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NRC SCIENTISTS HELP FIGHT DISEASE

Before the present century, there was no threat to human life greater than attack by germs – bacteria, viruses and other micro-organisms which cause such diseases as plague, typhoid, smallpox and poliomyelitis. Every day, living creatures are attacked by germs which, fortunately, are repelled by the body's own defenders. One basic mechanism supports all defensive action – the body's ability, developed over millions of years of evolution, to preserve its individual qualities. It automatically recognizes foreign materials, such as disease germs, and calls into action special cells and chemicals to destroy them. The same system that protects the body against harmful micro-organisms is also responsible for the rejection of transplanted organs, for allergies, and "auto-immune" diseases such as rheumatoid arthritis, when, in effect, the body acts against itself.

How antigens and antibodies are structured, how they work, how they can best be exploited in clinical medicine are questions currently being examined by Dr. G.A. Adams, Dr. N.M. Young, Dr. H.J. Jennings and Dr. M.B. Perry of the Immunochemistry Group and by Dr. C.T. Bishop, head of the Biochemistry Laboratory of the National Research Council of Canada.

After a bacterial infection has set in, the body brings into action two chemical defenders called antibody and complement. Antibodies, large proteins varying in molecular weight from 150,000 to one million, are highly specific in their action; an antibody effective against one type of germ will not act against another type. Each antibody is tailored to lock with a specific molecule called an antigen, which is usually found on the surface of the germ. Since there are thousands of germs, each with different characteristic antigens which signal the alien nature of the invader, the body may be called upon to make any one or more of an estimated required million different specific antibodies. When an antibody reacts with its corresponding antigen, the action of complement, a complex of biologically active molecules, is triggered and results finally in the destruction of the foreign material.

NRC's basic research on the body's immune system and its function in combating disease requires a broad interdisciplinary approach. Working in close co-operation on this project are: bacteriologists with facilities to grow pathogenic bacteria; chemists and biochemists with experience in immunology and protein and carbohydrate chemistry; doctors and medical researchers from hospitals in Canada and the United States, and physiologists with extensive animal facilities. Dr. Bishop says that this work represents the interdisciplinary approach to research that is essential for major advances in the life sciences.

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WORK OF BIOCHEMISTRY LAB

The Biochemistry Laboratory's research on antibodies focusses on their structure and function. Dr. Perry and Dr. Young are using transplant tumors in mice to produce antibody-like molecules (myeloma protein) which react with specific sugar molecules playing the role of antigens. By using synthetic sugar molecules that can be chemically activated by light they are able to tag the active sites of the antibody. When the tagged molecule is broken down by enzymes and the sugar-bound fragments are analyzed, the order of the amino-acid units in the binding site is discovered. Similar binding-site studies are being made on "pure" antibody produced in rabbits by immunization with highly purified polysaccharides. It is hoped that knowledge gained in these studies will lead to further understanding of the precise way in which an antibody combines with its antigen and may also, in some measure, assist in explaining how the body is able to make such immense numbers of different antibodies of specific action.

ANTIGEN STUDIES

Complementary studies to those on antibodies are being made on antigens. In particular, the program is directed towards the isolation of specific antigens from pathogenic fungi, yeasts and bacteria, followed by the determination of their complete chemical structures. Dr. Bishop and Dr. Perry, together with Professor F. Blank of the Skin and Cancer Hospital of Philadelphia, have completed one study of a group of fungi causing skin diseases and are now investigating the capsule antigens of different types of Diplococcus pneumoniae, a causative agent of pneumonia in man. Dr. Bishop and Dr. Jennings, in collaboration with Dr. Baruch Diena and Dr. Paul Kenny of the Communicable Diseases Centre of the Department of National Health and Welfare, are involved in examining the antigens of Neisseria meningitidis and Neisseria gonorrheae, causative agents of meningitis and gonorrhea, respectively. A group of specific protein antigens has been prepared from one type of N. meningitidis which has been demonstrated to produce active immunity to other types of N. meningitidis. Dr. Adams has worked out the structures of endotoxic lipopolysaccharides found in the cell walls of many bacteria. These molecules are very complex in structure and are made up of many unusual sugars and a lipid rich portion.

Knowledge of the structures of antigens assist in determining what features make a "good" antigen; it clarifies many of the complexities surrounding the classification of bacteria by serological methods; it leads to the preparation of purer antigens for use in immunization, and may possibly by chemical modification, lead to an increase in the effectiveness of natural antigens or even to the production of entirely synthetic antigens.

NATIVE ARTISTS TO OWN COMPANY

Steps to transfer ownership of Canadian Arctic Producers Limited (CAP) to the Eskimo and Indian people were announced recently by Jean Chrétien, Minister of Indian Affairs and Northern Development, at the official opening of the company's new headquarters at Uplands Airport in Ottawa.

The steps referred to by Mr. Chrétien, which have been approved by Cabinet, include payment of patronage dividends by CAP to Eskimo co-operatives and other organized producers doing business with the company, on the understanding that these dividends will be used to buy out Government shares in the company, and transfer of CAP control to northern producers of arts and crafts when they own 51 per cent of the shares.

HISTORY OF CAP

Canadian Arctic Producers Limited was established in 1965 at the request of the Federal Government to provide an efficient marketing agency serving Eskimo and Indian producers of arts and crafts in northern Canada. These producers, it was hoped, would eventually become owners of the company.

The Department of Indian Affairs and Northern Development encouraged expanded production of arts, crafts, and gourmet foods, and the emergence of producer co-operatives. The Department also provided the company with sufficient operating funds each year until 1970, when Mr. Chrétien announced that the Government was financing the company through a purchase of 400,000 redeemable preferred shares valued at $1 each, plus a loan of $250,000. This money allowed the company to pay cash on delivery of products from co-operatives and expedited payments to producers. Since this capitalization, CAP has operated without Government subsidy and has consistently shown a profit. Producers today carry the full cost of the marketing service.

Commenting on the plans to transfer ownership, Mr. Chrétien noted that the goals envisaged in 1970 were now close to attainment. "The steps taken to transfer ownership are in line with Government policy, which intends to give northern natives more say in decisions affecting them," he said.

CONTINUING GROWTH

CAP has a network of 900 dealers in 11 countries; its sales have increased from $60,000 in 1965 to $1.3 million in 1971, and are expected to increase to $2 million within three years. The company provides market information, conducts market research and assists in the development of new products for 20 existing co-operatives and 20 project areas now in the process of becoming co-operatives.

RECOGNITION OF BANGLADESH

The Secretary of State for External Affairs, Mr. Mitchell Sharp, announced on February 14 that the Canadian Government had extended recognition to the independent state of Bangladesh and to the Government of Sheikh Mujibur Rahman.

Prime Minister Trudeau has sent the following message to the Prime Minister of Bangladesh:

I am happy to inform you that Canada has today accorded full recognition to Bangladesh as an independent state. On behalf of the Government and people of Canada, I wish to extend greetings and best wishes to you and your Government. It is our sincere desire that harmonious and mutually beneficial relations may develop between our two countries and that these relations will be enhanced through an association within the Commonwealth.

In making this announcement, Mr. Sharp observed that it had been evident for some time that a new state was emerging in what was East Pakistan. With the usual legal criteria of an independent government in effective control of a defined territory having been substantially met, as many states have already recognized, the only matter that remained in doubt was the timing. In weighing all consequences, the Government took careful account of the problems facing the Government of Pakistan from whose nation the new state was formed. The Canadian Government hoped, said Mr. Sharp, that both Pakistan and Bangladesh would be members of the Commonwealth.

Arrangements are currently being made for the opening of diplomatic relations with the new state. It is expected that initially a Canadian ambassador from a neighbouring country will be dually accredited to Bangladesh and that his staff will make frequent visits to Dacca.

NAC ORCHESTRA IN NEW YORK

The National Arts Centre Orchestra will give its first major concert outside Canada on February 27, under the direction of its conductor, Mario Bernardi, in Alice Tully Hall, Lincoln Center, New York.

Mr. Bernardi, who began his musical career as a concert pianist, will be the soloist in the Ravel *Concerto in G*, and the young Toronto harpist Erica Goodman will be soloist in a work by Harry Somers, one of Canada's best-known composers.

The full program will consist of the *Fantasia Concertante on a Theme by Corelli* by Michael Tippett, the *Piano Concerto in G* by Ravel, the *Suite for Harp and Chamber Orchestra* by Somers, and the *Symphony No. 8 in F* by Beethoven.

The 44-member ensemble, formed late in 1969 as the resident orchestra of the National Arts Centre in Ottawa, has already toured extensively in Canada. It also gave three concerts at Dartmouth College in Hanover, New Hampshire, in June and July of 1970. The Orchestra is now in its third season. In its fourth in May 1973, it has been engaged to open the Bath (England) Festival, to participate in the Llandaff (Wales) Festival, as well as to give concerts in Bristol and London.

Mr. Bernardi's performance on February 27 will mark his New York début as a pianist. His conducting début took place in August of 1970, when he directed two concerts at Lincoln Center in the "Mostly Mozart" series of musical events. He has since conducted three operas for the New York City Opera Company.

SEAL HUNT PHASE-OUT RECOMMENDED

Mr. Jack Davis, Minister of the Environment, recently released the interim report of his special advisory committee on Atlantic seals, and will send it to the House of Commons Committee on Fisheries and Forestry for study and recommendation.

Last year, Mr. Davis asked Professor Keith Ronald, dean of the College of Biological Science, University of Guelph, Ontario, to set up a committee to study the seal herd. Other members are: T.I. (Tom) Hughes, director, Ontario Humane Society, Trevor H. Scott, International Society for the Protection of Animals, Dr. H. Rowsell, Canadian Council on Animal Care, Kjell Henriksen, Canadian member of the International Commission for the Northwest Atlantic Fisheries and Professor H.D. Fisher, Department of Zoology, University of British Columbia.

The committee recommended that there be:

(1) A phase-out of the Canadian and Norwegian Atlantic seal hunt by 1974, followed by a minimum six-year moratorium on hunting;

(2) no increase in exploitation of seals in any other area in the world, especially in the Antarctic;

(3) immediate institution of a research program covering

- (a) compensation to those affected by the abolition of hunting;
- (b) expanded biological and related studies of the harp, hooded and other species of seal in Canada;
- (c) development of satisfactory guide-lines for the protection and management of the seal population;
- (d) development of improved methods for taking seals.

"I'm impressed by the quality of the report," Mr. Davis said, "and quite certain the Government will be following it up with effective action of its own."

The Ottawa Little Theatre, gutted by fire July 1, 1970, reopened on February 10, 1972 in its new building erected on the original site.

HOUSING RECORD LAST YEAR

Mr. Robert Andras, then Minister of State for Urban Affairs, recently announced that rapid progress in Canada's housing program, which has been setting new records each year since 1968, continued in 1971, when a record number of new dwelling units were started.

"The quantitative measure of our housing progress, as stated in terms of dwelling starts, moved to a new level in 1971 with an estimated 233,600 starts being recorded," Mr. Andras said. "From the point of view of the consumer, the important Canadian housing statistic is the number of completions in a year or, in other words, the number of units that come onto the market for rent or sale. The estimate for 1971 is 201,200 units and this tops the former high of 195,829 units set in 1969. In this area, too, housing performance has reached new highs in three of the past four years."

Mr. Andras went on to say that enterprise by the housing industry, and upsurge in public housing activity and other forms of low-rental accommodation, the stimulation of special government measures, lower interest rates and "another good performance on the part of NHA and non-NHA institutional lenders" had been "the prime factors in carrying housing starts to a new and impressive level in 1971".

PROVINCES

All provinces shared in the increased house-building activity. Starts were up in Newfoundland from 2,636 units in 1970 to 3,658 units during 1971; in Prince Edward Island from 784 units to 1,363 units; in Nova Scotia from 5,878 units to 7,308 units; in New Brunswick from 3,182 units to 4,930 units; in Quebec from 47,118 units to 51,782 units; in Ontario from 76,675 units to 89,980 units; in Manitoba from 8,945 units to 10,705 units; in Saskatchewan from 1,743 units to 3,560 units; in Alberta from 16,251 units to 25,602 units; and in British Columbia from 27,316 units to 34,765 units.

Dwelling starts also increased in all metropolitan areas except Montreal, which declined by 3.2 per cent, and the Ottawa-Hull region, which declined by 1.8 per cent, each of which areas had unprecedented activity in 1970.

Mr. Andras said that statistics to be issued in a few days would show that the largest year-to-year increase occurred in single-detached dwellings, which were up by 38.6 per cent over 1970 figures and semi-detached dwellings, which were up by 27 per cent from the level of 1970.

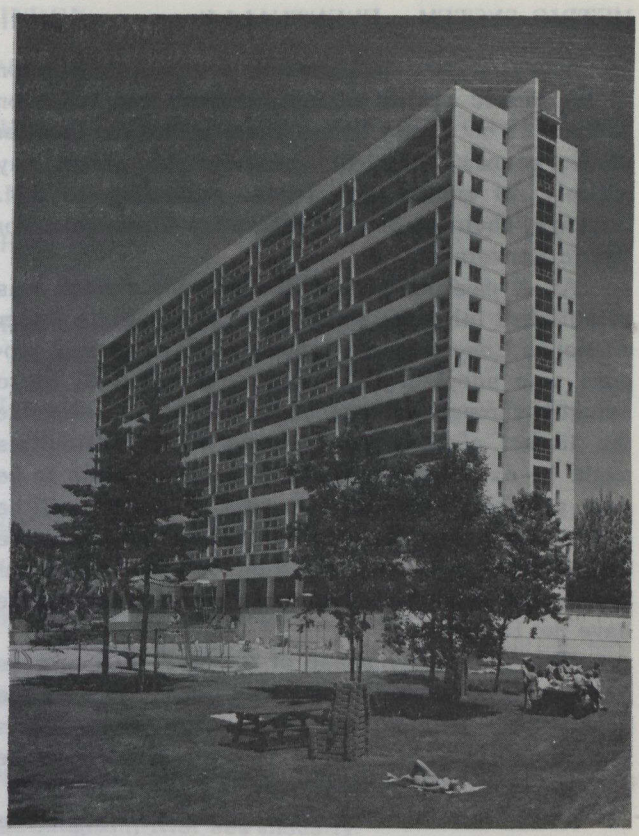
Apartment starts increased 15.5 per cent over those of 1970, although starts of row houses declined by 8.2 per cent from the 1970 level.

Mr. Andras continued: "Apart from quantitative considerations, there have been many impressive achievements in the past four years in the social aspect of the Government's housing program. There are fewer families doubled up. There are fewer occupied dwellings lacking basic facilities such as private bath and toilet. There are fewer dilapidated and obsolete occupied dwellings and there are fewer instances of congestion of living space in terms of persons per room.

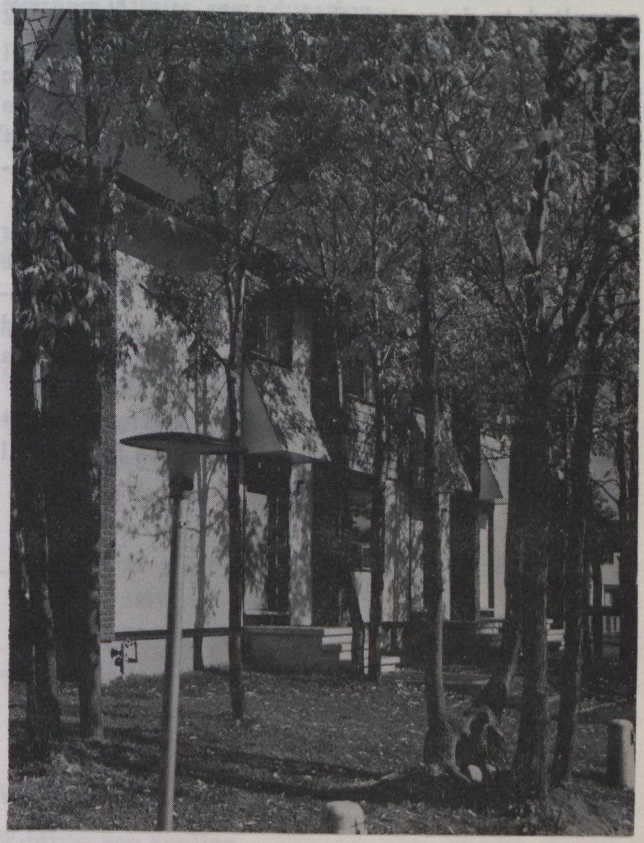
"This is not to say that housing conditions across the country are satisfactory or that we have no housing problems. There are still too many Canadians, especially in cities, who are badly housed or who have to pay too high a proportion of their incomes for decent shelter.

LOW-INCOME HOUSING

"However, the lot for many is improving and the promise for others is better than it has been for a long time. Under a variety of continuing and special Central Mortgage and Housing Corporation programs, more housing for low-income families has been approved in the past four years – approximately 130,000 units – than in Canada's history up to that time – approximately 80,000 units. In each of the last four years, more than one-half of the CMHC capital budget, representing more than $2 billion, has been reserved for the provision of housing for low-income Canadians. And in addition to the specifically-designed low-income units, we have been devoting an increasing amount of money to provide home-ownership for families earning below $6,000 a year."



Photos courtesy of Central Mortgage and Housing Corporation.



Opposite page – *Row housing for 40 families in Waterloo, Ontario.*
Below – *A subdivision built under the National Housing Act in Calgary boasts a man-made lake.*
Upper right – *A National Housing Act apartment building in Montreal.*
Lower right – *This "limited dividend" project in Ottawa consists of 118 three-bedroom units.*

METRIC SYSTEM – EVENTUALLY

The first step in Canada's eventual conversion to the metric system of measurement was taken on January 19 but it may be ten years before the familiar inches/pounds form of measurement gives way entirely to metres and litres, according to S.M. Gossage, chairman of the Preparatory Commission for Metric Conversion.

At a meeting of the Commission, which was established following publication of the White Paper on Metric Conversion in January 1970, a general program was adopted. "Our first approach will be to industry through industry associations to determine the impact of conversion, areas where difficulties might be expected and the timing that appears to be most suitable," Mr. Gossage said. "A letter will be sent to such associations suggesting questions the Commission feels are important, but we expect industry will wish to bring up pertinent problems we have not thought of."

The preliminary phase of the work will take as much as three years. "During this time," Mr. Gossage said, "there will be very little achievement that is visible to the public but it is work which must be done if we want to avoid trouble in future."

At the same time as the approach is made to industry, the Commission will be exploring the response to "metrication" in all segments of the Canadian economy. Non-industrial associations, educational institutions and consumer groups will be consulted to determine their opinions on the timing and method of changing the measuring system.

"The Commission was determined that the public must be kept informed of our intentions," Mr. Gossage said. "Our operation plan will eventually affect everybody in Canada and we must have an information plan that is closely co-ordinated with it."

It is proposed that associations and similar organizations establish committees to determine the views of their sectors of the economy. The recommendations of these committees will be discussed with the Commission and finally co-ordinated into a master plan for metric conversion in Canada.

"Even with the adoption of a master plan, it would probably take as much as ten years for its full implementation," Mr. Gossage said.

SUCCESS AT U.K. CATERING FAIR

"On-site" sales totalling $300,000 were reported by Canadian companies taking part in the International Hotel and Catering Exhibition in London, from January 6 to 14. The Canadian exhibit was organized and sponsored by the federal Department of Industry, Trade and Commerce.

Some 3,000 "firm" orders and "serious" trade inquiries are expected to yield another $8-million worth of business for the Canadian companies in the next 12 months. These sales are more than double those made by companies exhibiting on the Canadian stand at the previous exhibition in 1970.

Seven food-producers and 12 food-equipment manufacturers were represented on the Canadian stand this time. Canadian foods on display included lobster bisque and seafood chowders, pre-cooked turkey and chicken products, frozen lobsters, "instant" mashed potatoes and frozen Chinese food. Liquors were represented by rye whisky and Canadian wines. The equipment manufacturers showed Canadian cooking-ranges, stoves, freezers, beverage-dispensers, coffee-brewers, sandwich-makers, hot-dog-preparation units, machines to reconstitute convenience foods, wire shelving, and "compactors" and shredders for refuse.

Several products were on view in Britain for the first time. A fast method of preparing hot dogs – by making a hole in the bread with a heated spike for the insertion of the frankfurter and relish – attracted much attention. So did a combination refrigerator, stove and sink, and a dish-handling conveyor-belt that could move dishes up, down, round corners and in spirals. Lobsters frozen without prior cooking were also well received.

The popularity of the Canadian foods was evident from the number of visitors who tried them. During the eight-day exhibition, the Canadian stand served 10,000 hamburgers and slices of pizza, 6,000 hot dogs, 2,400 helpings of lobster bisque and seafood chowder, and 2,000 helpings of mashed potato, as well as hundreds of egg-rolls, and slices of turkey breast and chicken and turkey roll. These were washed down with 2,500 cups of coffee, 2,400 glasses of rye and 1,500 of Canadian wine, and 1,200 soft drinks.

MONTHLY INDEX

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