

Speech by Dr. G. Herzberg at dinner given in his honour by  
the Government of the Province of Ontario, 17 May, 1972.

Neither Rutherford nor many other scientists with basic discoveries to their credit, such as Faraday, Maxwell, Hertz, etc. were or are primarily interested in improving the standard of living but rather in extending the boundaries of knowledge.

Professor Chandrasekhar, the famous astrophysicist at the University of Chicago, was recently asked by an Indian student how he could justify spending all his time on abstract theoretical problems when millions of his countrymen in India were hungry. This question, just as the statement that basic science should only be done insofar as it contributes to economic betterment, shows a complete misunderstanding of human goals. Should Beethoven's contemporaries have asked him how he could justify spending all his time on compositions when millions of people in Europe at that time went hungry? It is so obviously the wrong question that instead of answering it I can only counter it by another question. Would it be worth saving the human race from extinction if it could only be done by giving up all those creative efforts in the arts and sciences that are not directly related to survival but represent the strongest justification for the attempt to survive? Surely preservation and advancement of our culture should have the highest place in our system of priorities.

In the past few years we have had innumerable committees looking into the question of how science should be organized in Canada; in fact it appears that

Canadian science has been more thoroughly studied and examined and more reports have been written about it than in any other country in the world. But the trouble with these committees and these reports has been that they have been concerned not with how science works and with what makes scientists productive but solely with how a Science Policy might be formulated that would ensure that all scientific activities could be well coordinated and would be relevant to national goals. It has always seemed evident to me, and most people seem to agree, that the creative activities of writers, musicians, painters and sculptors cannot be planned and correlated or made coherent and I believe that creative activity in science falls into the same class.

Science is, however, distinguished from art, literature and music by the fact that in addition to its cultural value it is also the source of modern technology, and therefore of wealth and power. But even those who are only interested in the technological applications of science must take account of the way science works and scientists work, if they want to obtain results that are of value to our economy.

It is important to realize that there is a continuous spectrum between pure and applied science. There may be creative people working in each part of this continuous spectrum. It would be fatal to separate pure and applied science in this country into two non-communicating

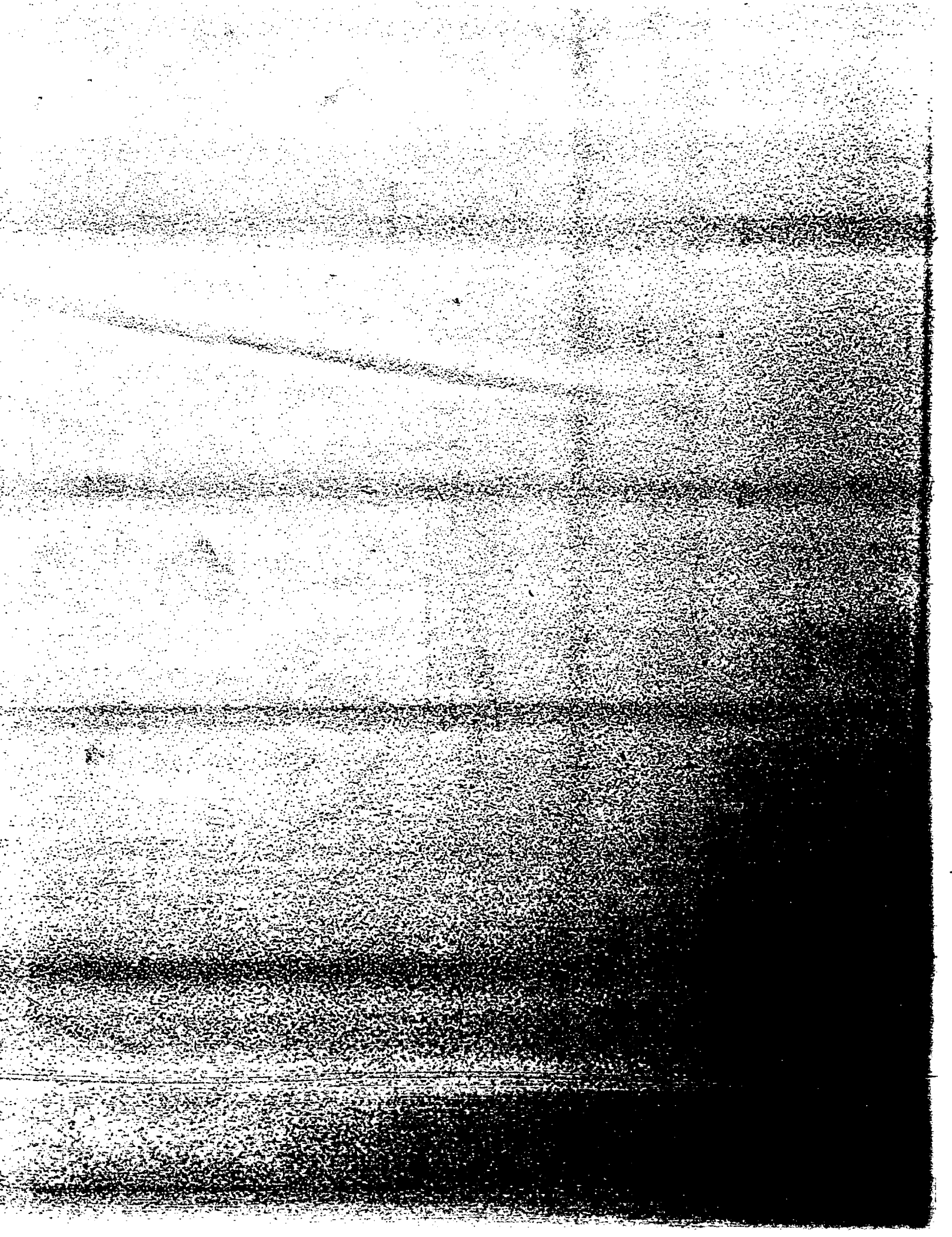
organizations, as suggested in a recent report, because one and the same scientist at one time may work at the extreme pure end of the spectrum, at another time in a region between pure and applied.

One of the great difficulties about organization and planning is that no matter how logical things appear on paper they do not always work out that way in practice. The current science policy discussions have made much of the subject of innovation - that is, the various steps that take a scientific idea from the laboratory and turn it into a product or a process that can be used by industry. I happen to know of two extremely brilliant young Canadian scientists who have earned their laurels in the field of pure science, one in physics, the other in chemistry. Each of them has developed techniques of great interest for certain practical problems. Both are trying to develop Canadian companies to exploit their creative ability, but they are not finding any support for this activity in spite of all the talk about the need for research and development in this country. The reason is the over-bureaucratization of many organizations that have to do with science and technology. For lack of Canadian support, one of the people I am referring to is getting support from a source in the United States, an industrial firm which does not ask for all the details of the plans of this particular individual

but has confidence in his proven creativity, has confidence in the outcome of something useful, something unplanned.

No country has as yet discovered the ideal solution to the problem of how to reconcile scientific activities with the political and bureaucratic procedures of modern government, but in all the studies that have been made in Canada it is overlooked that we ourselves have evolved a unique solution to the problem, namely, in the way in which the scientific activities in Canada have been organized around the concept of a National Research Council, dependent on Government in matters of political and financial control but essentially autonomous in decisions appropriate for scientific research. The success of NRC in promoting science in Canada has been admitted even by its strongest critics. It has built up the graduate schools of Canadian universities, it has created one of the strongest government laboratories in the world and it has supported general scientific activities in Canada to the point where Canadian science has a high international reputation. In addition it has carried out innumerable research programs aimed at aiding Canadian industry.

To one like myself who owes so much to the enlightened concept of scientific administration that was developed in Canada by those early Research Councils that were so severely criticized by the Senate Committee



it is disturbing to find that it is now proposed to break up the National Research Council and to replace it with a variety of committees, institutes and corporations that are held together only by the vague concept of a coherent overall Science Policy.

It takes a long time to build up a laboratory to the stature where it is in the forefront of international research; it is not simply a matter of establishing an academy or an institute and making it part of a coherent policy any more than to create great art or to produce great music is a mere matter of official support and administrative approval. There is in all these activities something more, something subtle that not only enables but actually encourages individuals to rise above themselves and to produce something so original that before it is given form it cannot be anticipated even by the artist or scientist himself.

After 50 years of development we have managed to create in Canada a number of laboratories where first-class scientific work of international calibre is being done. This has long been known to the scientists and one of the great advantages of the Prize is that it is now apparent to the layman and the politician. It would be a great pity, I contend, if at the moment when there is obvious international recognition of the achievements of Canadian science we were to jeopardize all that has been attained, in the vain quest for a coherent overall science policy.

In 1960, when the Conservative Government of the United Kingdom made the first tentative concession to the pressure for Science Policy and established a Minister for Science, it chose for the position Lord Hailsham, a politician who was trained in the humanities and who well understood the important role played by science in the development of our western civilization. In one of his speeches as Minister Lord Hailsham identified science as an aspect of culture in a way which succinctly sums up much of what I have been trying to say tonight.

"I am sure", Lord Hailsham said, "that there is only one doctrine of science which is worthy of a free society - or which corresponds to its real nature and genius. This is that science is primarily an aspect of culture or civilization. It is a liberating influence, a creative force, and however much we may seek to spend on it in the interests of national prestige, national prosperity, or national defence, we ignore its true nature only at our peril. Science must be free, and in the hands of the scientists, or it will ultimately wither and die and the scientists themselves will at first become corrupt and then lose their inspiration".

In conclusion, may I say again how much my wife and I appreciate the honour of having been tendered this dinner, with its beautiful musical frame, by the Government of this Province. Thank you, Mr. Premier, and thank you all for coming here to give us this warm reception.