

Dr. Mackenzie: The answer is not a simple yes or no. I do not exclude small researches, where a small group of scientists wish to do something. But multi-million dollar projects, such as space research and atomic energy, are usually not exclusively Canadian problems, although certain locations in Canada may offer special advantages.

Senator Carter: Canada is in a unique position to carry out research on communications over very wide spaces, in the north Arctic areas, where Russia has done much more in research than we have done. Should we not do those things which come naturally?

Dr. Mackenzie: Yes, that is certainly what we should do and I think in the main that is what we have done. As an example, the aeronautic industry and radio industry were stimulated by the problems raised in opening up the northern regions of western Canada. The only effective transportation was by aeroplane and there had to be a different type of aeroplane and a special navigation system, and out of the work done after World War I on northern development came the cathode ray detection finder, which was the forerunner of radar. The excellent research done on the upper atmosphere in Saskatoon is due to the fact that they have the magnetic pole in their back yard.

Senator MacKenzie: What is your opinion about research done in provincial laboratories such as in the Ontario Research Foundation? How does that fit into the picture?

Dr. Mackenzie: May I answer that not in the present but in the past? I faced this problem in the postwar period. In 1945 the Federal Department of Reconstruction, to assist smaller industries, started a Technical Information Service with field offices in all the provinces to make contact with the industries. This service was successful. After a few years certain of the provinces which had research foundations wished to take over the actual field work in their areas, and the National Research Council agreed to co-operate and made grants to these provincial bodies.

Personally I favour this type of co-operation. Obviously the federal Government has large central information facilities which provinces cannot match, but in my opinion there is an advantage in having provincial

bodies make the contact with individual industries, if they so wish.

Senator MacKenzie: In reference to Senator Carter's point about the Observatory, there are some authorities who suggest this work could be better done elsewhere, where there is fine equipment. The question is: do we do such research on an international basis or should we be firmly national about it and try to keep the facilities and the scientists here?

Dr. Mackenzie: Your question raises two points, one of which I have answered. I have suggested broad policy should be made before, not after, governments have made grants, for it is difficult to pull out later. Secondly, there is no reason why we should not take part in international efforts if it is to our advantage, although I do not see much scientific advantage to us in taking part in an international project in Europe, such as that in atomic energy which has advantages for Britain and the common market countries. On the other hand, I think international co-operation on this continent on such things as space, meteorology, communications, astronomy and atomic energy would be useful. One cannot give a generalized answer yes or no on this question. One must decide on specific cases.

Senator Grosart: Dr. Mackenzie, you have related the great strides everywhere in our own and other scientific technologies to periods of two great wars. Yet today we very often hear it said that high level of defence spending in the world involves the sacrifice of other more important social priorities. Is there a contradiction here?

Dr. Mackenzie: The experiences in wars demonstrated the potential power of scientific application. The public became convinced that the application could do the same for peaceful purposes, not by spending moneys on military research but by using similar efforts in the civilian field. Many of the results of military researches do "spill over" to civil fields, but in my view this is not a good reason for undertaking military research work. I am afraid, however, few governments would spend the enormous sums of money on civilian research that they feel is imperative for current wars.

Senator Grosart: How would you meet such needs or form a rationale of expenditures?