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CANADA

THE IDUKKI HYDEL
PROJECT

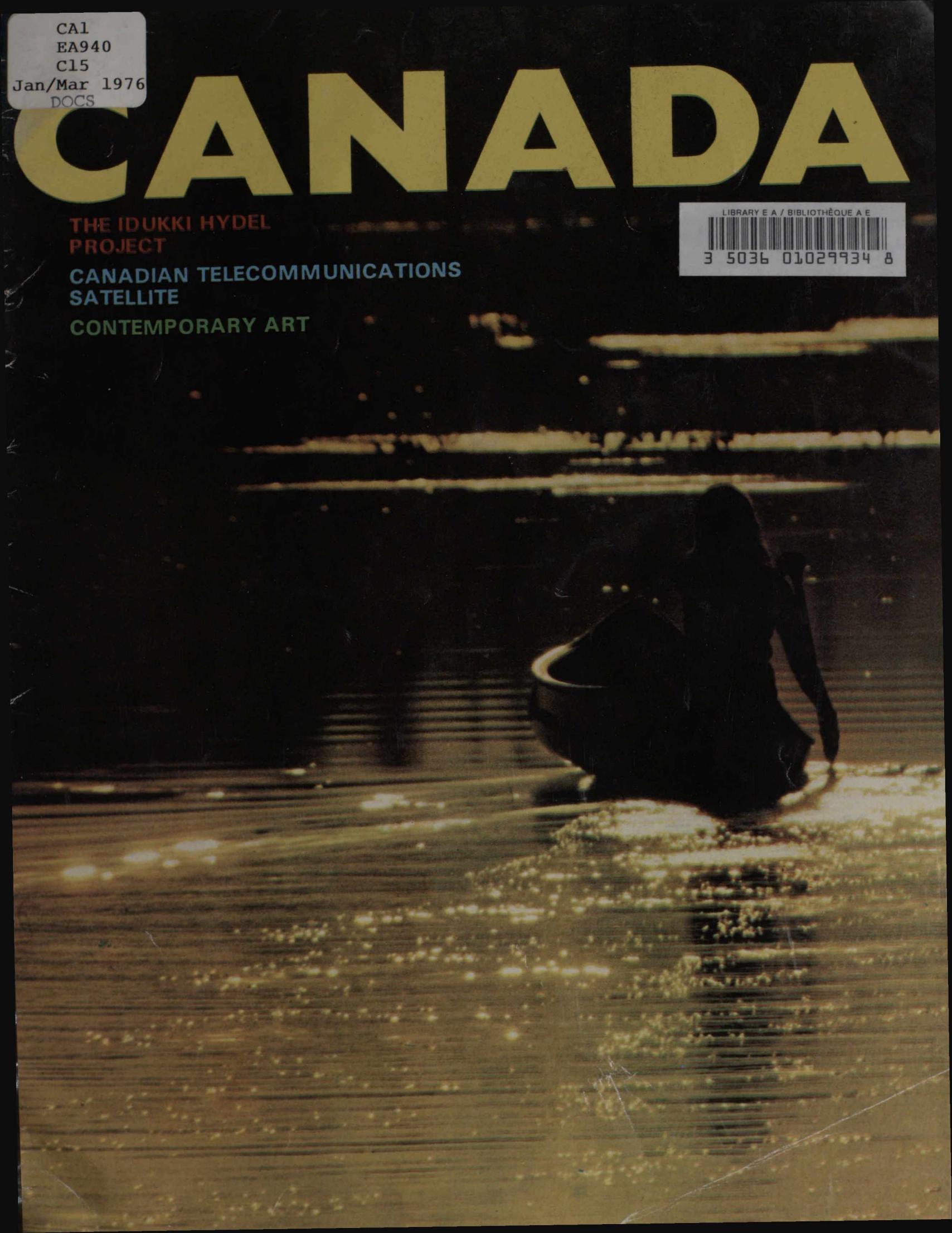
CANADIAN TELECOMMUNICATIONS
SATELLITE

CONTEMPORARY ART

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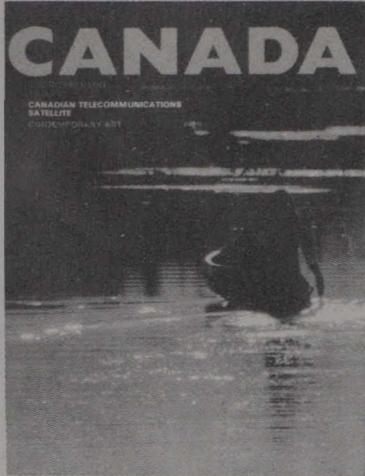


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CANADA

VOLUME 2 NUMBER 1



COVER : Our cover photo is taken from an exhibition of photographs depicting Canada that was held in New Delhi. The photographs were in colour and gave viewers a chance to see the natural beauties of Canada (More photographs on pages 10 and 11). On our back cover we have an artist's conception of the Canadian telecommunications satellite (story on page 5)

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EXPANDING WORLD

FOOD PRODUCTION

The Minister of Agriculture, Eugene F. Whelan, addressed the Eighteenth Session of the Food And Agriculture Conference in Rome on November 11. He spoke of the priorities and incentives needed if progress is to be made in expanding world agricultural production. Excerpts from Mr. Whelan's address:

The current food situation is somewhat better than it was a year ago, but far from satisfactory. Much of this short-run gain is due to improved weather conditions in North America and in some of the developing countries. It is offset to some degree by very low grain production in other areas. But we have no reason to be overly optimistic.

Over the next five years, the need for substantive increased food production in the developed countries will be of much greater importance for world food supplies than was thought at the beginning of the 1970s. To solve the food problem, developing countries and the FAO must give high priority to agricultural and fisheries development and adopt policies which give adequate incentive to agricultural producers if real progress is to be made.

How do we cope with problems of expanding agricultural production? It is very disturbing to find that 30 years after the Second World War we are still faced with a major food problem. Despite the gains in technology, despite the technical efforts of the United Nations specialized agencies, we have more instead of fewer hungry people.

A top priority in the interests of all countries is to ensure the vigour of the world economy. This requires, from our standpoint, an efficient agriculture producing enough food for all, which can't be done without providing a reasonable livelihood to the farmers of the world. We know that without farmers, without the tools of production, and without necessary incentives, food production will fall short of our growing needs.

Canada has responded to the interests of developing countries in several areas, including commodity stabilization, trade liberalization, investment and natural resources, technology for development, and agriculture and rural development. In fact, not only have we expanded our total aid program, we have restructured it towards agricultural and rural development.

Through our stockholding practices and our food and development aid programs, we have contributed substantially to world food security. At the same time, we are participating in discussions and strongly support meaningful negotiations which would enhance food security by means of international commitments affecting production, trade and aid in grains.

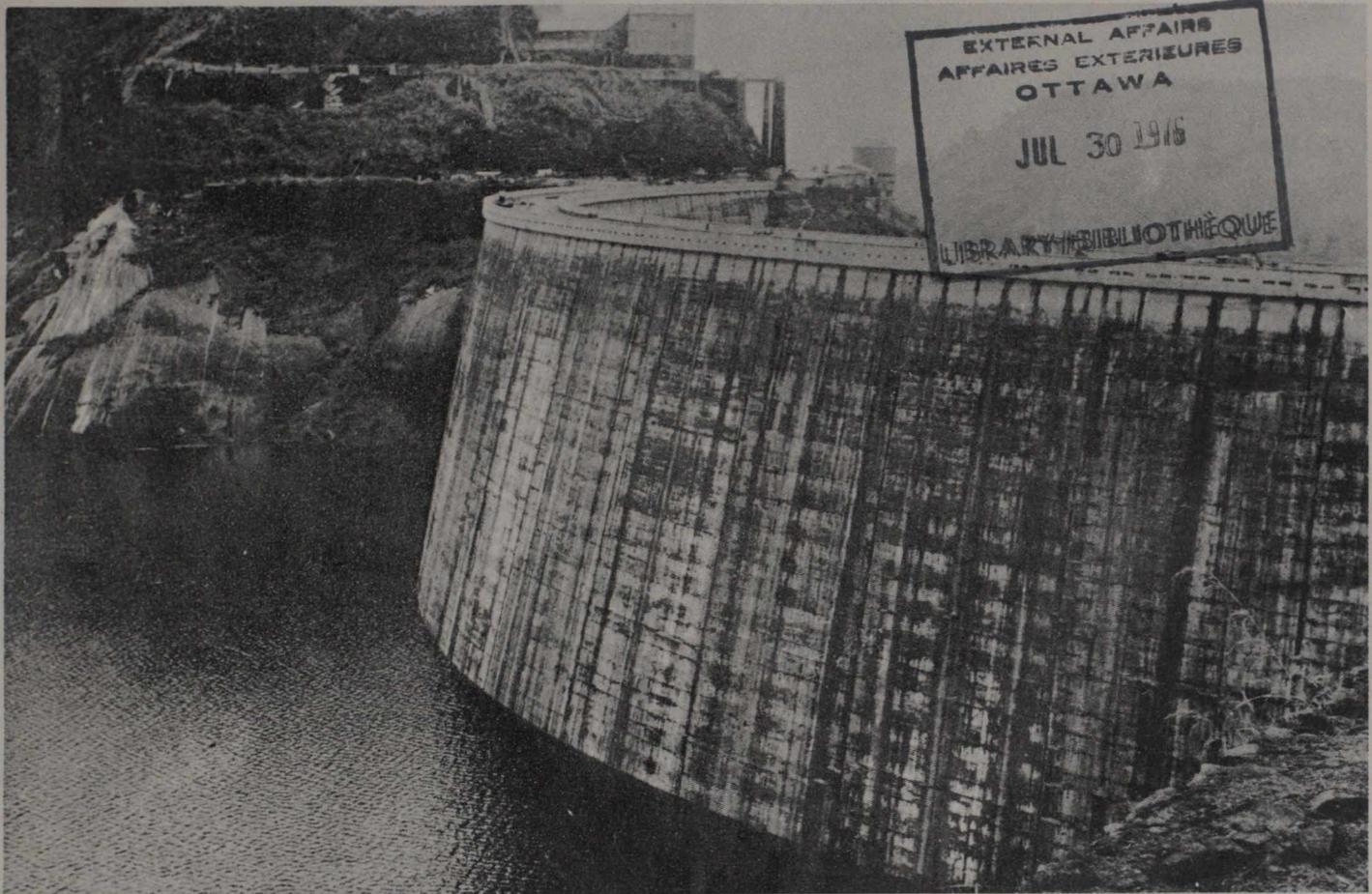
Canada has stated at the Seventh Special Session of the United Nations General Assembly that we are ready to examine positively the idea of negotiating arrangements for a wide range of products. We are prepared to consider the use of buffer stocks or other types of stockholding as a way of providing market stability. But, I add one word of caution. We are not prepared to support any commodity agreements that include economic discrimination against consumers or producers.

We understand the desire of developing countries to expand local food processing industries, and we will work in the direction of eliminating restrictions that may hinder this development.

In respect to agriculture and rural development, Canada has made an important contribution internationally. We have placed increased emphasis on an integrated approach to agriculture and rural development as a means of helping developing countries solve the fundamental problems of farming and fisheries production, rural depopulation and regional disparities. We also recognize the importance of concentrating development programs on small farmers and fishermen.

Canada has adhered to the Undertaking On World Food Security; we are participating in the Global Information System; and are exploring with other countries the possibility of establishing an International Grain Stockholding Scheme.

Canada is committed to providing one million tons of food grains as food aid annually for three years. This was a doubling of the Canadian obligations undertaken in the Food Aid Convention. Food aid is now approaching a value more than a quarter of total development expenditure per year.



The Idukki Hydrel Project

IT was an occasion of great significance. And of great rejoicing. "At a time when the need for electric power in India has come into sharp focus we have come today to witness the commissioning of one of the largest and finest power development projects ever built in India." With these words the Canadian High Commissioner to India Mr. J.R. Maybee welcomed the opening by Mrs. Gandhi of the Idukki Hydro-Electric Project in Kerala on February 12.

"I see a development which is certainly beautiful and impressive to look at, and which I am told is functional and efficient as well. This combination is not an easy one to achieve, and we are happy that it has been achieved here at Idukki."

Addressing the Prime Minister, Mr. Maybee said: "Several months ago you launched an economic program designed to focus the national effort on economic and social development. This project will certainly contribute to many of the most important aspects of that program. It will provide irrigation to a large area of agricultural land. It will provide power to the countryside and to industry. It

will contribute to the creation of jobs, and to greater productivity in the States of Kerala and neighbouring States. We are proud that Canadians have been able to join hands with you in such a tangible way in this important work."

Situated on the western side of the Nilgiris, the Idukki Project is already changing the face of the Periyar Valley. With an installed capacity for 780 MW (for 'peaking'), Idukki is the biggest hydro-electric scheme in South India and will increase the installed power capacity of the State by 15%. The 560 feet-high-arch dam is the first in India and the highest in Asia, over three times the height of the Niagara Falls. The reservoir, formed by damming the Periyar and Choruthoni rivers, the largest in Kerala, is 20 miles long and holding 70,450 million cubic feet of water at full level. Besides cheap power, the project will irrigate 1,50,000 acres via canals downstream.

Canadian cooperation with the Kerala State Electricity Board (KSEB) was first proposed in 1963; a memorandum of understanding specifying that Canadian grant and loan assistance would not ex-

ceed \$25.5 million and that rupee counterpart funds up to the equivalent of \$20 million would be allotted was signed on September 8, 1967; a loan agreement for purchase of Canadian equipment up to \$19.5 million was also signed. In addition, Canada has provided engineering consultant services to the project since the design stage.

The Canadian consultant firm of Surveyer, Nenniger and Chenover of Montreal was responsible for the Idukki thin arch dam; the underground power house — to eventually contain 6 × 130 MW generators; penstocks, surge shaft; and other smaller items. KSEB was responsible for the balance of the project but advice of the Canadian consultants was available on request. For the most of the duration of the project, six Canadian engineers and their families lived on the site.

There are three dams connected with this project, the Idukki (high-arch) and the Gheruthoni (concrete gravity) at one end of the reservoir and the Kulamavu (masonry) at the other (intake) and, from the intake the water is carried underground through the power tunnel with



its associated surge shaft and chamber to the penstocks where it drips almost straight down for a distance of 2,500 feet into the power house (also underground). After passing through the turbines the water passes through the tailrace tunnel to the tailrace channel and thence is discharged into a nearby river. The concept and design of the engineering structures are bold and novel. The Cheruthoni Dam is the largest and highest concrete gravity dam in Kerala. It is 454 ft. high and finds a place among the first hundred high dams in the world. The spillway for the Idukki reservoir formed by the three dams is located in the Cheruthoni Dam and will be controlled by 5 large radial crest gates (40' × 34').

The Kulamavu dam was designed as the highest rubble masonry gravity dam in Kerala. It is 328 feet high. The power tunnel intake is of the glory hole type and is the first of its kind in Kerala and second in India. The intake leads the water, regulated in the reservoir to a horse shoe-shaped tunnel of 23' diameter which ends in an underground surge shaft based on a novel concept and design. The surge shaft is a restricted orifice type which is entirely underground with bottom and top expansion chambers and an inclined shaft rising to 255 feet above the tunnel invert.

The underground power house cavern is the largest in India; it measures 453' (long) × 65' (wide) × 113.5' (high). Access to the power house is through a road tunnel 2,000 feet long. Three giant generators, each of 130 MW capacity—manufactured by M/s Canadian General Electric Ltd., Canada — run by 1,80,000 H.P. pelton wheels, ranking among the largest three of its type in the world, are being installed in the power house during the first stage of the project. The turbines are supplied by M/s Neyrpic, Canada.

The 220 KV switch yard overground is connected to the power house by two cable tunnels which accommodate the large oil filled power cables.

The energy generated at Idukki is transmitted over a double-circuit, 220 KV line to the Kalamassery Load Despatch Station. A single-circuit, 220 KV

line connects Idukki to Pallom and another single circuit, 220 KV line connects Idukki to Mysore. The Idukki-Mysore transmission line when completed will be the largest longest high-voltage transmission line in Kerala.

The tailrace system comprises a 4,000 feet-long tunnel, a tailrace channel passing below the mountain stream "Nachar"—taken care of by a concrete super passage—and a by pass channel leading to Valiar, a tributary of the Thodupuzha River, and will be utilised for irrigation and industrial purposes in the Muvattupuzha Valley. The entire water conductor system commencing from power tunnel intake up to the end of tailrace is designed for 5,400 cusecs discharge equivalent to the maximum capacity of six generating sets.

Idukki First Stage would generate over 2,300 million units of energy annually. This bulk additional power to the southern grid will be a blessing to the people of Kerala, Tamil Nadu and Karnataka. The annual power generation will be worth over Rs. 20 crores. The project with a large energy storage and a large intake capacity, is designed to serve as a peaking station. On the completion of first stage, the minimum rail race discharge would be of the order of 1,000 cusecs and this regular flow in the Muvattupuzha river will be utilised for development of industries requiring large amounts of water.

The Canadian aid to Idukki is one of the "softest" obtained by India.

The project, as Mr. Maybee pointed out, is not an isolated incident of Indo-Canadian cooperation in the field of power development. "Many years ago we participated in the construction of the Mayurakshi Project in West Bengal and Bihar which was built during the First Five-Year Plan. We took part at Umtru in Assam, at the Chambal Valley development in Rajasthan and Madhya Pradesh, and we are still involved with the Kundal Hydro-Electric Project in Tamil Nadu. Our countries are both in the process of developing hydro-electric resources as key elements in our economies, so this cooperation is a natural and important part of the relations between our two countries."

Canadian involvement in Kerala has

been long and durable. Perhaps this is because both the words rhyme well. Perhaps it is because the first ever major Canadian industrial venture in India was in this State. I refer to the Indian Aluminium Company's smelter at Alway which made India's first aluminium ingot way back in 1942. India's first ever zinc ingot also rolled out of an Indo-Canadian industrial project, the Cominco Binani zinc smelter which is also located in the same city. Both these companies, I am sure, are an important part of Kerala's industrial community and certainly will be among the principal customers of the power that Idukki will produce."

"This," Mr. Maybee added, "is also a time for praise for those who have been involved in this project. I am thinking of the many ministers and officials of the Kerala State Government, of the hard work of the executives, planners and organisers engineers and other technical personnel of the Kerala State Electricity Board, and of the thousands of workers who have laboured to bring this project to the stage that we see today. It is perhaps not entirely appropriate for me to mention my own countrymen who have worked on his project, but I would be remiss if I did not say that Canadians are proud of what they have done here. The Canadian consulting engineers, SNB, have been working on this project since 1963. I pay tribute to them and to the many other Canadian companies and their personnel who have had a part in Idukki."

In February 1968 the then Canadian High Commissioner to India, Mr. James George took part in the inauguration of the Idukki and Cheruthoni Dam Works. Throughout his appointment in India Mr. George maintained a close and personal interest in Idukki's development. He has asked me to send you his congratulations on this auspicious occasion," said Mr. Maybee.

"My government and the people of Canada would, I think, like to regard Idukki as yet another symbol of happy and successful Indo-Canadian cooperation." Mr. Maybee added, "On their behalf I extend congratulations to Kerala and to India on the achievement of Idukki, and good wishes for the work which lies ahead."



The newest Canadian-built experimental satellite, the Communications Technology Satellite (CTS)—said to be the world's most powerful—was launched into outer space from the Kennedy Space Centre, Florida, on January 17.

The satellite, a forerunner of a new type of high-powered orbiting transmitters expected to provide a wide range of expanded communication services in the 1980s, is the product of more than five years' work by Canadian scientists and engineers.

The primary aims of the CTS program are to demonstrate high-

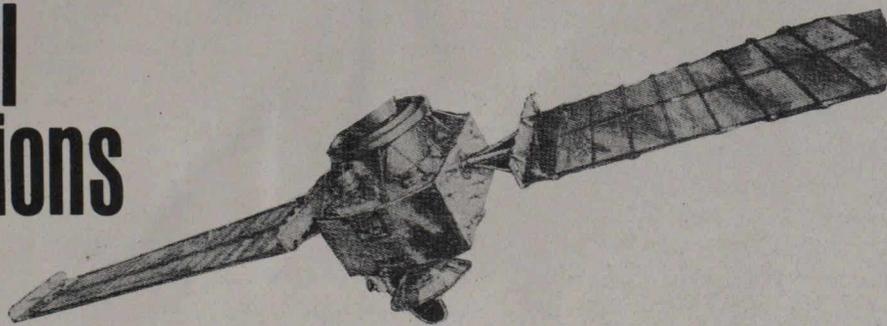
carried out the launch. Each country is responsible for its own parts of the program. The European Space Agency also participated through a bilateral agreement with Canada. The challenge of designing and building such a complex spacecraft to operate reliably for two years has been compared to building a colour TV set that will work flawlessly for 1,000 years without need of repair.

The Canadian management and design authority is the Communications Research Centre of the Department of Communications of Shirley Bay, west of Ottawa; the Lewis Research Centre of the Na-

Canada, the Alberta Native Communications Society and the Rural Health Society of Victoria, British Columbia.

The CTS ground stations are as important as the satellite itself. Eighteen small lightweight terminals, designed and built by RCA Limited of Montreal and SED Systems of Saskatoon, Saskatchewan, have been supplied to the experimenters, who have agreed to provide the Communications Department with assessments at the conclusion of the program. There are ten terminals with antennas of three-foot diameter and eight with "dish" antennas about twice that

experimental communications satellite



powered television and other transmission to small, low-cost earth stations; to flight-test major advanced technology sub-systems of the spacecraft itself; and to further develop and demonstrate the abilities of Canadian industry in the design and fabrication of sub-systems and components for the space communications systems of tomorrow. Over the next two years, the \$60-million satellite will be used for a series of social, technological and technical communication experiments by various groups on both sides of the Canadian-United States border. It was put into orbit under a continuing program of Canada-U.S. collaboration in peaceful uses of outer space.

Canada designed and built the spacecraft; the U. S. which provided its high powered transmitting tube and pre-launch test support,

tional Aeronautics And Space Administration in Cleveland is responsible for the U.S. part of the program. During the early stages of its flight, the satellite will be monitored and controlled by U.S. ground stations; then it will be turned over to engineers and technicians at Shirley Bay, the centre and focal point for satellite control, and for the experiments to follow.

Canadian groups of experimenters, whose interests include broadcasting technology, tele-medicine, tele-education, community interaction, data transmission and government operations in remote areas, will begin 26 experiments in May. Experimenters include several major universities in central Canada and the Maritimes, the Quebec, Ontario and Manitoba governments, the Canadian Broadcasting Corporation, Bell Canada, Telesat

size. The smaller stations will be used for such purposes as reception of audio broadcasting—perhaps, under very favourable conditions, even television—and two-way voice communications. The seven-foot terminals will be used for reception and transmission of the community and educational television, as well as for other, simpler forms of communications. SED systems were chosen to supply two fully self-contained, transportable earth stations. Housed in a trailer, the earth station includes a collapsible ten-foot antenna and its own generator. The terminal can be transported to virtually any location in Canada by road, rail or—with equipment removed from the trailer—by light aircraft. It will be capable of providing a full range of communication services, and will even be able to originate high quality colour TV



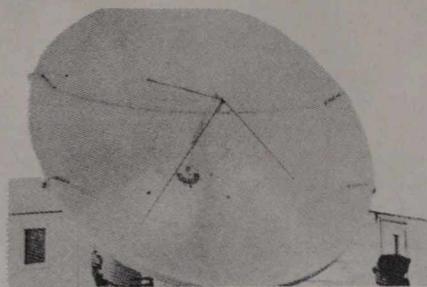
programming. Major earth stations with 30-foot antennas are located near Ottawa at the Communications Research Centre. One provides telemetry, tracking and command functions for the mission; the other is the communications control station.

Among the experimental communications services these terminals will make possible are community reception of radio and TV broadcasting in remote locations and interactive educational TV and tele-medicine. One experiment will help determine optimum uses of two way television in providing health care in remote rural areas. It will explore the extent to which the effectiveness of a medical team in a remote area can be increased through audio-visual and data links to specialists in urban areas. Results will help develop a model for a national urban-rural medical centre. Another experiment involves evaluation of curriculum-sharing. Carleton University Ottawa, and Stanford University California, will exchange courses by a digital-video-compression technique developed by NASA's Ames Research Centre.

The new satellite operates on a human scale, and this is the key to its flexibility. Conventional communications satellites, because they operate on frequencies used by existing terrestrial services, must be limited in the power they transmit. If they are too powerful they interfere with earth-based communications systems. To capture their relatively weak signals, ground stations must be large, expensive and normally fixed in one location. With CTS and the new generation of broadcasting satellite, all that is changed: operating on previously unused frequencies these satellites can be far more powerful than their predecessors without disturbing existing communications. Broad solar "arrays" folding out accordion-like from the satellite and equipped

with thousands of solar cells, draw energy from the sun and give the CTS its increased power. And higher power in the satellite means smaller, more portable, less costly antennas on earth. With a dish as small as a metre in diameter, and with the cost of an entire ground stations eventually reduced to that of a colour television set, the possibilities for "person-to-person" communication are remarkable.

Whether it be through the experimental transmission of a native newspaper by facsimile to a number of remote locations: providing diagnosis or medical staff training and supervision from a distance; enabling students in widely separat-



ed classrooms to share the same professor and course; or extending the horizon of broadcasting, CTS is a major Canadian achievement.

More so considering that it is only a decade since Canada became the first nation to join the Soviet Union and the United States in the Space Club.

Beginning with Alouette I, in 1962, and concluding with ISIS II, in 1971 four made-in-Canada scientific satellites established our place in space. They worked perfectly providing science with tremendous amounts of data to further man's knowledge of the ionosphere and giving both Canadian government and industry invaluable experience in the design, manufacture and operation of satellites and their subsystems. The space program entered a new phase in 1972 when the launch of Telesat Canada's Anik I gave Canadians the world's first domestic geo-stationary telecommunications satellite system. Anik's

twin brother, Anik II was launched the following year.

The space program to-date has fulfilled completely the original Canadian commitment to seek peaceful ways of participating actively in space research despite the limited resources available. This commitment was made by two prime ministers—John Diefenbaker and Lester Pearson in quick succession after the launching of Sputnik began the space race in 1957. As a result, Canada has probably conducted more successful space research per dollar than any other country. Though sometimes short on glamour this space research has been long on knowledge—scientific knowledge of the "inner space" above us and practical knowledge of the design and construction of spacecraft.

Their northern geography has given Canadians a particular interest in the ionosphere which can be at its most disturbed in the region above Northern Canada. The phenomenon has provided the beauty of the aurora borealis or "northern lights" but has also led to special communications problems. In the past, the Canadian space program emphasized a search for improved understanding of the ionosphere as the medium of our often unreliable short wave radio links. Now we are seeking new solutions to old problems of keeping in touch by putting the skills acquired, building scientific satellites to work in a communication satellite program.

Ionospheric studies and satellite communications are two major parts of Canada's space effort. But experts at the Department of Communications and in other government departments are also participating in international satellite program for resource-mapping, navigation, military communications and meteorology. This expert knowledge and involvement put Canada in the best possible position to exploit space technology.

THE HERZBERG INSTITUTE OF ASTROPHYSICS

The 1971 Nobel Prize-winner in Chemistry, Dr. Gerhard Herzberg, is generally considered the world's foremost molecular spectroscopist and his large institute in Ottawa is the undisputed center for such research. It is quite exceptional, in the field of science, that a single individual, however distinguished, in this way can be the leader of a whole area of research of general importance. A noted English chemist has also said that the only institutions that have previously played such a role were the Cavendish laboratory in Cambridge and Bohr's institute in Copenhagen.

Not many directors are in the enviable position of having a Nobel laureate on staff.

Dr. Jack Locke, Director of the National Research Council of Canada's new Herzberg Institute Of Astrophysics, is one who is.

The Institute, created in April, 1975, is named in honor of Dr. Gerhard Herzberg, distinguished NRC scientist who will continue active laboratory research within the new organization. The world-renowned Spectroscopy Section of the Division of Physics, founded by Dr. Herzberg in 1948, will form the initial nucleus for the Institute's work in laboratory astrophysics.

"Naturally, I felt greatly honored by the name chosen for the new Institute," says Dr. Herzberg. "More and more, I feel that answers to some of the really important unsolved questions about our universe lie in astrophysics."

"As one of the workers in the Institute, I do hope, by laboratory investigations, to make further contributions to the solution of problems in the study of comets, of planets and of the interstellar medium."

In forming the new Institute, several aspects of NRC activity have been integrated. One large component is the Astrophysics Branch of the Radio And Electrical Engineering Division (REED) which

involves activities in optical astronomy, radio astronomy and upper atmosphere research. Other elements, including cosmic ray research and Dr. Herzberg's Spectroscopy Group, have come from the Division Of Physics.

"In principle, the Institute has been created to serve as more than a new research Division," says Dr. Locke. "We hope it will become a focal point for astrophysical research in Canada and will develop into a center of scientific excellence in this field."

Dr. Locke himself brings a wealth of research experience to his new position. Following early studies in molecular spectroscopy and solar research, he turned his attention to radio astronomy in the late 1950's and became one of the prime contributors to the development of long baseline interferometry in Canada. For the last five years, he has served as Chief of REED's Astrophysics Branch which was formed in 1970 to coordinate the work of various government groups engaged in astronomical and related research.

"Astrophysicists will face some stimulating challenges in the coming years," he says. "Hopefully, through the Institute structure, Canadian scientists will be able to develop an expertise in some exciting new areas of research."

One giant step has been the advent of radio astronomy which involves the detection of radio frequency emissions from the universe. Using powerful radio telescopes, scientists have detected numerous spectral lines which arise from molecules in interstellar space. Whereas the radio spectrum once consisted of one atomic absorption—the 1420 MHz line of the hydrogen atom—the radio region now contains a host of molecular lines, including some associated with relatively complex species such as formaldehyde and ethyl alcohol.

"Spectral line research is one of the most exciting aspects of modern radio astronomy," says Dr. Locke. "The discoveries of new molecular lines provide valuable clues to our understanding of the interstellar medium."

The Herzberg Institute's radio frequency telescopes are located at the Dominion Radio Astrophysical Observatory in Penticton, British Columbia, and at the Algonquin Radio Observatory in Algonquin Park, Ontario. In addition to these, Institute scientists will use the 72-inch (1.85 m) and 48-inch (1.2 m) optical telescopes at the Dominion Astrophysical Observatory near Victoria, British Columbia. Other viewing facilities will become available in the years ahead.

The Canada-France-Hawaii telescope, scheduled for completion by 1978, will give Canadian scientists access to a 144-inch (3.6 m) mirror, which has twice the diameter and four times the collecting area of the largest mirror at the Dominion Astrophysical Observatory.

Another unique opportunity for advanced research may come in the 1980's with the American space shuttle program.

An optical or radio observatory orbiting in space would be free from both the turbulence and the absorption properties of the earth's atmospheric envelope. As a result, detailed astrophysical observations could be made over a range of wavelengths including the extreme ultraviolet.

"At a time when the value of science is seriously questioned by some," concludes Dr. Herzberg, "the formation of the Institute seems to me to be a particularly fine gesture on the part of the Council. It is encouraging that activities have been and will be devoted to understanding the world in which we live. That effort is surely of great importance to humankind in the long run."

THE CANADIAN CONCERN FOR THE ENVIRONMENT

In Canada, concern for the environment is a fundamental part of an increasing concern for justice, peace and quality of life for present as well as future generations of the whole family of Man. Radical changes in the values, habits of thoughts, and patterns of world resource use and distribution are going to be required of all nations, and there is no illusion among Canadians that such changes are going to be easy. But there is the growing conviction that a continuation of past patterns would be increasingly intolerable, and ultimately catastrophic.

From a global viewpoint, it seems that national sovereignty, and the responsibilities to other nations that go with it, will always be an important aspect of future planetary management. It is constantly being borne upon us afresh that the things that are everyone's responsibility end up as no one's responsibility. Yet the world is more than a physical planet with immutable laws and finite limits. It is a single, interdependent community, and the means must be found of solving overall global problems globally, preventing harmful unilateral actions without destroying the concept of national sovereignty. Freedom and accountability must go together in this kind of world.

In many ways, what is needed is something that governments, singly or collectively, cannot give—new values, a new ethic, a new philosophy of living on a finite earth. Such a philosophy is everyone's business. It must be compatible with the highest and most humane elements of all cultures, codes and beliefs that have enriched human life over the centuries. Only a common perspective, based on a wider vision of humanity, of our relations with the planet that sustains our life, and of our relations with one another in all our multifarious human groupings, can provide the cement needed to hold together the global community in the age that is upon us.

As for Canada, the environmental concern is increasingly being related to the need for greater balance in the distribution of people. Though Canada is the second largest country in the world, its most desirable habitable areas are limited. Like other nations, it faces the threat of runaway urban growth with all its attendant environmental, transportation, pollution and quality-of-life problems. In addition, the most favoured land for urban growth in Canada happens to be also its best agricultural land. Canada's population problems are obviously related to patterns of distribution of people—and of wealth. And along with this Canadians are conscious of the vast number of the world's people who live in dire need. Canada has actively participated in many public and private



programs of aid and development over the past 30 years.

The general attitude in Canada to today's problems, however, is far from that of resigned pessimism. There is increasing awareness that there are limits to the rate at which Canadian and global resources can be exploited; there are limits to the ability of the biosphere to accept pollution; and there are limits to the capacity of the globe to support human life. The global sense of responsibility that must develop must encompass the whole physical planet—its water and air, its non-renewable resources, its living organisms. And it must extend far into the future.

The relationship between individual and State control of resources is still evolving in Canada, and may be of special interest because of possible parallels between the smaller problems faced in a Federal State like our own, and the much larger problems of a somewhat similar nature which must be faced on the global level.

Some fruitful initiatives were taken in 1961 when the Resources For Tomorrow Conference recommended a Canada Land Inventory. A joint federal-provincial program was mounted and detailed information obtained on the suitability of land for various uses, and on climate patterns. This inventory made possible the first approach to a national land-use policy.

The Federal Government recently acquired a new, important environmental protection tool to stop pollution before it starts. The Environment Contaminants Act is administered by the Ministers of Environment and of National Health and Welfare. It empowers the government to obtain information about substances that may be harmful to human health and to the environment, to take measures, in consultation with the provincial governments, to prevent or control their use, and to exact penalties for non-compliance.

A primary function of the Act is to require industry to furnish information about contaminants. Information on substances being used, as well as on substances

proposed for use, must include data on the rate and extent of release into the environment, the effects on human and other life, and measures being undertaken to control release. Industry is required to carry out tests to provide this information.

Based on this information, the Federal Cabinet, in consultation with the provinces, will require any desirable preventive measures, ranging from limitations or controls to outright bans on the use, manufacture or importation of hazardous materials. The Act provides for fines of up to \$ 100,000 or imprisonment for up to two years for persons or companies found guilty.

Since 1974 Federal Government projects have been subject to an Environmental Assessment And Review Process. Administered by the Chairman of the Environmental Assessment Panel, it covers not only Federal-initiated projects and groups of projects but also those for which Federal funds are committed or Federal property involved. Under it, Federal departments and agencies are required to assess the environmental consequences of projects in which they are involved and to decide whether the effects are sufficiently significant to require a review by a panel of experts.

When such a panel is formed, it approves guidelines which form the basis for the preparation of an Environmental Impact Statement by the initiating department or agency. The panel then reviews this statement, obtains other information deemed necessary, asks for public response to the statement, and recommends appropriate action to the minister of the environment, who confers with the minister of the initiating department to decide on the implementation of the panel's recommendations and requirements to monitor this implementation.

Significantly, what we have been witnessing on the national level in Canada may be reflected more and more on the international level in the years ahead: a better balance between the rights of owners on the one hand and their responsibilities on the other. The emergence of a greater social conscience is increasingly being expressed by cooperative programs aimed at better management of the environment and resources. Resource management decisions are now commonly affected by social, cultural and environmental considerations. This does not necessarily mean that proprietary rights to resources will disappear, but dominion, or sovereignty, and private ownership are becoming more closely linked to responsibility to society for stewardship.

This may require, on the international level, certain modifications of sovereignty in relation to the global environment and the use of global resources.

Basketball and soccer are perhaps the most popular team sports in the world, and gymnastics, while not so widespread, is growing steadily.

The ancient Greeks practised a primitive form of gymnastics to train for combat sports. Later they elevated gymnastics to the Olympics. The 19th Century, however, marked the beginning of modern gymnastics. It quickly proved to be a fine form of physical and mental discipline with recreational and therapeutic value. In addition, it proved to be one from which both men and women could benefit; there has been a gradual change in the emphasis from strength to fluidity of movement.

ward III banned it in 1365, fearing it endangered national security by competing with archery. The ban had little effect. Mobs continued to play in the streets and whole parishes competed against one another, sometimes setting the goals miles apart. In the 19th Century, when schools took up the sport, it became more orderly and gave birth to rugby football, North American football and soccer.

To commemorate the 1976 Olympic Games at Montreal, which will feature these and many other sports, the Canada Post Office has brought out a series of special stamps.

The designer, James Hill's medium is casein paint. He depicts a

Mint stamps are available to collectors through philatelic counters at select post offices across Canada, as well as by mail order through the Philatelic Service, Canada Post Office, Ottawa, Ontario, KIA-OB5.

Four other Olympic stamps issued by the Post Office feature three categories of the Arts And Culture Program—the Performing Arts, Handicrafts and Communications Arts—and the Winter Olympic Games at Innsbruck.

The first three Arts And Culture stamps were designed by Ray Webber of Toronto, and measure 30 mm by 49 mm in a vertical format. A total of ten million 20-cent stamps and 8,500,000 each of

CANADA'S OLYMPIC STAMPS



James Naismith invented basketball in 1891 at Springfield, Massachusetts.

Students could not play baseball or football during winter and they found calisthenics boring. A new game was required. It would have to be an exciting, easily learned, non-violent, indoor team sport played with a large ball. The objective of the game, Naismith decided, would be to hurl the ball into a box suspended high in the air, but since no boxes were available for the first game, peach baskets were used. Naismith's enthusiastic students thus proposed the name "basketball."

Soccer, often called association football, is one of the games which evolved from medieval British sport "in which a round or oval object, usually the inflated bladder of an animal, was kicked, punched, carried or driven toward some goal." The sport was so popular that Ed-

single athletic figure in a moment of intense action, with extraneous detail eliminated to focus on the movement.

The predominant cool blue colour of the stamps featuring gymnastics, basketball and soccer is in contrast to the hot, aggressive orange-reds of the previous set of combat sports. Olympic stamps, also designed by James Hill, a well-known Canadian illustrator whose work has appeared in numerous Canadian and American magazines.

The stamps featuring gymnastics, basketball, and soccer are in the denominations of eight cents plus two cents surcharge, ten cents plus five cents surcharge, and twenty cents plus five cents surcharge. They measure 30 mm by 36 mm in a vertical format. A total of 15 million 8+2 cents stamps, ten million 10+5 cent stamps, and ten million 20+5 cent stamps have been printed in four colours.

the 25-cent and 50-cent stamps have been printed in four-colour lithography.

Another set of Olympic stamps features combat sports: boxing, fencing and judo. A total of 24 million 8+2 cent stamps, 14 million 10+5 cent stamps, and 14 million 15+5 cent stamps have been printed in three-colour lithography.

The net proceeds from the surcharge portion are being used to support the Olympic Games and Canadian amateur athletes.

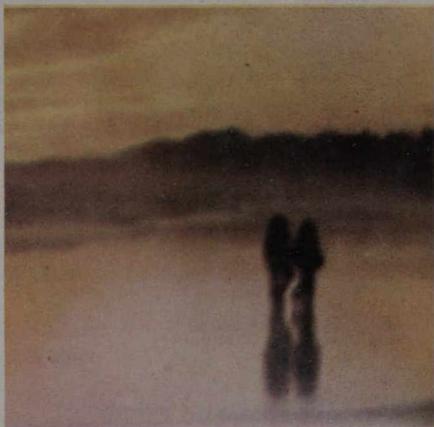
"Many Canadians have been making a point of buying every Olympic stamp since the first issue. In doing so, they are not only collecting souvenirs of the 1976 Olympic Games, but also contributing to the support of these Games," says the Postmaster-General Mr. Bryce Mackasey. For those who haven't bought these yet, the Olympic stamps will be on sale until the end of 1976.

THE FACES OF CANADA

AN EXHIBITION

THE Canadian High Commission recently received a collection of prestige colour photographs from Canada. Before coming to Delhi this exhibition had been shown in Tokyo and Jakarta.

This photographic collection was produced by the "Still Photography Division" of the National Film Board of Canada under the direction of Mrs. Lorraine Monk, Executive Producer, who is known throughout the world for her displays of the



1 *The western end of a continent, Long Beach. —Kenneth C. Alexander*

2 *Old stone house, Montreal, Quebec. — Richard Vroom*

3 *Rural route, New Brunswick. — John de Visser*

4 *Sainte-Anne-de-la-Perade, Quebec. —Roger Teesier*

5 *Sunset on the Tim river, Algonquin Park, Ontario. — John Foster*

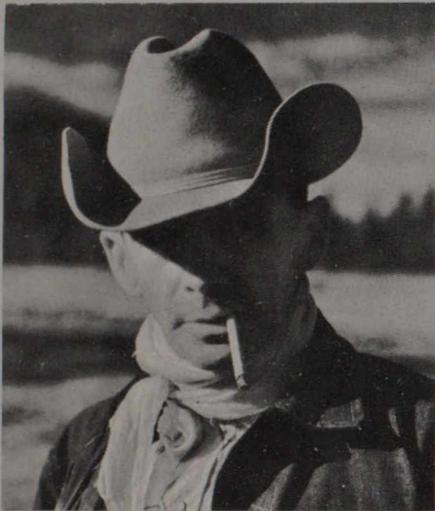
finest examples of Canadian photography.

These prestige colour photographs first appeared in a book specially commissioned in a limited edition of 500 copies, by the Canadian Government as its official gift to Her Majesty the Queen and visiting Heads of Government to commemorate the Commonwealth Conference held in Ottawa August 2-10, 1973. The book "Canada" was designed by Allan Fleming, Chief Designer of the Univer-

sity of Toronto Press who is widely recognized as the most outstanding book designer in Canada today. Poems in French and English are matched with some 54 colour photographs of superb quality. "This is a uniquely eloquent book about the face of Canada" wrote the famous Canadian journalist Robert Fulford "full of fresh and evocative images. It should perform superbly its job of suggesting to non-Canadians and Canadians

alike the variety and beauty of the country".

Mr. Krishan Chand, Lieutenant Governor of Delhi inaugurated the exhibition February 8 at the Triveni Kala Sangam.



6

6 Alberta Rancher — Tedd Grant

7 In the wilderness of northern Ontario a gull takes off from the shore of Lake Superior — Bruce Litteljohn

8 Lac des Deux-Montagnes, Quebec. — Richard Vroom

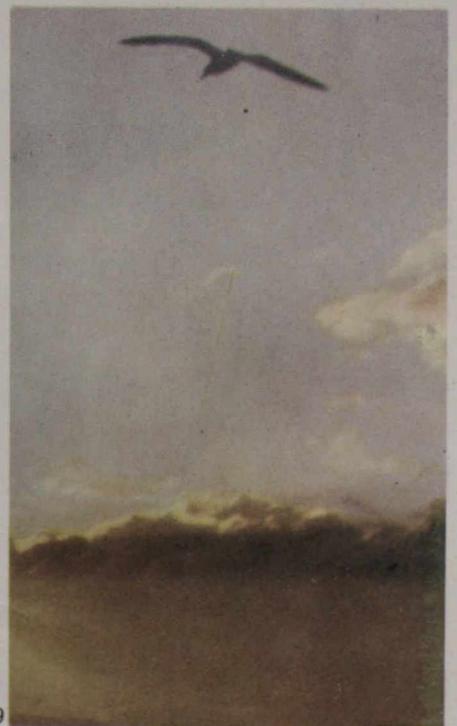
9 St. Lawrence river ferry between Riviere-du-Loup and Saint-Simeon, Quebec. — John de Visser



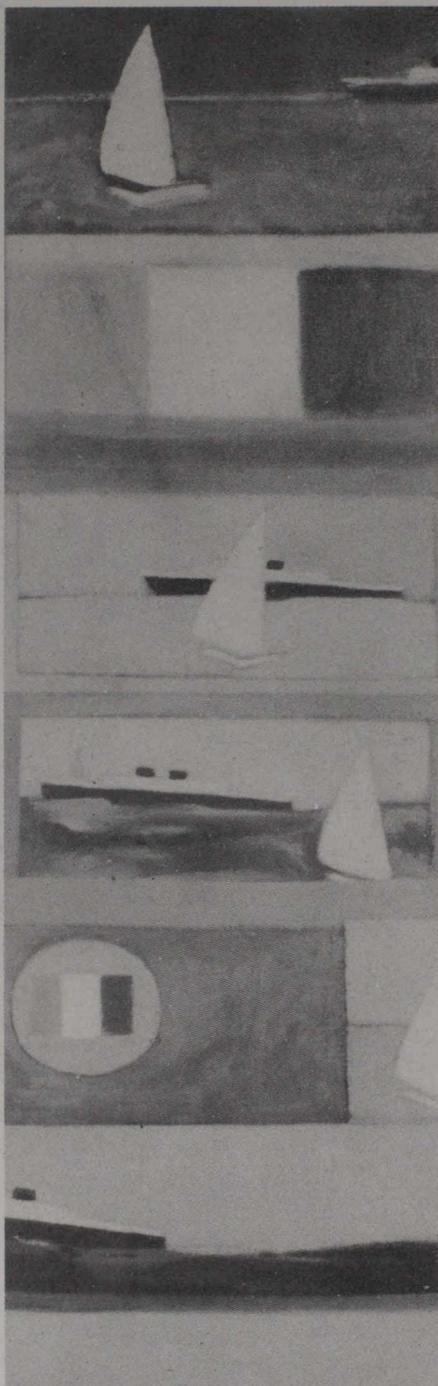
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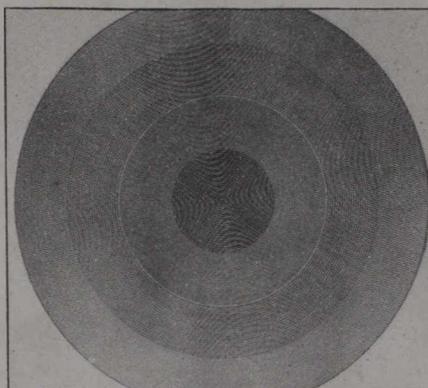
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Sailing On The Bay—oil on canvas by Joyce Weiland.



Clothed Woman—oil and lucite on canvas by Michael Snow.



Gong-88—acrylic on canvas by Claude Tounignant.



The Heart Of London—acrylic and plastic on plywood by Greg Curnoe.

The past quarter-century has seen radical changes in the state of art and artists in Canada. It was the period Canadian art caught up with the 20th Century; in Europe abstract art was established by the start of the World War I, but in Canada it came into its own only after World War II.

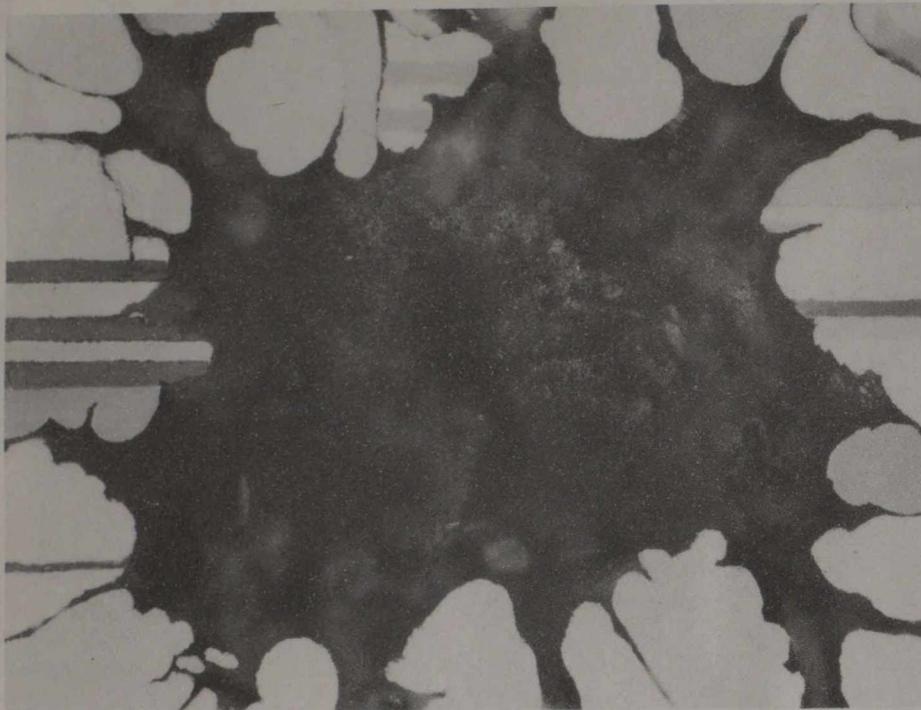
In less than two decades from War's end, Canadian painting was overwhelmingly non-figurative, and non-figurative Canadian painters were established firmly on the international scene. Jean-Paul Riopelle was the darling of Paris, and William Ronald was selling in New York. In 1956, Ronald won a Guggenheim Award against international competition, as did Jack Shadbolt of Vancouver in 1958 and Paul-Emile Borduas in 1960. In 1971, Jack Bush was described by American critics as one of the important non-figurative artists painting today.

During the same period, living artists became visible. There was an odd but definite effect of Canadian painters having multiplied, reinforced by the appearance of work by living

artists not only in galleries and at society shows but in many unlikely public places. Artists were all over: on television, radio, and in newspapers and magazines. All part of another change the quarter-century witnessed: the raising of the artist's status.

The beginning of change came with war's end. For two reasons. The first: Emily Carr's death in 1945. In her struggle to express herself, and to survive as an artist, she stands as a symbol of what it was like in the first half of this century. The art schools were hidebound and conservative. Technique was everything; experiment, particularly "modernism," was quelled. Scarcely could a painter make a living off "fine" art. The idea seemed to postpone buying the work of an artist until he was safely dead and his reputation reliably established. A "modernistic" painter could scarcely get exhibition space. And yet, terribly belatedly, against all these odds, just before her death, Emily Carr had been recognized by the official art world.

CONTEMPORARY CANADIAN PAINTING



Green Fire—oil on canvas by William Ronald

It was in 1945, too, that a group from the Arts And Letters Club in Toronto began pushing for government support. From this small germinal endeavour sprouted ramifications which altered the art scene. The first step was the organization of the Canadian Arts Council, which in 1959 became the Canadian Conference Of The Arts. Through its efforts, the government set up a royal commission to investigate the national development in the arts, letters and sciences. Its report led to the establishment in 1957 of the Canada Council.

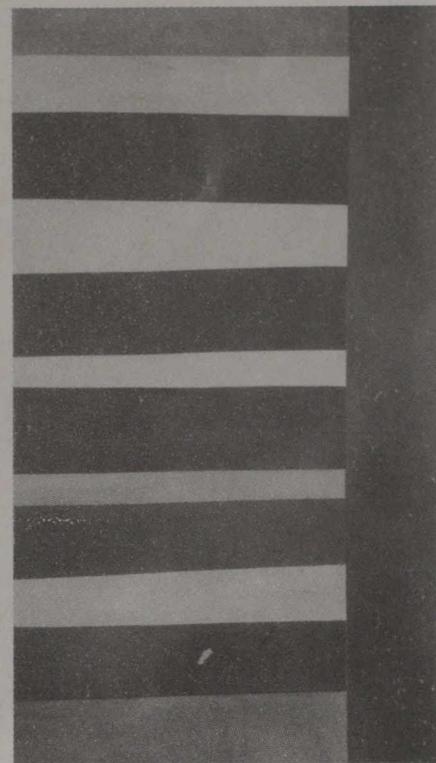
But the flowering of contemporary Canadian painting is a complex phenomenon, and long before that many things happened.

First in Montreal. Alfred Pelland, back from Paris, was attracting students and experimenting with fresh techniques. Paul-Emile Borduas was painting his first abstracts, a sort of automatic, action-painting approach. He soon had a group of disciples, Les Automatistes, with whom he exhibited. It was this group, with other like-minded radicals, that in 1948 published a collection of

rebellious plays and essays called 'Refus Global,' causing a furor. It became a magically liberating force for young Quebec painters.

When Les Automatistes waned in influence in 1954, their place was quickly taken by Les Plasticiens: four young Montreal artists who in 1955 issued a manifesto. French-Canadian artists differ from their English-speaking colleagues in one main respect: their love of manifestos. The inspiration for Les Plasticiens was mainly Piet Mondrian and their aim to purify art by emphasizing the formal elements.

Two other artists, Guido Molinari and Claude Tousignant, had very similar aims and, with others, formed a second plasticien group about the time the first one was breaking up. The difference between the two groups was the change in orientation: away from the European tradition and towards New York. The most important post-war development in international art had been the so-called New York School and the consequent shifting of the art world's focus from Paris to America. This new generation of Quebec painters had been quick to recognize the shift. The Quebec art scene remains



Tall Spread—acrylic polymer on canvas by Jack Hamilton Bush.

vigorous and experimental, which seems only fitting since 20th Century Canadian painting was born there in 1948

As in Montreal, the embattled non-figurative artists took the most important step in Toronto. In 1953 William Ronald talked his department store employers into building a home-decoration promotion around abstract art; the seven participating artists began discussing the possibility of other joint exhibitions and in due course, with four other artists, formed Painters Eleven.

Over the next five years Painters Eleven exhibited regularly. In 1956 they exhibited at the annual American Abstract Painters Exhibition in New York and got rave reviews. And in 1958 the Quebec artist, Jacques de Tonnancour, arranged a show by the group at 1' Ecole des Beaux Arts in Montreal. The next year, Painters Eleven disbanded; their work of forcing public recognition and acceptance of abstract art was, they felt, done. It had been a formidable accomplishment.

A change on a wider scale was the appointment, in 1955, of a new



Floraison—oil on canvas by Alfred Pellán.



Pavane—triptych, oil on canvas by Jean-Paul Riopelle.

director for the National Gallery who had great sympathy for living Canadian artists and who, in his first year as director, not only bought the work of 26 Canadians for the gallery but undertook a cross-country tour during which he made 158 speeches promoting contemporary art.

In the late 'fifties, the focus shifted to an unlikely location: Regina, Saskatchewan. The University of Saskatchewan's art school conducted an arts series with guest lecturers. The two who seem to have had the greatest impact were Barnett Newman, the colour-field painter from New York, and art critic Clement Greenberg, also from New York and undoubtedly the most influential exponent of colour-field painting, or, as it was later called, Post-Painterly Abstraction. Newman's personality and convictions seem to have fired the school's participants with new ambitions. In 1961, an exhibition called *Five Painters From Regina* was organized; it was such a success that the National Gallery reorganized it and circulated it across the country. At almost the same time, Vancouver earned the attention of the Canadian art world. It was Jack Shadbolt whose personality and leadership as a teacher and painter provided the main impetus. Roy Kiyooka arrived in 1959 with his ambitious work and through it and his guru's presence broke down the barriers that had tended to separate the British Columbia artists from the mainstream. Vancouver has since

been given equal status with Montreal and Toronto/London, and has consistently produced work of international interest.

Nowadays, one of the greatest visual arts movements is Inter-media—a loose group of some 60 artists come together to form a vehicle for co-operative ventures in related arts; for example, the combination of the visual arts with poetry, dance and music. Inter-media has not simply limited its endeavours to technologically-oriented art. Not only has it contributed to the widening of intellectual and aesthetic horizons for both participants and audiences, it has stood for a rarity in the arts: creative co-operation.

If Regina as a centre for innovative artists seemed unlikely in the early 'sixties, London, Ontario, seemed unthinkable. But, in the mid-'sixties, this is what happened. The return of Jack Chambers and Greg Curnoe to their hometown led to an artistic revolution. The two were joined by a lively group of young artists, including John Boyle, Murray Favro, Bev Kelly, Ron Martin, David and Royden Rabinowitch, Walter Redinger, Edward Zelenak and Tony Urquhart. This group grew to include poets, photographers and filmmakers, so that an unselfconscious cross-pollination stimulated the imaginations of all and multi-media collaborative efforts evolved.

Psychologically, of course, Centennial Year and Expo-67 climaxed the post war artistic awakening in

Canada; the excitement and achievement of the 'sixties reached its peak in Centennial Year. The national consciousness, the new sense of national identity and purpose with which Canada had emerged from the War had been growing quietly. Now it exploded in joyous celebration. For the first time the public visibly shared the excitement and pride in their nation's creative achievement.

And today art is more than ever alive and well and living in Canada. The facts are clear: Toronto continues to be the country's commercial art centre and one of the major centres of contemporary art in North America; artists in Canada have formed a union, the Canadian Artists Representation; no living artist has stopped contributing, in one way or another, to the sum of the nation's collective aesthetic experience. What's more, the new technology embraced by the artists is matched by a public acceptance of new forms and aesthetic modes.

The title of this article might be "Painting in Canada" and yet it would appear that "Canadianism" is absent in contemporary Canadian painting. Contemporary Canadian paintings remain individual to their creators and international in approach. But if Canadian art has gone beyond any current definition of nationalism, perhaps more important than this, it has lost its innocence and come of age.



CANADIANS OF AFRICAN DESCENT

People of African descent have a long and honourable connection with Canada, dating back to the days of the first explorers.

Matthew Da Costa, a Black, came to Nova Scotia in 1606 as a member of the Poutrincourt-Champlain expedition. Da Costa was an interpreter of the language spoken by the Mic Mac Indians living in the Atlantic region. It is unknown how he learned Mic Mac, but it seems reasonable that he must have visited these shores before and had learned the language then. The group settled at Port Royal, built the previous summer on the north bank of the Annapolis river just below its mouth. Here Canada's oldest social club, The Order Of Good Cheer, was organized. Da Costa was one of its charter members.

It was at Port Royal itself that Da Costa breathed his last.

Twenty-three years later another Black, a youth from Madagascar, came to Quebec with an invading force led by the Kirke brothers from New England. Samuel De Champlain, founder of the settlement of Port Royal, surrendered his small French colony to the invaders on July 20, 1629. This youth was the slave of David Kirke who sold him to

Olivier Le Tardif, head clerk of the French colony and one of the collaborators of the English. When Quebec was restored to the French in 1632, Le Tardif had to flee the settlement to escape punishment. Before leaving, he gave his slave to the Couillard as a gift. With an Indian student, the boy began to attend a school established by Father Le Jeune, the Jesuit Superior, shortly after his arrival in the colony, becoming one of the first students in Canada's history. At his baptism a year after his registration, he chose the name Olivier Le Jeune in memory of the chief clerk and of his teacher. When he died in his 'thirties, death certificate described him as a domestique.

On May 1, 1689, Louis XIV permitted his subjects in New France, as Canada was called at that time, to import African slaves. The colonists had long agitated for this privilege because they considered slavery the major reason for the economic advantage New England held over them. Various factors, including capital costs, climate and the absence of a suitable staple, combined to prevent slavery from developing in Canada the way it did elsewhere. Nevertheless, it became a

very important institution until it was abolished in 1834 by the Imperial Parliament, 125 years after it had been legalized.

Though the slaves and their descendants made up the vast majority of Canada's first Black residents, it must be stressed that there were always citizens of African descent who never were enslaved. This population base received its first major boost as a result of the American War for Independence which ended in 1783. Colonials who wished to retain their British connection had to leave the emerging nation, the United States of America. Nearly 42,000 of these United Empire Loyalists fled to Canada. Some who were slaveholders in their former homes were allowed to bring their human property along. This helped increase the Black population here. However, an estimated 12% of the Loyalists themselves were of African descent, most of whom went to the Atlantic regions, while others settled in areas of what is now Ontario and Quebec.

Blacks in Canada have many other origins as well: the Maroons, the refuge Blacks, passengers of the Underground Railroad, and immigrants just before and during

the Laurier era, as well as before the Great Depression and after World War II.

The Maroons, lovers of freedom who had defied both Spanish and English owners in Jamaica, arrived at Halifax in the summer of 1796. After about four years, most of them left for Sierra Leone. The refugee Blacks came from the U.S.A. after the War of 1812. Like the Loyalists before them, they had supported the British cause and, leaving the country of their birth when hostilities ended, headed for the Atlantic region where about 2,000 eventually settled.

The prairie regions, which became Saskatchewan and Alberta in 1905, received some Black settlers among those who migrated to Canada over the turn of the century. The Canadian Government had carried out an extensive campaign to attract settlers both from the U.S.A. and Europe. Black Americans who responded to the call were discouraged by government officials and their agents. Nonetheless, despite difficult barriers, some did get through to begin homesteading in parts of Alberta, such as the Amber Valley settlement.

The most recent Black arrivals in Canada consist of immigrants from the U.S.A. who came to Montreal and Toronto to work on the railroads, as well as groups from the Caribbean. The Americans



arrived during the 1920s, while the bulk of the Caribbean peoples came after World War II. There has been immigration in smaller numbers from other countries, too.

The West Indian element and their descendants now comprise approximately 80% of Canada's Black population, estimated at 300,000. As census data in Canada does not classify people on the basis of race, there are no precise figures.

Today the greatest proportion of Blacks live in the province of Ontario, followed by Quebec and Nova Scotia. With the exception of Nova Scotia, New Brunswick and, to a lesser degree, Alberta, where there are still pockets living in rural areas, the Afro-Canadian is an urban dweller. Toronto has a Black population estimated at between 60,000 to 100,000, followed by Montreal with nearly 55,000, of which about 13,000 are French-speaking immigrants who came to Canada mainly from Haiti during the 1950s and 1960s. The Halifax-

Dartmouth area accounts for another 35,400,000.

The Church has been, and still is, a major institution for Blacks in Canada. Black churches are not the result of segregation or discrimination by the majority. Blacks have always been free to worship in the church of their choice, so that the majority belong to integrated congregations. Some preferred, however, to establish their own churches for nationalistic as well as other reasons—a black church has a flavour, a style and form of worship and a function not usually found in others.

Some of the existing Black secular institutions have evolved from the churches. Many tend to reflect national origins, such as clubs and associations named after the various Caribbean islands from which members emigrated. Other groups are organized in different ways and for different purposes. The Coloured Women's Club of Montreal, a social organization formed at the turn of the century, is one of the oldest of its kind in North America. Black political associations as such do not exist. There is no such thing as "delivering the black vote" to any particular party.

Other organizations concentrate on areas such as education, integration of immigrants into Canadian life, housing, employment, youth welfare and commu-

BLACK FIRSTS IN CANADA

Lincoln Alexander—First Black Member of Parliament, 1968.

Leonard A. Braithwaite—First Black elected to a provincial legislature (Ontario, 1964).

Rosemary Brown—First Black woman elected to any Canadian legislature.

Anderson Ruffin Abbott—First Canadian Black to be granted a licence to practise medicine, 1861.

Dr. Alexander T. Augusta—First great Black doctor in Canada.

William Hall—First Black to receive the Victoria Cross.

William A. White—First Canadian Black to receive a

Doctorate of Divinity, 1936.

Rt. Rev. Wilber K. Howard—First Black Moderator of the United Church of Canada, 1974.

Samuel Ringgold Ward—First editor of 'Provincial Freeman' in Ontario.

J. A. Robinson—First President of the Brotherhood of Sleeping Car Porters, early 1900's.

Johnny Bright, Rolland Miles, Thomas Casey, Herbert Trawick (First Black professional import in Canadian football).

Willie O'Ree—First Black player in the National Hockey League (1950's, 1960's.).

nity development. An attempt has been made to unite the various groups into one national body, the National Black Coalition of Canada (NBCC). Formed in October 1969, it brings together, in a loose federation, associations from the Atlantic to the Pacific.

Two institutions deserve special mention: the Black Press and the African United Baptist Church of Nova Scotia. The first Black newspapers were organized towards the 1850's and one of the earliest, 'The Voice Of The Fugitive,' was founded at Sandwich, Ontario, in 1852. Today the Black community is served by several publications including 'Contrast,' a weekly newspaper; 'The Islander,' a fortnightly; and 'Spear,' a glossy pictorial magazine, all published in Toronto. In addition, there are in-house publications which print some material of interest to the general community. These include 'Habari Kijijii,' 'Bam News,' and 'Grasp,' put out by the 'NBCC,' the Barbados Association of Montreal, and the Black United Front of Nova Scotia, respectively.

The African United Baptist Association of Nova Scotia was organized in 1854 at Granville Mountain in the beautiful Annapolis Valley by Rev. Richard Preston and lay Brother Spetimus Clark. Thirteen years older than Confederation, it has brought together all Black Baptist churches of the province into one body.

Blacks have made contributions to Canada much out of proportion to their numbers. In the period after Matthew Da Costa's facility with the Mic Mac tongue proved useful to the 1605-1606 expedition, people of African descent participated in the fur trade at all levels. They were voyagers, entrepreneurs, cooks, general servants, and trappers. It was as translators, however, that they proved to be of greatest value. The literature refers



Oscar Peterson, Pianist

often to their ability to speak several languages and, accordingly, communicate with the natives. They appear to have been successful negotiators with the Indians.

Blacks have also played a role in the defence of Canada. Before their struggle to retain the British connection during both the American War for Independence and the War of 1812, they had fought in colonial conflicts. During the rebellions of 1837-1838 they were volunteers fighting against the rebels. Their patriotism, loyalty and professional conduct won them handsome praise. Blacks went overseas with the Canadian Expeditionary Forces, they participated in World War II, the Korean War and the various U. N. peace efforts.

In politics, Mifflin Wistar Gibbs was a member of Victoria's municipal government from 1860 to 1870. He was a delegate at the Yale Convention held in 1868, when British Columbia was persuaded to join the Canadian Confederation. W. P. Hubbard was a successful member of the government of Toronto at the turn of this century. He served on the Toronto Council intermittently from 1894 to 1913, including six years on the Board of Control.

Contemporary politicians include Leonard Braithwaite, the Black elected to a provincial government in Canada; Lincoln Alexander, the first Black to sit in the House of Commons; Rosemary Brown and Emery Barnes, the first persons of African descent to be members of

the British Columbia legislature. Lincoln Alexander has represented the people of Hamilton West since 1968, while Rosemary Brown and Emery Barnes were elected in 1972. The voters in the constituencies represented by these people are overwhelmingly White.

In sports, Blacks have made a name on an international scale. In track and field events Phil Edwards, Harry Jerome, Ray Lewis, Marjorie Bailey, and Yvonne Saunders immediately come to mind. The last two will be wearing the country's colours at the 1976 Olympics.

Universities have conferred honorary doctorates on quite a few. Quite a few lawyers have been named Queen's Counsel. Blacks have also received many military decorations. The Victoria Cross, the highest decoration for valour in the British Commonwealth, was presented to William Hall in 1858. He was the first Canadian, the first Nova Scotian, and the first Black to win this honour.

Five Blacks have received the Order of Canada, the highest non-military decoration that can be bestowed on anyone by the country: Harry Jerome, Isaac Phils, Oscar Peterson, Major A.W. Case, and Dr. Carrie M. Best.

Black institutions have also recognized Black achievements. The National Black Coalition of Canada led the way three years ago when it instituted the National Black Awards which go to "Blacks who have made outstanding contributions to Canada...in the fields of culture, art, academics, science, politics, and sports." Among other such organizations are the African United Baptist Association of Nova Scotia and 'The Islander' fortnightly.

What matters most really is the effort and determination by the Blacks as well as others to make the Canadian mosaic truly beautiful, durable, colourful and meaningful.

NOVEL APPROACH TO CANCER RESEARCH

EVEN the most optimistic of researchers long ago abandoned the hope of finding one single cure for cancer. Not only are there innumerable types of cancer occurring in almost every organ and tissue of the body, but no particular type of cancer will necessarily exhibit the same characteristics in one person as in another—that is, each cancer is “patient-specific.” Cancer research has been approached in a number of ways and members of the medical profession now universally acknowledge that it is only through the combined efforts of researchers with different attitudes to the study of cancer that any significant breakthroughs are likely to be

made. There has, however, been a tendency to isolate work which takes place in the laboratory from the clinical aspects of the disease, i.e., the actual course of the disease in the human body. Thus, animal studies have, in some cases, become far removed from the human problem. Many cancers induced in animals by ambitious researchers bear no resemblance to the disease in humans but there do remain some fields in which the investigation of certain animal cancers can be validly linked to cancer in humans.

McGill University's Cancer Research Unit in Montreal is considered by many to be one of a kind. It has deliberately

abandoned attempts to work out problems exclusively in the test-tube in favour of studying the disease as far as possible in humans and using laboratory procedures to help pursue their observations. According to its director, Dr. Martin Lewis, this approach has been largely neglected by cancer researchers, and he confesses to being lucky in having a strongly clinically-oriented group relating strongly to the laboratory group. Both have excellent co-operation from a team of cancer surgeons at the Royal Victoria Hospital. In fact, several members of the Unit, like Dr. Lewis himself, are scientist-clinicians.

CANADIAN WOMEN IN SCIENCE

HELEN Battle, Moira Dunbar, Catharine Parr Traill and Alice Wilson are all female Canadian scientists who have made outstanding contributions in their fields. Some have earned international reputation for their work. Last year, Lorraine Smith, a research fellow in the biology department at Carleton, undertook to write, for the National Museum of Natural Science, a storyline which was used to prepare an exhibit on women scientists in recognition of International Women's Year. The exhibit, which was on display at the Museum from July to September, is now on a two-year tour of Canada. Nineteen scientists are in the exhibit, including those mentioned earlier.

Anne Innis Dagg is a mammologist, the world's expert on giraffes, and was one of the first scientists in Canada to initiate studies on urban wildlife; Doris Speirs is recognized for her studies of Evening Grosbeaks; Helen Battle is internationally known for her research in

marine biology, Mildred Nobles made a unique contribution to forestry and forest management through her studies of wood-destroying fungi; Margaret Newton is internationally known for her work on wheat rust; Jean Adams is an entomologist, well known for her work on aphids, undertaken to preserve the potato crop; Catharine Parr Traill, a pioneer who settled near Peterborough, Ontario, was the first person to collect and identify the flora of Canada in significant quantities; Helen Hogg is a world authority on variable stars in globular star clusters; and Moira Dunbar, once a British actress, is now internationally recognized as an expert on Arctic.

The list does not include chemists, physicists or medical scientists, who are not under the jurisdiction of the National Museum of Natural Science. For Dr. Smith, in fact, “it was awfully hard to make a decision on which women not to include!”

BIRD STRIKE DETERRENT

SIGNIFICANT progress has been made in reducing the number of collisions between birds and aircraft, but much remains to be done. At the speed aircrafts travel today, the impact of even small birds can shatter a windshield, puncture a wing, or destroy a jet engine. At Vancouver International Airport, when the usual deterrents such as shell crackers, gas cannons, live shot, and runway patrol vehicles failed to dispel large flocks of small shore birds called dunlins (sometimes numbering 8,000), the problem was brought to the attention of the National Research Council Of Canada's Associate Committee On Bird Hazards

To Aircraft. Studies were initiated using live falcons and radio-controlled model aircraft as deterrents. Ornithologists advised the committee that most birds were alerted by the shape of a predator. Would a falcon-shaped model aircraft then be more successful than a conventional-shaped one? Trials were carried out and the results proved successful. Dunlins, ducks, gulls and geese treated the falcon-shaped model as a potential threat and dispersed from the area. It still has to be determined, however, if, through repeated exposure to the model, the birds will learn that it is different from a live falcon and not a threat to them!

NEW MEDICAL ACCELERATOR

THE first Canadian-built therapeutic linear accelerator for cancer treatment was installed recently at the Ontario Cancer Foundation's clinic in Victoria Hospital, London. The unit, known as Therac-6, is valued at \$200,000 and was built by Atomic Energy of Canada Limited (AECL) Commercial Products. It is the first of a family of accelerators designed by AECL and CGR-MeV of France. Both have extensive experience in the development of accelerators and radiation therapy equipment and have pooled their expertise to produce this new series of cancer therapy machines. Therac-6 has 20 times the output of the first commercial cobalt-60 unit installed in London 24 years ago. Accelerators produce an intense beam of radiation by electronic means, whereas cobalt therapy units use gamma radiation from reactor-produced radio-active material. Although Cobalt-60 teletherapy units are still considered the “work-horses” of cancer therapy clinics, a number of radiotherapists prefer linear accelerators because the beams from these machines are more sharply defined and capable of greater penetration and the higher output makes possible the treatment of more patients daily.

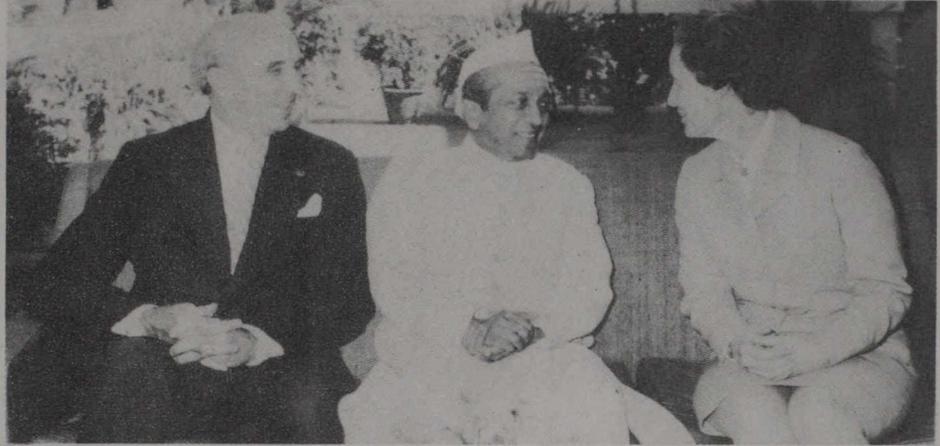
SEAT BELTS MANDATORY IN ONTARIO

THE Health And Welfare Minister, Mr Marc Lalonde, recently endorsed the initiative taken by the Ontario provincial government in its legislation making the use of seat belts mandatory. Ontario is the second province in Canada to pass the law, following the lead of the government of Nova Scotia.



CANADIAN NATIONAL DAY

Below : The Canadian High Commissioner, Mr. Maybee and his wife with Vice-President Jatti at the National day celebration. At left : Mr. Ross Nichol, Olympic Liaison Officer at the Canadian High Commission, presents an Olympic pin to Mr. B.S. Ahuja, Manager of Sita World Travels



Canada celebrates its national day on July 1, but in Delhi, the Canadian High Commission celebrates the event during the more pleasant time of spring, that is, on February 15, a day which coincides with the Canadian Flag Day.

This year, Canada day was celebrated with a reception held in New Delhi on February 21 which was attended by the Vice-President of India and other VIPs.



THE MAPLE LEAF FLAG

The maple leaf flag became the National Flag on February 15, 1965, replacing the Canadian Red Ensign which, for a number of years, had been authorised by the government as the appropriate flag to be flown within and without Canada when ever place or occasion made it desirable to fly a Canadian flag.

The national flag was proclaimed by the Queen of Canada following the adoption of resolutions recommending the new flag in both Canadian Houses of Parliament.

Red and white are the official colours of Canada while the maple leaf has long been a Canadian emblem.

Wind - Powered Turbine

A new design for a wind-powered turbine conceived by two researchers at Canada's National Research Council has contributed to the search for energy sources other than fossil fuels.

Increasingly, attention has turned to renewable energy resources such as wind, tidal, solar and geothermal power. Wind power is particularly attractive since it can be tapped as direct mechanical energy, with none of the loss involved in thermal conversion processes.

However, exploitation of wind energy has been slowed by design problems. New NRC's National Aeronautical Establishment has

developed a simply, designed, ruggedly constructed wind turbine that surmounts the problem of orienting the turbine's blade with wind direction.

Already in commercial production, this vertical axis omni-directional wind turbine promises to be an energy conversion system especially significant for developing countries lacking extensive and technologically sophisticated industrial resources. It is useful for electricity generation and direct mechanical power such as pumping for irrigation systems.

Essentially the turbine comprises two or three (depending on design)

convex blades of narrow-chord symmetrical cross-section, attached to a vertical shaft. Wind, striking a blade, generates a certain amount of lift (acting in a horizontal direction) but since the blade is fixed to the vertical shaft the net result of the lift force is to cause the blade to rotate about the vertical axis. At the point of maximum diameter of the turbine, the blade speed can be several times the windspeed. The whole arrangement is supported by means of guy wires, providing a simple, cheap and easy-to-erect system.

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