



Another project brought to you by **GenomeCanada**

---

## Genomic Approach to Identify Fungal Enzymes for Industrial Processes and Environmental Remediation

<b>Status</b>	Past
<b>Competition</b>	II
<b>Sector</b>	Environment
<b>Genome Centre</b>	Genome Quebec
<b>Project Leader</b>	Adrian Tsang

---

### Project Description

The research methods developed for The Human Genome Project are being applied to the study of many kinds of organisms that are important in our daily lives. For example, many forms of fungus carry out natural biochemical reactions that are potentially useful in industrial applications, including production of pulp and paper, ethanol for and bio-diesel for energy, human food and animal feed, and a host of other uses. These micro-organisms can be thought of as miniature “bioreactors”; they can work at very high temperatures and are environmentally sound, producing only natural waste products.

We used the methods of genomic science to identify and study a selected group of fungal enzymes for environmental and industrial applications. We chose 14 diverse fungus species on the basis of their abilities to degrade environmentally hazardous compounds or to catalyze important reactions in food production and other applications. Parts of our research were carried out with two industrial partners in order to speed the discovery of applications.

We established several kinds of experimental tools. First, we identified over 70,000 new genes using advanced genetic methods; among these are almost 3,000 that have potential practical application. Second, we set up a laboratory system to produce proteins coded by these genes so that we can determine how useful they might be. Third, we built a database and specific software that allows us to deposit and analyze our genetic results. Fourth, we set up a state-of-the-art technology called DNA micro-arrays that allows us to measure which fungal genes are active under many different environmental conditions. We made these three experimental tools available to researchers all over the world.

## **Fast Facts**

<b><i>Highlighted outcome:</i></b>	Creation of a Canadian and international resource for fungal-genome research.
<b><i>Number of research personnel employed by the project:</i></b>	71 (39 research assistants, 11 postdoctoral fellows, 7 technicians, 2 bioinformatics experts, and 12 programmers) plus 58 students (14 graduate and 44 undergraduate)
<b><i>Number of peer reviewed publications published:</i></b>	13 + 5 book chapters
<b><i>Number of patents in process or obtained:</i></b>	2 copyrights, 3 provisional patents filed
<b><i>Resources generated:</i></b>	71,000 gene markers and ~ 3,000 potentially important genes identified, many potentially useful proteins purified, a fungal DNA micro-array facility established, and a fungal genomic database made available.
<b><i>Co-funders:</i></b>	DSM Food Specialties, Pulp and Paper Research Institute of Canada