States.



The Canada Keystone, a Bicentennial gift from some 200 Canadian individuals, in the ceiling of the Churchill memorial porch of the Washington Cathedral.

High above them in the vaulted ceiling, supported by 72 carved stones, was the Canada Keystone – a Bicentennial gift from over 200 Canadians as an expression of Christian fellowship and international good will. This unusual donation was given by individuals from all walks of life and various denominations, including architects, businessmen, clergymen, engineers,



Queen Elizabeth and President Ford flank Dean Francis B. Sayre as they leave Washington Cathedral on July 8. Prince Philip is behind the Queen.

housewives, industrialists, labourers, lawyers, physicians, senior citizens, students, teachers and tradesmen.

The huge Keystone bears the Royal Arms of Britain and the Arms of the United States.

Fifteen members of the Canadian Embassy staff in Washington were in attendance at the ceremony on July 8, as well as the Chairman of the National Cathedral Association in Canada, Rev. Earl W. Haase.

Housing for earthquake-stricken region

The Canadian Government will work with the National Congress of Italian Canadians to provide housing for the earthquake-stricken Friuli region in northeastern Italy, announced Allan MacEachen, Secretary of State for External Affairs and John Munro, Minister responsible for Multiculturalism, recently.

Mr. MacEachen said the Federal Government would join with the Canadian Italian community which has been conducting its own fund-raising campaign in a project to provide houses to the devastated region. The Government contribution, announced May 13, is \$1 million.

Technical details of the project are

to be worked out jointly between the National Congress of Italian Canadians and the Federal Government.

More than 900 people were killed and 80,000 were left homeless by the earthquake that struck the area, May 6.

Within hours of the disaster, some 300 members of the Canadian Armed Forces were dispatched from West Germany to provide medical and engineering assistance.

Early in June at the request of Prime Minister P.E. Trudeau, Mr. Munro toured the region.

Ma Bell on N.Y. big board

Bell Canada, claimed to be Canada's largest investor-owned corporation in terms of assets, has received approval from the New York Stock Exchange (NYSE) for listing on the big board effective August 18.

Bell Canada is now listed on the Montreal, Toronto and Vancouver stock exchanges in Canada, as well as on the London, Brussels, Paris, Frankfurt am Main, Dusseldorf, Zurich, Basle, Geneva and Amsterdam stock exchanges. Bell Canada will become the first company to be listed on the NYSE under its recently-adopted standards that focus on international rather than the U.S. distribution of a foreign corporation's shares.

A.J. de Grandpré, Bell Canada's chairman, said the NYSE listing would provide Bell Canada with a further presence in the major international capital markets and provide United States shareholders with a more readily available marketplace.

With assets of over \$6.5 billion at the end of 1975, Bell Canada and its affiliated companies represent Canada's largest industrial entity and are the largest suppliers of telecommunication services and equipment in Canada. Its major subsidiary, Northern Telecom Limited, the second largest telecommunication-equipment manufacturer in North America, has five manufacturing plants in the United States. Bell-Northern Research, jointly owned by Bell Canada and Northern Telecom, is Canada's largest privately-owned research and development organization.

Bell Canada's consolidated income before extraordinary items for 1975 was \$266.8 million or \$6.20 a common share, compared to \$224.4 million or \$5.57 a common share for the previous

year. For the six months ended June 30, 1976, consolidated income before extraordinary items was \$148.0 million or \$3.36 a common share, compared to \$116.9 million or \$2.78 a common share for the same period in 1974.

New highways for Newfoundland

Marcel Lessard, federal Minister of Regional Economic Expansion (DREE), and John C. Crosbie, Newfoundland's Minister for Intergovernmental Affairs, have announced the signing of the two-year agreement on highways construction in Newfoundland. The total value of the agreement is \$38 million, the DREE share amounting to slightly more than \$34 million.

A contract valued at \$743,840 has been awarded to McNamara Corporation of Newfoundland Limited for paving 18 miles of road along the Bay D'Espoir Highway, and Lundrigans Limited received a contract valued at \$522,400 for paving 13 miles of road between La Scie and Baie Verte. With the completion of these two projects, the upgrading and paving of the Baie D'Espoir Highway and the Baie Verte Peninsula Highway initiated under earlier DREE/Newfoundland agreements will have been completed.

McNamara Corporation of Newfoundland Limited has also been awarded a contract valued at \$1,067,172 for upgrading 7.3 miles of road from Lockyers Bay toward Wesleyville. A contract for upgrading an additional 8.7 miles of road along the same route has been awarded to Len Singleton Limited at a value of \$898,331. Nova Construction Limited has been awarded a contract valued at \$626,658 for upgrading 9.5 miles of road from Gander Bay toward Wesleyville. Also along the same route, Western Construction Limited has been awarded a contract valued at \$877,670 for upgrading 8.4 miles of road.

Len Singleton Limited has been awarded a contract valued at \$1,443,126 for the construction of 10 miles of new highway from Southwest Brook on the Trans-Canada Highway toward the community of Burgeo.

A number of additional contracts will be awarded under the agreement in the near future, including several major construction projects to be carried out in the current year on the Great Northern Peninsula Highway.

Seat-belt law favoured

According to a survey conducted by Transport Canada, 70 per cent of Canadians favour mandatory seat-belt legislation.

The survey, conducted in November 1975, involved 4,104 persons, about 400 in each province, who were interviewed by telephone and asked their opinion on legislation making the wearing of automobile seat belts compulsory.

Newfoundlanders were most in favour with 91 per cent of those surveyed indicating approval. Nova Scotia was the only province where those against outnumbered those in favour by 47 per cent to 45 per cent, with 8 per cent undecided. The most frequent reason for objection given by those opposed to legislation was the loss of freedom of choice.

Native Heritage exhibition

Inuit and Indian artisans from across Canada highlight the Native Heritage exhibition at the Ontario Science Centre in Toronto.

At the opening ceremonies on June 14, the throat singers from Povungnituk were a major attraction. They were Mary Siruarapik, Lucie Amaivalik and Nellie Nunqak, three of the 21 adults and five children from Povungnituk, who were in Toronto for the first two weeks of the show, which closes in September.

More than 200 Inuit and Indian people are giving demonstrations of their various skills. Every few weeks the performances and demonstrations change to show as many aspects of native life as possible.

In the first week, the show drew almost 50,000 visitors and a projected attendance of one million until the show closes could make the Native Heritage the most popular attraction since the Centre opened.

Inuit people taking part are from Aklavik, Baker Lake, Cape Dorset, Eskimo Point, Holman Island, Igloolik, Pangnirtung, Rankin Inlet, Repulse Bay in the Northwest Territories and from Inoucdjouak and Povungnituk in Northern Quebec.

Since regular food of the Inuit is not available in Toronto, refrigerated

trucks brought down 400 pounds of Arctic char, 400 pounds of caribou meat and two common jar seals.

Technology in Inuit fine art is the theme of a collection especially mounted by the Eskimo Art Section, Indian and Northern Affairs, which includes 38 prints and drawings that show for example, the loading of fur bales, a seal hunter, kayak makers and the cutting up of a whale. Some 34 soapstone carvings include illustrations of seal-skinning, pulling a seal from the hole, stretching a seal skin and a man putting boots on his dogs.

Prehistoric and historical artifacts, many from the government of the Northwest Territories, the Royal Ontario Museum, the National Museum of Man and the Museum of the Woodland Indian are also on display close to the demonstration areas.

Public participation

Visitors, who see natives at work, are invited to try their hand at scraping skins, tanning hides, making prints, masks, basket weaving and engage in a host of other activities.

Visitors to the outdoor demonstration area watch the Inuit skin a seal and they see how thongs are made for dog harnesses, harpoons and lashings for kayaks and sleds. The seal carcass is also used for meals prepared on site.



The Inuit throat-singing demonstration drew large crowds during the first week of the Native Heritage exhibition. Participants wore traditional clothes, apparently without any ill effect in the 25-degree-plus weather.

In the same area, renowned Inuit carver Kumakuluk Saggiak from Cape Dorset is working on soapstone sculptures for the entire 12 weeks.

Some of the most unusual plants, mosses and lichens in Canada, with samples of naturally dyed materials are from Spence Bay, courtesy of the Government of the Northwest Territories.

The display of Woodland Indian paintings and sculpture was chosen by the Education Branch of the Department of Indian and Northern Affairs, which put up most of the funds for the exhibition. The rest came from private contributions.

Deer and moose hides are from animals killed in traffic accidents in Northern Ontario (about 800 of them last year) and supplied by the Ontario Ministry of Natural Resources for the Indian people.

The workplace is changing

One of the themes of today's society is the urge felt by many people to arrange their lives to suit their own personalities.

This, of course, extends to that portion of their lives which they spend at work.

Many people are no longer willing to completely schedule their lives around their jobs. They are looking for ways to adjust their work to suit their lives as well.

As a result, the workplace is gradually changing to become more flexible and perhaps more human.

Part-time work is viewed by many as an ideal way for women to meet the demands of home life while continuing to advance their careers. Part-time work can also be advantageous to an organization. More part-time positions could reduce today's rate of job discontinuity — the breaks that many employees, particularly women, find necessary to make in their careers. And, an organization would be able to draw on the skills and expertise of a larger section of the work force.

This was verified in a recent study on the interest in part-time employment among non-teaching employees of the Toronto Board of Education. Psychologist Carol Reich found that 32 per cent of married women who left the board in the past three years would

have stayed if part-time work had been available. Seventy per cent expressed an interest in working part time at some point in their lives.

However, although it is of special interest to women with families, part-time work could also be an answer to the needs of individuals coping with health problems; to anyone trying to combine study and work; and to people nearing retirement, with its spectre of total and abrupt life change.

Breaking the 9 to 5 rut

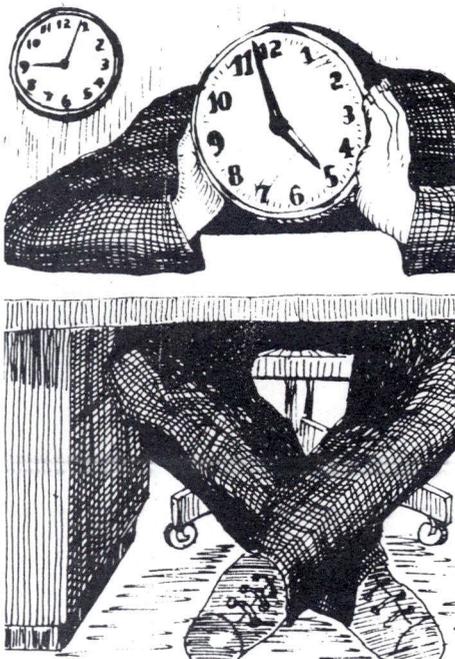
In the two years since their introduction in the Public Service, flexible hours have been both praised and criticized. However, according to a Treasury Board survey, the majority of people think the new hours have had positive effects on both their jobs and their personal lives.

Twelve per cent of a random sample of 3,975 employees also thought service to the public had improved, while 63 per cent found it was the same as before flexible hours began. Only 5 per cent believed service had deteriorated or that problems in service had been created by the new hours. (Percentages given do not total 100 per cent because some respondents didn't answer specific questions or said they didn't know.)

Fifteen per cent of the managers who answered the questionnaire thought service to the public had improved, and 68 per cent found it the same. Six per cent thought it had deteriorated or problems had been created.

In addition, four out of five managers surveyed were satisfied with the program; almost half said their employees' work attitudes had improved; and one-third said individual employees were more productive.

Today 39 departments in the national capital area and approximately 5,000 employees in the regions are operating



on either fully flexible hours or fixed flexible hours.

Employees working fully flexible hours select, within the time limits set by their departments, their own hours of work, and can vary these hours as long as they work seven-and-a-half hours each day.

Employees working fixed flexible hours select the times they will start and finish work, within the time set by their departments and subject to managerial approval. Once these times are set, employees need advance approval from their supervisors in order to change them.

In addition, a small number of employees are working staggered hours. Under this system, employees within a department begin and finish work at different times but these times are prescribed by management.

News briefs

- Canada won 25 gold medals, 30 silver and 31 bronze at the 1976 Olympics for the Disabled — the best showing ever. At the 1972 Games, for wheelchair athletes only, the Canadian team won six gold medals, six silver and seven bronze. Most medals at this year's Games, held at Toronto from August 3 to 11, were won by the United States — 62 gold, 38 silver and 45 bronze. Britain was second with 119 medals, of which 34 were gold; West Germany was third with 87, including 35 gold. Canada, with 86 medals, tied for fourth place with the Netherlands.
- Canadian-born Lord Thomson of Fleet, who built a newspaper empire in three countries, died in London, August 4, at the age of 82. His son will take control of the huge family holdings, which include ownership of some of Britain's main newspapers, as well as newspapers in Canada and the United States, and North Sea oil interests.
- The Prime Minister announced August 5 that a Cabinet shuffle would take place either in September or December, just before Parliament resumes in the autumn or during the Christmas break.
- British Prime Minister James Callaghan has accepted Prime Minister Trudeau's invitation to visit Canada

September 10 to 18. A broad range of bilateral and international questions will be discussed.

- The Cabinet has issued an order restraining Pacific Western Airlines (PWA), owned by the government of Alberta, from moving its head office to Calgary from Vancouver, B.C. Transport Minister Otto Lang said the order, sought by the B.C. government, would remain in effect until the Supreme Court had ruled on a bid by the Alberta government to bypass the Canadian Transport Commission in its purchase of PWA two years ago.

- Communications Minister Jeanne Sauvé said August 5 that the Federal Government would oppose the Saskatchewan government's plan to introduce the first provincial system of pay television because it could have serious consequences on the future of the TV industry in Canada.

- One hundred years ago this month Alexander Graham Bell successfully completed the world's first long-distance telephone call. The call, made on August 10, 1876 from Brantford to Paris, Ontario, was over an eight-mile telegraph line, with the battery in Toronto, 58 miles away.

- The Quebec cabinet has approved several programs that will invest some \$1 million into commercial fishing on the northern and eastern coasts of the province in an effort to improve catches and stabilize employment in the industry.

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