ADDRESS AT THE SPECIAL CONVOCATION AT DALHOUSIE UNIVERSITY

HALIFAX, NOVA SCOTIA

OCTOBER 24, 1962

ON THE OCCASION OF THE OFFICIAL OPENING OF

THE BEDFORD INSTITUTE OF OCEANOGRAPHY

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Mr. President, Mr. Chancellor, honoured guests, ladies and gentlemen:

May I say, before going further, that I deeply appreciate the honour of being called to speak on this occasion. We are marking a proud moment in the development of the Science of Oceanography and an important milestone in Canada's scientific history. Tomorrow the new Bedford Institute of Oceanography across the Bay will be formally opened. And speaking as one who has looked forward to this occasion since the Institute was envisioned, it is indeed a moving experience to take part in an academic ceremony honouring the event. For these two ceremonies--one of academic emphasis, the other stressing the inauguration of a new federal research establishment--symbolize two great influences which must be harmonized to achieve maximum benefit from the total Canadian research effort.

Before I enlarge on this theme, I should like to comment on the background which led to the emergence of the Bedford Institute.

Oceanography in Canada is not a new science. The study of the seas that surround us on three sides is as old as Canada's history. Specifically, I can refer to the work of the Fisheries Research Board since the turn of the century, and to the work on tides and currents initiated under Dr. Bell Dawson in 1893. The concept of co-operation to which I have referred has characterized the science of oceanography

almost from its beginning. In Canada, it was particularly apparent during World War II when scientists from the Fisheries Research Board, the National Research Council, and the Armed Services pooled their knowledge and resources to combat the submarine menace. Following the war, the same order of close co-operation continued through the Canadian Joint Committee on Oceanography.

This was a unique body which functioned successfully without any statutory authority: Its strength came from the desire of its members to obtain the maximum value from the resources available. Over the years the stature of the Committee grew, and, in 1959, its name was changed to the Canadian Committee on Oceanography. Membership was formalized; universities were represented; and the Committee was recognized also as a sub-committee of the Associate Committee of Geodesy and Geophysics. Today, the Canadian Committee on Oceanography is recognized both here and abroad as Canada's official voice in oceanographic affairs. I know of no comparable body--governmental, academic, or scientific--that started with so little official authority and achieved so much eminence.

Two factors have contributed to its success: The vital necessity for co-ordination in oceanography--a field with broad implications in many disciplines--and the genuine desire of scientists to work together in the interests of furthering the science of the sea. Today the Canadian Committee on Oceanography scrutinizes the entire Canadian program in oceanography; and its efforts bring about the most effective use of the nation's resources, human and otherwise, in this field. The C.C.O. might well be considered as a useful model for many other areas of science.

In the intervening years since the War, the major portion of field research in oceanography was conducted by the Fisheries Research Board. The Board developed effective working groups on each coast and, with the help of the Departments of National Defence and Transport, initiated programs in the Arctic. But in recent years the demand for oceanographic information has been particularly heavy. This comes from many sources: for example, the Royal Canadian Navy, the Royal Canadian Air Force, fishing and commercial interests, and the needs of navigation. We are also obligated by international treaty to undertake a comprehensive oceanographic program. In fact, by 1958, these demands had grown far beyond the scope and resources of the Fisheries Research Board and it was decided that the Department of Mines and Technical Surveys should develop an extensive and effective program in the realm of physical oceanography.

First, a capital and staff development program was implemented to provide the basic facilities, including ships, and to secure an adequately trained staff. The National Research Council agreed to contribute, through grants, to the development of institutes of oceanography on each coast. Strides were taken in the recruitment of key personnel and in the development of a staff training program. And all indications pointed to the building of an effective program of research in oceanography in Canada. The Bedford Institute of Oceanography, the opening of which takes place tomorrow, provides the first concrete evidence of the progress we have made so far.

Now, I should like to dwell for a moment on the research and technological program for the next five years. This has been outlined broadly by the Canadian Committee on Oceanography and is published under the heading "Proposed Five Year Plan" dated April 1962. The proposed plan includes the needs of all agencies, but does not refer to University research.

It is a vast, many-sided research program. It includes problems of navigation in open and ice-infested waters of the Gulf of St. Lawrence, the East Coast and in the Channels of the Arctic Archipelago; the circulation of water in offshore and deep oceans adjacent to Canada and in the channels and estuaries; the physical and chemical properties of the waters. Other projects concern ice research; heat budgets; submarine geology; the phenomena of upwelling; productivity and the factors determining its development and concentration; energy exchange between the sea and the atmosphere; pollution research; factors and conditions determining sound transmission in ocean water environments; geophysical studies related to gravity and magnetic research biological studies; and other research as required. Ships of the Department of Mines and Technical Surveys will continue their intensive program of hydrographic charting - a responsibility that is in no way lessened by the Department's oceanographic plans.

Canada will play a greater role in international programs through agencies such as the Intergovernmental Oceanographic Commission, the Special Committee on Oceanic Research, the North Pacific Fisheries Commission, the International Pacific Salmon Fisheries Commission, the International North Atlantic Fisheries Commission. In addition, Canada will maintain close co-operative working arrangements with United States establishments on each coast.

The co-operative aspects of oceanography on a world-wide scale provide a challenge we cannot ignore. Oceanography is truly an international science and demands on our research resources to meet international commitments will continue to grow. Vital fishing interests are involved and these can be protected only by a substantial Canadian contribution to the required oceanic research. No other field of science offers as much promise for effective and worthwhile international collaboration.

It is also of interest to note that during the last four years oceanographic studies have been in progress over the Arctic Ocean Continental Shelf and in the channels. Studies in this area have been conducted, mainly, through ice cover. This research complements oceanographic studies conducted for several years from the icebreaker C.C.G.S. LABRADOR and recently from the C.C.G.S. JOHN A. MACDONALD.

The 1958 Laws of the Sea Conference recommended that the mineral resources of all continental shelves belong to the adjacent countries. The convention has now been ratified by most nations. This international decision increased the size of Canadian territory by approximately one-seventh or 500,000 square miles. It is our responsibility to delineate this area and its mineral potential.

We anticipate also that a Canadian data centre will be established either in Ottawa or Dartmouth to coordinate and regularize records. I am pleased to say that, in this matter, we have already made considerable progress. The data centre when completely operative will provide essential material for all oceanographers working on serious problems on each coast and as well, we hope, for the Great Lakes.

The overall oceanographic program is oriented to the solution of immediate and long-term questions; but it is designed to include a high content of fundamental research. We recognize that, to be productive, the program must have a high degree of elasticity and allow a large measure of freedom to the individual scientist. Thus, we hope to encourage the development of an ideal research atmosphere wherein the professional staff have freedom to develop to the full their imagination and creativity.

You may be interested in the accomplishments of the Mines and Technical Surveys' oceanographic program. The five-year plan of the Canadian Committee on Oceanography called for the construction of the Bedford Institute as the first stage.

It also called for several oceanographic ships and a suitable staff. Included in the overall plan was an Institute for the West Coast, as well as ships and personnel.

During the last three years key personnel have been recruited; others have been trained. This has been a long, slow process because oceanographers were almost non-existent in this country. However, thanks to a generous policy of financial assistance to graduate students we have made considerable progress. And, even with the government's austerity program we hope that a well trained and capable staff will result as the most important aspect of the developing program. While buildings, ships, and equipment are important, the basic research productivity of the program depends upon the quality of the staff.

As I have mentioned, the first major item on the expanding oceanographic program for Mines and Technical Surveys is the opening of the Bedford Institute of Oceanography. This modern establishment will supply office and laboratory requirements for our hydrographers, oceanographers, marine geologists, and geophysicists working off the Atlantic Coast and in the Eastern Arctic. Space is also provided for the Atlantic Oceanographic Group of the Fisheries Research Board. We hope that the new Institute will encourage close coordination and provide an integrated oceanographic program. If our plans and hopes materialize, this Institute will become an important national and international research establishment. To support a properly coordinated research effort and to encourage the best use of our capital equipment, my Department has organized a new Branch. It includes the professional groups interested in either engineering or research on or in the sea and is known as the Marine Sciences Branch.

While the ship-building program has developed more slowly, we hope that the new 5000-ton C.G.S. HUDSON will be commissioned in May, 1963. This is a floating laboratory supplied with facilities to meet the most exacting requirements of the marine sciences. It is designed for operations anywhere in the world including the ice-infested waters of the Arctic. The ship will be used to meet Canadian needs but will allow significant contributions to be made to international oceanographic programs.

Two smaller ships were designed for use in the near future on the East Coast. These are dual-purpose ships suitable for hydrography or oceanography, and it is hoped that construction of one or both can be started in 1963.

Other ships will be required in the future to implement the broader aspects of the East Coast program. But we felt that the design of these should wait in order to benefit from experience with our present or proposed fleet and to accommodate refinements of the program as it unfolds.

To bring our oceanographic needs into clearer focus, I should like to say a few words about the West Coast. The Pacific Oceanographic Group of the Fisheries Research Board located at Nanaimo, B.C., is proceeding with its program on the Pacific Ocean. In addition, this group is assisting in the training program for the Marine Sciences Branch and will provide some accommodation as its West Coast staff is assembled. Authority has been sought from the Government to plan and later build an Institute of Oceanography on the Campus of Victoria College in Victoria, B. C. This would be similar to but smaller than the Bedford Institute and the docks, shops, and depot would be some distance away on the waterfront. In addition a new oceanographic ship was authorized and the design and plans completed for the West Coast.

We have also sought permission to plan a new ship to co-operate with the Oceanographic Institute of the University of British Columbia. The present austerity program will no doubt delay the implementation of some of these plans.

With this brief outline, Ladies and Gentlemen, you can see that we are forging ahead in our five-year plan for oceanography as it affects our new Marine Sciences Branch. The buildings and ships, open to the public this week, offer ample evidence that we are making good progress in providing facilities for the scientific study of oceanic waters of interest to Canada.

I spoke earlier of the dual influences symbolized by this ceremony and that of tomorrow. I should now like to amplify this concept:

We who serve in the research and development areas of government hold our partnership with the Universities continually in the forefront of our thoughts and actions. The great federal research organizations emerging over the past century of Canadian history have developed into prominent institutions, all seeking to apply the scientific method to the improvement of Canadian life, and indeed that of mankind in general. They are well known to you: - the National Research Council, the Fisheries Research Board, the Defence Research Board, the Scientific Service of the Department of Agriculture, and, if I may be excused some bias, the Department which I represent. These research agencies continue to grow in their contribution to man's well-being and knowledge.

Their strength stems from two main sources: 1) the continuing and growing financial support of the government, and 2) the supply of well-trained personnel.

The vigor of our federal research institutions can be maintained only by providing both these ingredients, and more important, they must flow together and merge in proper proportion. Occasionally, the availability of each may vary. For example, in the past the flow of highly qualified scientists from the universities has not kept pace with the physical resources provided by the federal government. For the moment, (and only for the moment, we are confident), austerity measures are changing the balance. But this temporary respite must not be allowed to dampen the efforts of universities to supply us with trained men.

The strength of our federal research agencies, I said, depends on their partnership with the universities; and we shall therefore continue to do all we can to strengthen our academic partners.

How can this best be done? In my position, the answer is clear: We must make available to our academic colleagues the full range of resources embodied by the Bedford Institute building and the research ships alongside its seawall. This is particularly true in the field of marine research. For the basic physical facilities necessary to this realm of endeavour (which we must pursue) are expensive. And each of us will gain if those facilities are used to their utmost capacity. We look forward, then, to providing our associates of the Dalhousie Institute and its graduate students the means by which they can carry on their research.

But I have one word of caution which I shall direct to both professors and federal scientists; and it is this. I mentioned earlier that the "Proposed Five Year Plan": drawn up by the Canadian Committee on Oceanography does not refer to university research.

Nor is it appropriate that it should.

Unlike the universities, much of the government's research programs must, of necessity, be organized or planned along specific lines. Federal agencies have a responsibility to answer well-defined questions; and planned research, or "oriented research" is a necessary element of their total activity. (At the same time these organizations should be engaging in what is commonly referred to as "pure" research, for without this invigorating or supporting effort, planned research would become sterile and ineffective.) The correct balance between "applied" and "pure" research in an establishment such as the Bedford Institute cannot be determined in advance -- it must become apparent with experience.

On the other hand, it is equally essential that universities avoid to the utmost any emphasis on a planned research program. Now, when I say this, I am not advocating undisciplined research. Any worthwhile scientist must continue to exert self-discipline in his approach to a problem and must plan that approach with care. What I am trying to say is that universities must ensure that a professor or student remains free to tackle <u>any</u> problem without the feeling that he is compelled to do so because its solution may be required by a particular agency.

When embarking on his research he must <u>not</u> ask himself, "is this a problem for which the Marine Sciences Branch is seeking a solution? If so, I may be better able to obtain ship time or laboratory facilities". Rather, he must tackle a problem on the basis of its scientific merits and his own scientific competence. Let me assure you that a well conceived attack on a marine problem by a well qualified and original scientist will not fail to find whatever support in facilities the Bedford Institute can provide.

I am not suggesting that a university appointment will be any "open sesame" to the facilities of the Bedford Institute. What I am suggesting is that its facilities will be placed at the disposal of the professor or student whose research problem will stand up to the critical scrutiny of our oceanographers on the basis of its scientific merits; not on how closely it is oriented in the direction of the Institute's program.

I have spoken of how our Institute can help yours. There is another important way in which we as a research organization can profit by close association with you.

I hope your Institute will recognize the scientific stature of the staff we are assembling across the Bay. I think it important that our most outstanding members be afforded some of the academic privileges enjoyed by your Institution. It is not always enough for a scientist to be continually engaged in research; he should be exposed to the stimulating and challenging influence which derives from the art of instruction. I am sure both our Institutes would profit by an occasional Bedford scientist lecturing to, and being challenged by, a group of eager and demanding students.

In conclusion, ladies and gentlemen, I envision a period of expanding endeavour leading to a mutually integrated and beneficial research program between the Institute of Oceanography of Dalhousie University and the Bedford Institute of Oceanography which will enhance the scientific stature of each, and contribute to the solution of the many complex and difficult problems to face the oceanographers of the future. Much-needed scientists and the costly facilities are being supplied. The program appears to be well launched. I think we can say with a high degree of assurance that the development will continue and that, in the not too distant future, Canada will be contributing substantially more to both national and international oceanography. If oceanographers continue to co-operate as they have in the past, this prognosis is assured.