

Those needs will not invariably be met within the walls of a university, and we have to ensure variety of opportunity as well as adequacy of resource. We can only do this so long as the universities and professional institutions are alive to their responsibility. Within them there must be freedom for the variety of opinion, for the "creative minority" among all those who respect the standards of professional conduct and intellectual honesty which are fundamental in the search for truth. The vigour of academic and professional life depends on the existence of such groups, and on the readiness of their members, within the safeguards and security which academic and professional institutions afford, to think deeply on their special studies; and also, in a wider professional and social context, to consider how best their technical contribution to the solution of a particular problem can be rendered to the Government and to the society of which all are members, and if necessary to put their opinions to the test of experiment.

We have as yet scarcely begun to visualize the contribution which the professions could offer to the better ordering of society, or to the ways in which their knowledge and experience could be put most effectively at the service of society. There are many problems of organisation here to be studied, but the attention now being focused on voluntary action should remind us how urgent is the need for all professional associations to give unceasing attention to the whole issue. Powerful forces of the modern world are threatening the security and independence of the professional classes as a whole, and if unchecked may render them incapable of such potential services or even of supplying the leadership they have done in the past. Professional freedom can only exist in a free society; the principles underlying it are those on which academic freedom also, and the most essential liberties of society as a whole, are based. The defence of freedom rests above all on the willingness of professional men and women to use their professional—and voluntary—associations to great and unselfish ends.

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## CHEMISTRY IN CANADA

### A History of Chemistry in Canada

Compiled by C. J. S. Warrington and R. V. V. Nicholls. Pp. x + 502 + 13 plates. (Toronto: Sir Isaac Pitman and Sons (Canada), Ltd., 1949.) 4.50 dollars.

IT is clear from this book that chemistry has played a great part in the development of Canada. Indeed, according to Lash Miller, the first colonist of New France was a chemist, Louis Hébert; upon lands given by his descendants in the city of Québec stands Laval University at the present day. Moreover, it was in the Séminaire de Québec, in 1720, that the first public instruction in chemistry in this part of North America was begun. There is much picturesque historical detail of this kind, new to the European reader, in the authoritative work under notice; but the book is equally valuable for the picture it gives of the economic and industrial development of Canada, viewed against a chemical

background. Almost every important field of applied chemistry has been treated in this triple aspect, with the help of numerous specialists working under the auspices of the Chemical Institute of Canada.

The book opens with the statement that a thread of metal runs through the whole fabric of Canadian history. With Cabot and Frobisher and Cartier this thread was of gold, although the imagined gold and diamonds that Cartier (who was obviously neither a chemist nor a mineralogist) brought back to France turned out to be iron pyrites and quartz! In later days, by a kind of inverted alchemical transmutation, this thread has changed into silver, copper, iron, nickel and uranium. From metals the story passes to chemical by-products of smelting, and thence to other subjects of great scientific, economic and industrial importance. Fertilizers, mineral products, chemicals from coal, natural petroleum and derived chemicals, products of the electric furnace, of electrolysis, of wood, of agriculture and the sea, medicinal and fine chemicals, explosives, oils, fats and waxes: all these and still other fields of applied chemistry are treated in turn from the Canadian point of view, and set forth with statistics, maps and other illustrative material.

In this way a realistic picture is gradually elaborated of Canada's impressive natural resources and of their development to date, as seen by the chemist. The extent of these resources may be illuminated by a few statements selected from the book at random. Enormous subterranean deposits of common salt extend over an area of three thousand square miles in the province of Ontario alone; the province of Quebec contains, at Asbestos, the largest asbestos mine in the world; in coal reserves Canada stands next to the United States; three out of every five newspapers in the world are printed on Canadian-made paper. This wealth of natural materials is accompanied by bountiful natural sources of energy. The expanding use of electrical energy is particularly noteworthy. During the past hundred years the five-fold increase in material output per worker in North America is ascribed chiefly to the extensive industrial application of electricity as a motive power and in electrochemical reactions. In this respect, the hydroelectric power of the Niagara and Shawinigan areas assumes a special importance. Canadian activity and enterprise find a further expression in the fact that Canada consumes more petroleum products per head than any other country. At present more than 90 per cent of these oil supplies is imported; but current developments in Canadian oilfields are gathering momentum, notably in Alberta.

An account of chemistry and public services in Canada describes numerous research organisations, including the National Research Council, formed in 1916, with its many divisions and sections, illustrated by such diverse undertakings as the Atomic Energy Project at Chalk River, Ontario, and a Prairie Regional Laboratory at Saskatoon. The flourishing state of Canadian chemistry finds a further reflexion in the detailed accounts of chemical teaching and research in the universities and other institutions.

In brief, this book affords an impressive description of Canada's natural resources seen from the point of view of the chemist; of their development from early days to the present time; of the leading men responsible for this development; and of the striking vitality of Canadian chemistry in the industries, research organisations and universities of that great country.

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