Letters from Canada

In 1991, two German scientists posted to Canada shared their impressions with colleagues ...

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Below is an English translation of "W. Heywang, und R. B. Heimann, Als Physiker und Materialwissenschaftler in Kanada, Physikalische Blätter, *Volume 47, Issue 10, October 1991, Pages 943-944", DOI: 10.1002/phbl.19910471017. The first paragraph is the article's abstract.*

This article reports observations of two German scientists, a physicist and a material scientist, who visited Canada as of their different formal positions. Since 1989, Walter Heywang, professor of Technical University of Munich (TUM) and former director of Siemens R&D, is visiting technical adviser in the University of Alberta, where he visits three times a year for four weeks. His main job is technology consulting and transfer and he helps different companies across the Atlantic. Robert Heimann is head of material science division in Alberta Research Council as well as professor at University of Alberta. He is responsible for technology transfer in raw material and manufacturing industries in the Canadian province of Alberta in the area of traditional materials and high power materials especially high power ceramics. He lives in Canada since 1979 (in provinces of Ontario, Manitoba and Alberta) and worked in McMaster University, University of Toronto and in industry (3M Canada) as well as Federal (Atomic Energy of Canada Ltd.) and provincial research laboratories (Alberta Research Council) where he was and still is active in the area of material research.

When a natural scientist steps in a country like Canada, he/she has reasons to study still interesting topics like ice formation, northern light or other similar northern climate changes which characterize this land. However this is not all; as many important contributions in physical research also happen in Canada. Examples for such are: TRIUMF facilities for medium-energy nuclear and particle research in British Columbia with planned "Kaon factory" for medical research, under construction SNO (Sudbury Neutrino Observatory) in Ontario, Herzberg Institute for Astrophysics as well as high energy physics group at Carleton University in Ottawa and OPAL project (Omni-Purpose Apparatus for Linear Electron-Positron Acceleration) which collaborates with CERN. Also many space research projects should be mentioned as well e.g. Mobile Servicing System for Space Station, VIKING project satellite and interesting Space Shuttle experiments.

Finally the works of Erner Israel, University of Alberta, with Stephen Hawking in Cambridge, UK, about black holes must be named which are very topical today. Despite all of these, Canadian contributions are under appreciated in the view of Europeans, who compare things with United States. This holds even more in terms of technical-industrial applications, in which the neighboring United States with ten-fold development puts Canada in the shadow.

This puzzles us more when we see for example how Bell Northern has established itself beyond a Canada-wide telephone company. Why? The enormous area of the country has a determining role in creating the demand for telecommunications. Likewise there are problems like transportation in the vast country under harsh climatic conditions which must be resolved, and Bombardier, which was founded based on local solutions, found a worldwide reputation. The energy issue adds another dimension. So Hydro-Québec, a pioneer in 735KV-distribution, conquered longer distances. Nuclear energy has another leading role based on heavy water moderated CANDU reactor system and the low energy SLOPOKE system, to heat the isolated settlements in Northwest Territories. The raw material industry can proceed by developing extraction procedures for heavy oil, zinc and nickel and biotechnology with the first application of cloning in beef industry.

The medicine has of course a major role as such a young country shows an extraordinary long tradition in that. In 1923, two Canadians F. Banting and R. Macleod won the Nobel Prize for discovery of insulin and its working mechanism. Their colleague, C. Best, made a breakthrough for insulin mass production as a medicine. The remarkable status in medical technology with important contributions like imaging systems, prosthesic devices and new drugs benefit a lot from their exemplary social healthcare system. And as another example: in Alberta there is a fund to generously sponsor the medical research and developments.

However we should not still use these to compensate the prevalence of physics and technology in United States when comparing with that of Canada. This is because Canada is much younger as an independent country and so far it was only a raw material producer and in many aspects it is still at the beginning of industrialization. Large dependence on the reservoirs of raw material and a less diversified economy of Canada, for example oil and natural gas and coal of Alberta, forest industry of British Columbia and Quebec, potassium and uranium mining of Saskatchewan as well as nickel, zinc

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and copper mining in Manitoba and Ontario, makes the country very susceptible to the cyclic ups and downs of the world market.

As the aforementioned situation in Canada was very much recognized, wide spectrum industrialization felt necessary which will shift the economy toward more high performance products, materials and technology. This is only possible through participating in a steadily increasing globalized commercial competition. The importance of this was mentioned in the so called Halifax-Declaration 1989, a report presented by the National Forum of Science and Technology Council to the Canadian Federal Government. Ultimately that was this necessity which brought the authors together. The realization of these goals from the status of a raw material country with yet weakly developed technological resources was and is not at all easy. A very fruitful step was founding internationally known universities and research institutes, which is of course one of the many prerequisites for commercially usable high technology innovations. For an effective technology transfer the expertise in production and marketing are also necessary. These could not be achieved by merely shifting the existing R&D activities in these directions, although it was recently practiced to some extent - not only in Canada.

Also the required growth of total R&D expenditure in Canada, which is still 1.4% (compared with 2.9% in Federal Republic of Germany) of the gross national product, is not only hampered by the budget crisis due to austerity measures of the fiscal policy, but only provides a partial solution to the problem as the industries are mostly formed from small companies as well as production companies with foreign consortiums that sparsely contribute to local development.

Based on what we have said before, the way to quickly resolve the aforesaid problems is a focused international cooperation through which the missing Know-how's in technology and industrializing as well as management experiences can be incorporated. This is one of the essential tasks that the authors devoted themselves to, a task which is appealing as well because Canada is not empty handed. There is – as it was said before – exceptional experiences from the raw material sector, from agriculture to wood industry as well as its geographical vastness.

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In telecommunications sector, first of all the mobile and satellite communications must be mentioned. In addition there are particular achievements from newly founded universities and research centers with remarkable but yet less applied synergy potential. This is partly due to the geographical vastness of the country and partly because of the less developed industrial infrastructure. Although there are many positive aforementioned examples here which could be used, we would like to emphasize on our two year projects with Alberta in focus:

In the material sector, so far two cooperation contracts with European companies as well as research institutes were closed and four more are under progress. In this sector the Alberta experience regarding raw material extraction and processing was an essential factor, possibly by looking back at our economical trade with Soviet Union whose northern territories have geological and climatic similarity with that of Canada.

With regard to agriculture one of these operations in biotechnology must be emphasized. Beside these activities which are mandated by economical conditions, some specific areas must not be forgotten for example laser sector in which two cooperation contracts were signed with German companies or the field of speech recognition and parallel data processing as well as heavy automotive industry with altogether four cooperation contracts in progress.

All of the abovementioned cases fall into the category of the authors' expertise and therefore serve as examples only. But they would like to show that Canada is appealing as a technical-scientific collaborator, a fact that Europeans despite their common cultural roots with Canada took less advantage of as opposed to the Japanese.

In this summary we would like to mention that Canadian people not only consider themselves as "multicultural", but also they practice it in reality. Thus for a German person it feels more to be "at home" compared to the neighboring United States- and with the same generous and vast nature.

This should be a reason for a physicist who is interested in having a technical-scientific cooperation with this country. On the other hand Canada welcomes such cooperation in order to achieve a balanced development not only in the preferential raw material sector but also in industrial business as well. Only if this is achieved very fast, then Canada can protect its economic and technological independence despite having a close border and free trade with USA and it can play its sought role as a bridge between developing economy blocks. ■

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