

has been dictated, among other reasons, by their need to be able to support extensive research and development efforts. My own experience has proven to me that no purely Canadian company, that was basically operating in the Canadian market, could possibly function effectively in the synthetic fibre field without access to the R and D of some much larger international company. Thus, we find in Canada, Chemcell with which I was associated, as part of the Celanese family. CIL is part of the Imperial Chemical Industries family; Dupont of Canada is in the Dupont family; and Courtaulds of Canada in the Courtaulds of England family. Licensing and royalty arrangements are useful but are no substitute for direct access to continuing technological developments. By definition the licensee is never in the forefront; he is always a few laps behind. I suspect that what is true in the synthetic fibre field is true in many others—and whether we like it or not the big international companies are now a fact of life. They are here to stay and we have to learn to live with them, and hopefully to develop more of our own.

This, it seems to me, has a real bearing or should have a real bearing on our scientific and research policy. It is a companion piece to the almost trite saying that scientific knowledge, like all knowledge, knows no national frontiers. No industrial R and D effort, that was worth its salt, could operate on the basis of solely Canadian scientific knowledge; it must have access to what is going on in other parts of the world. And this brings me to the point of Canadian nationalism in our research policy. I firmly believe that the Canadian Government approach to the encouragement of industrial research should be to develop a competence for good research in Canada rather than the narrow approach of looking at individual projects to see if they themselves "will benefit Canada".

In Chemcell we had access to a tremendous volume of material in the R and D departments of Celanese Corp. That access, however, was worthless unless we had the trained personnel in Canada to know how to use what was available to us. In order to have that competence we had to have our own R and D effort in Canada—and one good enough to attract good people to it—which means among other things an opportunity for the scientific personnel to do original work on their own. In our view, the important matter was not whether the results of their labours

in Canada were ultimately followed through in Canada or elsewhere. The absolute amount they could produce in any event would probably be small in comparison to what was available to us through the huge R and D effort of Celanese. What was of primary importance was to have in Canada a competence to take advantage of what was available to us.

Let me cite a case history from my own experience. Celanese Corp. in its laboratories in the United States developed, to bench scale, a process for producing pentaerythritol—a polyhydric alcohol made by combining acetaldehyde and formaldehyde. It is used extensively in the manufacture of many types of surface coatings for such applications as automobile finishes, refrigerators and other domestic appliances, paints for railway box cars and many types of enamels. It is also used in the manufacture of explosives and in some plasticisers.

Chemcell was given the opportunity of bringing this development into actual production. This meant bringing it from the bench scale, through the pilot plant stage and ultimately to the commercial production stage. A very substantial amount of further R and D work was required for this purpose, which we undertook at Edmonton—and eventually we were successful. The plant has been increased to some extent in size but more importantly by improved processes and techniques until it is now one of the largest, if not the largest, units producing this product in the world. We believe it is also one of the most efficient in the world. We got to the point where, apart from the Canadian market which is only a few million pounds a year, we had almost 10 per cent of the whole United States market and sold in some 35 or 40 other countries. Taking Canadian raw materials that sell for less than one cent a pound—and here I refer to butane and propane from which we made acetaldehyde and formaldehyde—and producing a product that sells in export markets for over twenty-five cents a pound, is certainly good for the Canadian economy. Eventually, the demand in the United States was such that Celanese decided to build its own plant in Texas, which they did in large measure on the basis of our R & D effort in Canada. In the result we have, of course, lost most of the United States market for the Canadian company; but we still have a 50,000,000 pound production in Canada that we sell in some 35 or 40 different markets. Here was a situation based in the early stages