Convocation Address, University of Western Ontario, 10 June 1976

Herzberg, Gerhard

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Speech by Dr. G. Herzberg

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Mr. Chancellor, Mr. President, students of the graduating class, distinguished guests, ladies and gentlemen:

It is a great privilege indeed for me to have received an Honorary Degree from this University and to be counted henceforth as one of its Alumni. My fellow graduand Dr. Colter (I am sure) joins me in expressing to the University our sincere appreciation for this honour. It was also a great honour for me to take part in the official opening of the new wing of the Chemistry Building which I am sure has completed an important phase in the development of science, and particularly chemistry, at this University.

In searching for a suitable topic for this address I came across a Convocation Address by Dr. Wilder Penfield, the famous neurosurgeon who died a few months ago. He quoted Cyril James, the former Principal of McGill

University, as saying "There is only one good Convocation Address. The problem is to set the right words to it". Penfield's difficulty was, and my difficulty is, that Dr. James did not divulge the secret of the good Convocation Address.

Two months ago while I was on a lecture tour in Japan my wife and I were given the opportunity to view the sights of Kyoto and the ancient city of Nara with the help of a chemistry student of the University of Kyoto accompanied by a girl friend, a student of English literature. Unfortunately our guide's knowledge of English was considerably less than basic English and his girl friend did only slightly better as an interpreter for him. Over lunch, when we tried to rest up from the strenuous

sightseeing, the student suddenly asked me, in broken English: "What is the purpose of life?". I did not foresee this question and am not sure whether I answered it to his satisfaction or indeed whether because of the language barrier he understood my answer. I shall come back to my answer in a moment but would like to mention another student, this time at the University of Chicago. He asked his professor, the famous astrophysicist Chandrasekhar, the following question: "How can you, Professor Chandrasekhar, with all the poverty in your native country India, justify spending all your time on abstract mathematical and physical problems?". Professor Chandrasekhar used this question as the starting point of a Convocation Address of his. I certainly will not be

able to do as well as he did in answering either of these students' questions, but in the few minutes at my disposal I shall try to make some relevant comments (realizing that they are far from doing justice to the subject).

First of all let me say something about the question of the purpose of life. As I see it, there are two ways in which this question can be meant and can be answered. First of all, given the present set-up of human society, what can you or I have as our purpose in this society? Secondly, you may ask, what is the purpose of the existence of man or of human society?

The first question is relatively easy to answer. Obviously each of us would like to make as good a contribution as we can to help in the education of

children, in caring for the sick or in the building of houses or factories, or in the production of food or of other material needs, etc., etc.

The second question is much more difficult to answer, and the answer will vary a great deal depending on whether or not you are a religious person or what other philosophy you may espouse. If for a moment you specialize the question, you might ask what is, or what should be, the purpose of human society in Canada or, if you like, what are the goals of the Canadian nation. In several government reports the question of national goals has been raised, but to my knowledge no generally accepted or satisfactory answer has evolved. I have seen one list of such national goals which gives first priority to the

improvement of the standard of living in Canada. This particular list I find deplorable. Surely a further increase in our (high) material standard of living and, connected with it, the removal of the last pockets of poverty, cannot be considered as an overriding national goal. It seems to me that the only possible overriding goal can be the cultural advance of this nation. Of course the nation has to survive in order to benefit from the advance of culture, but survival by itself is useless if it is not coupled with a higher aim.

We can readily translate these remarks to human society as a whole. Survival of the human race is an important goal only if it is coupled with some higher activity that distinguishes man from animal. The human activity that

distinguishes man from animal is his intellectual power. Man can think not only about the best way to survive but he can also think of things that have nothing to do with survival. Indeed human culture started not when man first developed tools to do certain jobs for his survival but when he began to embellish his tools and devoted some time to art and music, when he started to write poems, and when he began to think about the nature of things as we do in science. The essence of culture is always in those things that from a purely utilitarian point of view are unnecessary, superfluous or even wasteful.

The great thinkers of the past did not try to do something useful for survival but rather tried to widen the horizon of mankind by exploring the unexplored, by

trying to find connections between things previously thought to be unconnected. In doing so, but only incidentally, they also helped to improve our position in our fight against adversity. Faraday did not discover electromagnetic induction because he wanted to help provide a new source of power. Nobody knew at the time, not even Faraday, that electromagnetic induction would supply the source of power that even to-day is at the basis of virtually all electric power production whether it originates from coal from hydro or nuclear energy. Faraday made the discovery because he wanted to understand the connection between electricity and magnetism.

As thinking members of human society we must make sure that not all our activities are devoted to the improvement

of the standard of living but that a reasonable fraction of all our efforts and our government expenditures goes towards the furtherance of the arts, to music, to literature, to science.

In saying this I have implicitly answered the question of Chandrasekhar's student. Certainly we must help the developing countries to improve their standard of living and to combat poverty, but it should not be done at the expense of our pursuit of the highest things in life, that is, not at the expense of the improvement of our cultural standards, of the support of excellence in art, literature, music and science, of the attainment of new knowledge and understanding. Surely there are lots of non-cultural expenditures that could be redeployed for aid to developing countries.

This brings me, almost unwillingly, to a topic which 10
at present is foremost in the minds of most scientists in this country, namely, the fact that the present difficult economic situation has induced our government to cut down the support of basic science. We are told that "University researchers will not be given special consideration for government funding"; but the question is not special consideration. All that scientists (and others) ask is that expenditures for research not be cut down more than those for other activities. At the moment the support of basic research in Canada is faring far worse than most other activities and far worse than in other countries. In Canada very few of the inroads of inflation have been compensated by increased dollar support for research at universities, so much so that in

real dollars the support of research at universities has gone down to almost one-half of what it was a few years ago.

The feeling among some of our politicians seems to be that the contribution that Canada can make to international science is so small that we may as well forget about it and take our information from countries like the United States and the United Kingdom. Politicians who think like that forget that this implies that Canada will be going back to colonial status, that it will not be a country with its own culture and its own cultural accomplishments in the intellectual sphere. Actually I could name a number of fields in scientific research in which Canada's contribution has been far above that to be expected

relative to its population. Naturally this can not be expected in every field.

Some politicians seem to think that you can turn off and on basic research, depending on the state of the economy of the country, not realizing that it takes many, many years to form and develop an active and productive research group in basic science as well as in applied science. In bad times it may be possible to dissolve a construction company that has proved to be efficient and to reassemble it a few years later when times are better. But this method cannot be applied to scientific research. If we want to develop science in this country we can not interrupt the process for a few years waiting for better times without damaging the whole activity irreparably.

The situation is not unlike the mythical situation about the geese that lay the golden eggs. You cannot starve those geese one year and expect the next year still to reap a harvest of golden eggs. I use this example advisedly because, as I have already suggested, the activities of scientists devoted entirely to basic research for its own sake do frequently lead to golden eggs in the form of discoveries that are of practical benefit.

As a modern example I need only mention the history of the development of the laser. Shortly after the last war the Bell Telephone Company as well as three other industrial companies had strong research groups in microwave spectroscopy but they soon gave up this

activity because they felt it was not of any foreseeable practical use. This was just two years before the maser was developed by Townes on the basis of his work on microwave spectroscopy at the Bell Telephone Company. A few years later when Townes and Schawlow wanted to patent their basic ideas for an optical maser (now usually called laser) the Bell Company's patent department refused to consider it because they thought that "the invention had little bearing on Bell System interests". To-day there are more than 100 research workers at the Bell Telephone Laboratories working on laser problems and thousands of other workers in other industrial laboratories throughout the world. The laser now represents a billion dollar industry.

This example and many others that could be quoted also illustrate the importance of not circumscribing the efforts of research workers in their respective fields if one wants the best results both from the point of view of pure science and applied science. Nobody, not even the research workers themselves, can predict what the results of a discovery in a given field will be, particularly not when the discovery has not yet been made.

I am making these remarks to you, the graduating class of this University, because I feel that you, as young voters in this country and possibly as active politicians, will have a strong influence on the future of this country. I cannot overstress sufficiently to you the need to realize that man does not live by bread alone.

Besides your daily struggle to earn a living, to bring up a family, to help your neighbours, you should never forget that survival of the individual, of a nation, of the human race is not enough to give purpose to human existence. I submit to you the thought that it is the high intellectual achievements of the great thinkers, poets, painters, musicians of the past and the future which give purpose to the existence of mankind.

It is therefore of prime importance that we support the work of gifted individuals whether they be scientists or humanists, painters or poets, musicians or writers. It is equally important that we as ordinary mortals try to understand and appreciate the work of the intellectual giants and try ourselves to contribute to the store of

knowledge on which the giants can build.

Of course, creative men of genius cannot live on their own. For one thing the human race must survive so that these men of genius can arise, and many able men and women are needed to ensure survival - physicians, politicians, engineers, etc. But let no one tell us that survival and the improvement of the standard of living is to be the principal aim of society. Rather, let us develop a cultural climate which believes that human excellence is a good thing in itself, a climate in which all members of society can rejoice and delight in the things that the small number of exceptional members is able to do without asking what use they have for survival. We must come to the point where even the average citizen

considers the works of art, literature and basic science as not merely the icing on a cake but as the essence of human existence. Without that, to quote C.P. Snow, "some of the major hopes, the major glories of the human race will rapidly disappear".

It is at the universities where much of the creative work of men of genius has been done and appreciated. For the future we must look to the universities to maintain and improve the high standards of the past, to recognize, to preserve for posterity and to interpret works of genius wherever they are found, to encourage excellence of all degrees in its students and faculty members, and not to give in to any tendency that, for the sake of egalitarianism, tries to belittle the striving for excellence.

In closing may I thank the University again for this honour and express to you the graduates my warmest congratulations on what you have achieved and my best wishes for the future.