

## Introduction

Human beings have long used micro-organisms to produce the things they need. Since people first began to make beer, bread, wine or cheese, they have been using biotechnology, even though these traditional technologies were not known as such.

However, only the most recent discoveries of biology and genetics, and the areas to which they have been quickly applied, have opened the way for modern biotechnology. It took about 15 years for "selected" or "manipulated" micro-organisms to become (or at least hint at becoming) industrial giants. These are now the stars in the biotechnological firmament.

Biotechnology has become the nucleus of a true technological

revolution that is blazing new trails in the fight against disease, allowing traditional sectors such as the agri-food and forest industries to modernize and increase their productivity, providing new weapons for the fight to protect the environment and forests, and making it possible to develop new industries, such as bioelectronics, and to create new products.

Already, biotechnology is responsible for introducing new synthetic substances and producing existing products at a lower cost, and for developing more effective, inexpensive and less polluting processes. Here is proof of the dynamism and know-how of Canadian biotechnology.

Canada is carving out an enviable position for itself in an extremely competitive biotechnological and bioindustrial field and is in the forefront of advanced research in biology, genetics and biotechnology-based business endeavours.

The use of the term "biotechnology" is a recent phenomenon, originating with an epoch-making discovery in the history of the biological sciences. In 1973, researchers in Stanford, California, succeeded in carrying out an experiment of vital importance. After cutting DNA (deoxyribonucleic acid) fragments that carried a particular gene from a cell, they were able to transfer that gene to another cell, thus achieving the very first gene transplant.

Since that time, genes have become concrete entities that can be manipulated at will, and this has led to the rise of the "age of genetics." It is now possible to manipulate the genetic coding (contained in the DNA) of all living organisms, from bacteria to human beings. Because of genetic engineering, it is even possible to reprogram micro-organisms in order to make them produce certain desired substances continuously.

However, the biotechnologies used by those working in this field are not restricted to genetic engineering. They also include cellular fusion, which is the basis for the production of hybridomas for diagnostic or therapeutic purposes. In agriculture and forestry, they consist mainly of cell and tissue cultures. Enzymatic and fermentation engineering techniques also play an important role, especially in the food and pharmaceutical industries, because they make it possible to domesticate microbes effectively and use them to produce various substances that meet people's needs.



Aerial view of the Balco Canfor greenhouses.

(Balco Canfor Reforestation Centre Ltd.)