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ANNUAL REPORT 2007-2008

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GenomeAlberta

Genome Alberta is a not-for-profit organization that initiates, funds, and manages genomics research and partnerships.

We were established in 2005 as part of Alberta's Life Sciences Strategy through an initiative between the Government of Alberta and federally funded Genome Canada.

Together with our funding partners, Genome Canada, other Canadian Genome Centres, the Alberta Government, other provincial, federal, international institutions, and industry, we coordinate and manage the projects and programs you'll find in these pages. We work with the research teams to ensure scientific excellence, accountability and appropriate governance. This funding allows us to bring together industry, government, and researchers to develop tangible outcomes for the benefit of Albertans, Canadians and society.

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Note from the Genome Alberta Board

It has been a pleasure working with the Genome Alberta Board of Directors and staff over the last year to see this young organization build momentum and develop a portfolio of research projects.

CEO and President Dr. David Bailey has focused the considerable expertise and energy of his team towards some of the biggest issues facing Alberta and Western Canada.

With the Mountain Pine Beetle threatening both the livelihood and recreational opportunities of many Albertans, Genome Alberta received funding to add its research and knowledge to the province's efforts to combat the pest. Energy costs and concerns about supply have rocketed in the last year and the Genome Alberta Board was pleased to see funding coming from the province to help find ways to use genomics as a tool to build the bioeconomy. As a Board we have also been supporting and encouraging Genome Alberta's work to



further research initiatives into Petroleum Metagenomics. We have strong reason to believe that this proposal will come to fruition over the coming months and that the work will build a greener and more efficient conventional energy industry here and around the world.

Genome Alberta first saw the light of day in mid-2005 as the science of genomics was still caught in the glare of the 21st Century. As it matures, genomics is starting to touch us everywhere—nutrition, energy, disease diagnosis, and reproduction. Genome Alberta was created to focus on genomics and is a key component in the Province's Life Science Strategy and has the potential to have an impact on Albertans on a daily basis.

Premier Ed Stelmach has been quoted as saying that being timid and doing nothing is a threat to our future and that the diversification of our economy will be driven by the creativity and innovation of Albertans. Genome Alberta has the knowledge, the vision, and the enthusiasm to help take the province in some new and exciting directions, and on behalf of the Board of Directors we trust you will join us as we continue to tackle the science of the 21st century.

A handwritten signature in black ink, appearing to read 'Art Froelich', written in a cursive style.

Art Froelich
Chairman of the Board

Message from the President and CEO

“ This is the biotechnology century. This is the most transformational human endeavour in history.”



Those words are from James Greenwood, head of the Biotechnology Industry Organization and with just over two full years of operations behind us, everyone at Genome Alberta is excited to be part of the great endeavour he was referring to.

Fiscal year 2007–08 was a year of both consolidation and looking forward for Genome Alberta as we undergo our own transformation from start-up to developing a full range of projects.

We launched the 4 million dollar Mountain Pine Beetle project in January, and received funding of \$800,000 from Western Economic Diversification Canada for the establishment of a series of Western Canadian Genomics networks. These two projects are excellent examples of collaboration between the Genome Centres and will help build our profile as we move beyond our inception phase.

We also received 1.5 million dollars in funding from Alberta Energy. The money will be spent over two years for three sequencing projects in plant genomics, and to develop a business case on the role of genomics in the development of bioenergy in Alberta. We have initiated the competition and will be announcing the successful projects in mid–2008.

I'm pleased to report that all Genome Alberta projects that were launched as part of Genome Canada's Competition III successfully completed an interim review conducted by an International Scientific Review Committee. With this endorsement, we are now looking forward to exciting discoveries and continued progress towards the completion of Project Milestones.

Part of that moving forward has meant establishing our presence in many important areas. We have been very active in meeting with representatives from government, industry, associations, and academia to build the contacts and networks needed to establish partnerships over the coming years.

I am pleased to look back on the last year as a success in getting Genome Alberta's presence onto the Alberta life sciences' stage. It couldn't have happened without the expertise of our staff, our Board of Directors, and the researchers involved in our projects. I'd like to thank everyone involved for their efforts and look forward to even bigger and better achievements.

A handwritten signature in black ink that reads "D. Bailey". The signature is fluid and cursive, with a horizontal line underlining the name.

Dr. David Bailey
President and CEO

The Science of Genome Alberta

“We are a ways away from designing people. Our goal is just to make sure they survive long enough to do that.”

~ World-renowned genetic scientist Craig Venter, when asked about the potential risks of modifying microbes to capture CO² and turn it into fuel.

Genomics continues to capture the imagination of the general public, policy makers, governments, and the media. What many people do not realise is that the work of Alberta scientists have played a significant part in contributing to this excitement while seeking out practical solutions to immediate problems.

The Mountain Pine Beetle Genomics Project (MPB) a joint effort with Genome BC, was officially launched in January 2008. While some reports suggest that this beetle epidemic will fade away as large portions of the lodgepole pine have already been destroyed, others argue that the Mountain Pine Beetle will simply move to different forest species. This makes the MPB Project even more relevant to the whole country.



Genome Canada, our largest funding partner was able to secure \$140 million in the 2008–2009 Federal Budget. A portion of this funding has been dedicated to a Competition in Applied Genomics Research in Bioproducts or Crops that was launched on April 1 2008. In preparation for this competition, Genome Alberta held a number of stakeholder consultation meetings and workshops, results of which will be incorporated into research proposals that our Research Community will be submitting in the Fall of 2008.

In early 2008, Genome Alberta received an investment totaling \$1.5 million from Alberta Energy. This investment will be used to solicit competitive research proposals that focus on the establishment of Alberta Crop Genomics platforms.

Building on the success of the “Building the Metabolomics Toolbox” Project, Genome Alberta has invested a total of \$670,000 in the establishment of a Pan-Alberta Metabolomics Platform. This platform will be used to provide metabolomics services and expertise to Albertan, Canadian and International scientists and projects. This platform will be an important foundational resource to ensure that Alberta maintains its international leadership position in the area of metabolomics.

Looking ahead Genome Alberta is working hard on generating interest and financial support to develop a major Petroleum Metagenomics project. With its abundance of natural energy resources and intellectual capacity in related disciplines, Alberta has the potential to become a leader in Petroleum Metagenomics and effectively participate in a new generation of energy projects.

A handwritten signature in black ink, appearing to read 'G. van Rooijen'.

Dr. Gijs van Rooijen
Chief Scientific Officer

Reaching Out

Over the last year we have created some new and interesting communication tools for Genome Alberta.



To open up more interaction with the general public we added a series of blogs on our website which have been well received. Our education consultant Gerry Ward continued his blog, we added a blog from Mountain Pine Beetle Project Manager Matt Bryman, and a Communications section. I had my own personal genotyping done by three direct-to-consumer genome testing companies and have used that as partial content for the blog postings, for media interviews, and for public speaking opportunities. All of our blogs are available at www.genomealberta.ca/blogs

The Genomics Application is ready to launch on Facebook spring of 2008. This unique application allows users to 'give the gift of a gene'.

A virtual gene of course, but an innovative way to reach out to a new demographic and tell them about Genome Alberta and about the science of genomics.

Organizers of the 2008 International GE3LS Symposium being held in Calgary approached Genome Alberta to help sponsor an art exhibit and contest in keeping with the theme of the event. It was decided to make it an all digital art contest and entries came in from around the world. You can view all of the submissions and find out the winners by going to www.genomealberta.ca/vote.aspx

Genome Alberta also sponsored a wide variety of events to help build relationships and enhance our profile. These included Discovery Day at the University of Calgary, the AsTech Awards, Harvest Gala, ABIC 2007 in Calgary, the Plant Agricultural Genomics meeting in San Diego, CKUA's Innovation Alberta Program, and of course our ongoing support of Alberta's Regional Youth Science Fairs.

Finally, one of the highlights of the year was certainly the launch of *Geee!* in Genome's new National tour in mid-March. Along with the Canadian Museum of Nature and Genome Canada, Genome Alberta is a sponsor of the 2500 sq. ft. interactive exhibit while it is in Alberta. Federal Minister Rona Ambrose and Provincial Minister Doug Horner were on hand for the official opening at the Telus World of Science. It will stay there until the beginning of June before moving on to the Red Deer Museum and Art Gallery for three months.

The 2007–2008 year was a good one for Genome Alberta's Communications initiatives. We've received some excellent media coverage, produced some unique work, and been able to raise our profile in many areas. We look forward to more of the same in the coming year and encourage you to visit us on the web, on Facebook, or drop by the office.



Mike Spear,
Director of Corporate Communications

Mountain Pine Beetle Project

The current mountain pine beetle (MPB) outbreak has devastated approximately 15 million hectares of pines in British Columbia, and has now expanded into Alberta's northern forests. The potential exists for continued spread of the epidemic eastward through Canada's boreal region. Funding from Genome Alberta has brought together a diverse group of researchers, including genomicists, population geneticists, systematists, ecologists, and mathematicians. The team has solid expertise in working with the MPB, the beetle-transmitted fungi MPB (*Ophiostoma clavigerum*) that ultimately kill the tree, and the pine trees that are attacked by the beetles. This multidisciplinary, highly collaborative project got underway in January of this year and is being carried out jointly with researchers in British Columbia, who are funded by Genome BC.



Valemount tree

The research will provide new, state-of-the-art knowledge about MPB, their fungal associates, the host pine trees, interactions between these organisms, and how these interactions impact MPB population dynamics. The goal is to equip forest managers and policy makers with better tools and management options for more effective forest management decisions.

The project recently completed its first research quarter. Advance funding from the Province of Alberta, secured with Genome Alberta's assistance, enabled extensive sampling of MPB, MPB-associated fungi, and host pines across Alberta and BC. The collection of more than 10,000 samples is the first step in creating an integrated genomic landscape map of the population structures of these organisms, and how these populations relate to geographic and climatic variables.

Molecular marker development is nearly complete, and genotyping is underway. This genetic information is vital to understanding the rapid spread of MPB in western Canada. The upcoming year will also see us begin research into how environmental conditions influence pine defences against MPB and its associated fungi, using a unique approach that combines gene expression profiling with ecological assays. These studies will reveal how the environment affects a tree's capacity to sustain low versus high populations of MPB. Genome Alberta's partnership in this unique venture makes it possible to tackle this serious economic and ecological issue using novel approaches.

PRINCIPAL INVESTIGATORS (ALBERTA)

- Dr. Janice Cooke**, University of Alberta
- Dr. Barry Cooke**, Canadian Forest Service
- Dr. Dave Coltman**, University of Alberta
- Dr. Maya Evenden**, University of Alberta
- Dr. Nadir Erbilgin**, University of Alberta
- Dr. Felix Sperl**, University of Alberta

PROJECT MANAGER

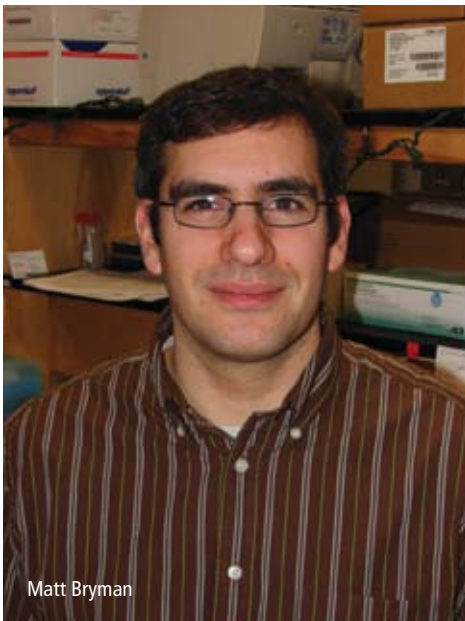
Matt Bryman

BRITISH COLUMBIA INVESTIGATORS

- Dr. Jörg Bohlmann**, University of British Columbia
- Dr. Brian Aukema**, Canadian Forest Service
- Dr. Colette Breuil**, University of British Columbia
- Dr. Richard Hamelin**, Canadian Forest Service
- Dr. Dezene Huber**, University of Northern British Columbia
- Dr. Christopher Keeling**, University of British Columbia
- Dr. Brent Murray**, University of Northern British Columbia

PROJECT MANAGER

Kyeema Burns



Matt Bryman

Translating Science: Genomics and Health Systems

For a thousand dollars you can buy a “spit kit” on the Internet to have your own personal genotyping completed. This comes only a few years after the 2.7 billion dollar sequencing of the human genome. A new era in genomics has emerged in the 21st century and with it comes questions related to ethics, economics, environment, law, and society. We simply call it GE3LS but it is far from simple to offer up answers to some very complex questions.



This Genome Alberta-funded project investigates the broad question: How is genomics knowledge translated in health systems and what are the subsequent policy implications?

The principal investigators are addressing the question by examining how genomics knowledge is translated through intellectual property systems, how such knowledge is represented in the public sphere, and how it challenges the development of appropriate governance and regulatory policies.

As genomics continues to build momentum and raise societal issues it has meant a busy year for the GE3LS group.

Timothy Caulfield's team continued their work around the project theme by exploring various research communities' perceptions and concerns associated with commercialization and patenting. They also continued their investigation into how the print media portrayed the Myriad Genetics patent controversy, giving special consideration to the potential influence the media has on public perceptions and policy reform. Peter Phillips' research on identifying Access Benefit Sharing (ABS) models in developing countries was further refined this year, with social network analysis of a database of 111 organizations.

The team's work on public representations of genomics knowledge largely focused on how various groups assess the benefits and risks of Plant Molecular Farming (PMF). Michelle Veeman conducted a survey earlier in the project assessing the public's perceptions of PMF, however much of the analysis, writing and conference presentations regarding this work took place during the past year. Edna Einsiedel created a Citizen's Panel that discussed and learned about the potential benefits and risks of PMF currently being considered for commercialization. Although this panel was held late in the previous fiscal year, like Veeman, much of the analysis of the panel results extended into the 2007/2008 fiscal year. Both Veeman and Einsiedel delivered presentations regarding their respective work on public engagement and PMF at the Asia Pacific Economic Cooperation meeting in Lima, Peru in October 2007.

The third theme investigating governance and regulation of new technologies has involved all team members. Examples of their work include:

- The administration of a survey to Canadian genetic professionals to determine provincial funding structures and how resource allocation decisions are made regarding genetic testing (Caulfield)
- Analysis of input from different stakeholders regarding the development of policy and regulation of PMF (Einsiedel)
- Development of a survey regarding functional food attributes (Veeman)
- The comparative analyses of governance models, looking specifically at complex modeling structures used in technology decision making (Phillips).

We look forward to an equally productive and interesting year ahead. Upcoming events and activities include a unique public outreach project called the Imagining Science exhibition; the administration of a functional food survey; and the development of a national survey of 640 First Nations' practices around Access to Genetic Resources & Benefit-Sharing.

PRINCIPAL INVESTIGATORS

Prof. Timothy Caulfield, University of Alberta

Dr. Edna Einsiedel, University of Calgary

Dr. Peter Phillips, University of Saskatchewan

Dr. Michele Veeman, University of Alberta

PROJECT MANAGER

Robyn Hyde-Lay

Four-Dimensional Modeling of Genetic Disease Patterns (The 4D project)

Francis Collins, the man who led the Human Genome Project has said that he “cannot imagine a more exciting time to be involved in genomics”. Take one look at the amazing images of the *4D Man* and you quickly realize that some of that exciting work is taking place in our own backyard.



Dr. Christoph Sensen and the 4-D man

Left to right:
Dr. Benedikt Hallgrímsson,
Dr. Jane Shearer,
Dr. Christoph Sensen,
Dr. George Robertson
and Dr. David Wishart.



The 4D project is developing a software tool which will allow medical researchers to visualize the processes of genetic disease in a spatio-temporal environment. Researchers in the 4D project are undertaking research in two concurrent streams—one to collect genomic and metabolomic data related to multiple sclerosis, cleft lip and palate, and obesity, and a second stream to develop a software tool for the visualization of the data utilizing a 3D representation of the human body.

After undergoing review by teams of international scientists in September and December of 2007, the Genome Alberta funded project has received the go-ahead to proceed to March 2010 with funding intact. This is good news as the project is making significant scientific gains on several fronts to better understand disease processes.

The CAVEMan as a tool for visualization continues to be front and centre in the 4D project with North American and international media coverage. Popular Science magazine, along with local and national radio and television took the technology out to the public in 2007.

Advances have been made during the current fiscal year in understanding the process by which the embryonic face forms, the impact of obesity on cardio-vascular tissue, the identification of additional markers in blood and blood products which may be indicative of various stages and types of multiple sclerosis and the processes by which pharmaceuticals act in the human body. Software has been developed for the modeling of and ultimately, predictive simulation of the relationships between genomic, metabolomic and phenotypic data. These relationships may provide the key to the causes of selected diseases and anatomical deformations, and ultimately potential treatment to mitigate the effects.

The next year will see a greater emphasis on the tasks of modeling and simulation, bringing the visualization of the relationship between genotype and phenotype to reality. This will be where the data collected during the past two years has the most value and significant scientific advances made.

PRINCIPAL INVESTIGATORS

Dr. Christoph Sensen, University of Calgary

Dr. David Wishart, University of Alberta

Dr. Benedikt Hallgrímsson, University of Calgary

Dr. Jane Shearer, University of Calgary

PROJECT MANAGER

Michael O'Connell

Integrated & Distributed Bioinformatics Platform

In 2007, the Bioinformatics Platform underwent a successful interim review by Genome Canada. With that completed, the Platform team continued to develop hardware and software bioinformatics tools to facilitate the understanding of how genomes are organized and how cells, tissues and organisms function.



Provision of Service to Genome

Canada and Other Projects

In March 2008, the Platform Expansion (PER) completed its mandate. PER provided bioinformatics services to the two Genome Canada Applied Human Health projects. As a result of the support from PER, the "Building the Metabolomics Toolbox" project and the "Diagnostic Applications of Microarrays in Organ Transplantation" project, under the directions of Drs. David Wishart and Philip Halloran, have achieved their scientific milestones.

Large Scale Genome Analysis and Hardware Provision

This year work began on using the Honeycomb storage array donated by Sun Microsystems. Testing started on how to integrate the Honeycomb system as a backend for MAGPIE. The Multi-purpose Automated Genome Project Investigation Environment is a software package developed for the automated curation and presentation of DNA and protein sequences. The use of this hardware with MAGPIE will allow for faster read/write accesses, hot-swap disk drive replacement and an improved system management graphical user interface (GUI).

BioMoby/Web Services

There have been many exciting developments within BioMoby/Web Services. In May 2007, the first publication of SeaHawk, the newest and most powerful/ intuitive BioMoby client was unveiled. In February 2008, the BioMoby development team was invited to represent the BioMoby project at the Open-Source BioHackathon in Tokyo. Moby was promoted as the de facto standard for web services in the open-bio community. As of March 2008, Moby services stood at 1666.

Help Desk/Tools for Proteomics

The Help Desk maintains a repository of 78 useful scripts and software packages which are distributed to 38,000 users across Canada and around the world. The Help Desk has developed a number of new web servers, including DrugBank2, Contact Order Predictor, CS23D, Proteus2, Protein Property Prediction and Testing Database (PPT-DB) and the West Research Group Cardiac Transplantation Laboratory Information Management System (LIMS). The Help Desk continues to maintain a large number of web servers including BASys (Bacterial Annotation System), PlasMapper, BacMap, SuperPose, MovieMaker, the Transplant Transcriptome Project LIMS, and many others as listed on <http://gchelpdesk.ualberta.ca/servers>. Collectively, these web servers receive more than 3.3 million web hits per year.

Training

The Applied Computational and Genomics Course (ACGC) received its two highest registrations for paid participants during the 2007 sessions. McGill University (April 2007) hosted 16 students and the University of Alberta (July 2007) hosted 28. Participation from students from the United States made the 2007 ACGC an international event.

User-Oriented Bioinformatics Tools

By the end of March bioLegato has reached an important landmark toward the milestone of creating a working application that is backward-compatible with Genetic Data Environment (GDE.) Continued development to the multiple alignment canvas, menu system and file I/O have brought bioLegato to the point where a file can be read, data displayed, data selected and programs run. In principle, the prototype could now be used to perform actual analysis of data. Three releases of BIRCH were created, with a total of 297 downloads.

The upcoming 2008-2009 year promises to be equally exciting. It will continue its mandate to provide easy and integrated access to bioinformatics services, to deliver ACGC courses, and to develop bioinformatics tools to address the informatics challenges posed by new ultra-high throughput sequencing technologies.

PRINCIPAL INVESTIGATORS

Dr. Christoph W. Sensen, University of Calgary

Dr. Mark Wilkinson, University of British Columbia

Dr. David Wishart, University of Alberta

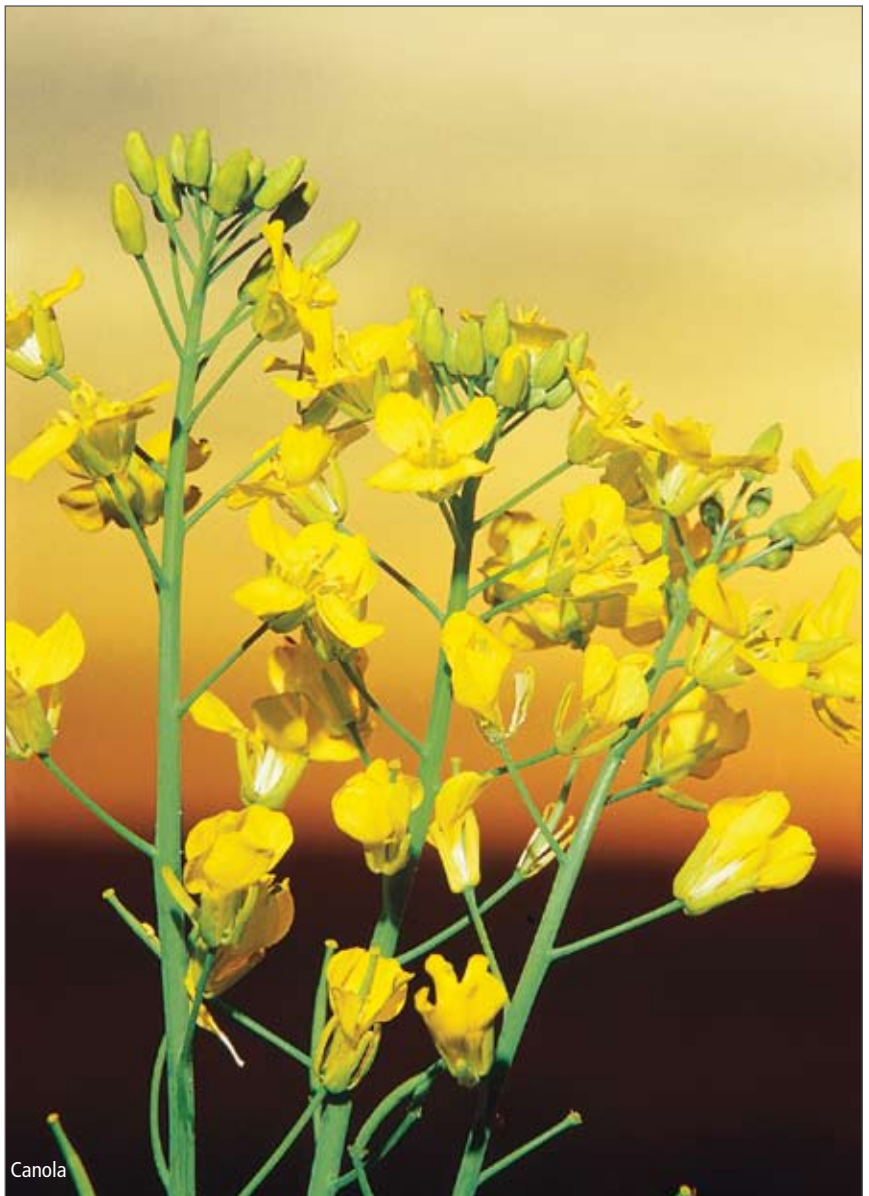
Dr. Brian Fristensky, University of Manitoba

PROJECT MANAGER

Lisa Bicek

Designing Oilseeds for Tomorrow's Market

The acting Director-General of the National Research Council—Plant Biotechnology Institute, Dr. Wilf Keller said, “Genomics research is critical for the improvement of important Canadian crops and will have a positive economic impact for our country”.



● Designing
● Oilseeds for
● Tomorrow's
● Markets

That promise of genomics research is being realised by the DOTM team as they work to boost the value of canola seed by enhancing the quality of canola meal and increasing the oil content of canola seed.

The canola industry truly is a made-in-Canada success story, contributing more than \$13 billion annually to the Canadian economy. Developed in the 1970s using traditional plant breeding techniques, canola oil is prized for its low level of saturated fats, balanced polyunsaturated and monounsaturated fats, versatility, and light taste.

While oil is the primary product of canola (*Brassica napus*), the meal left after crushing—which is 50 percent of the weight of the seed—is an increasingly important co-product. The high-protein meal represents a huge potential market in the animal feed sector. The main research goal of this 14.8 million dollar project is to maximize the value of canola by increasing the total value of the meal produced in the oil-crushing process. Researchers are using genomics, proteomics and metabolomics techniques to:

- Understand the genetic basis of yellow-seeded canola types that are associated with higher seed oil yields and lower fibre in canola meal.
- Develop canola with fewer undesirable compounds by knocking out genes involved in various biochemical pathways. For example, the metabolite glucosinolate is toxic to fish but fine for cattle feed. The metabolite sinapine creates a fishy odour in brown eggs.
- Reduce seed coat thickness by understanding and manipulating seed coat developmental genes, which will result in lower meal fibre and canola meal that is more easily digestible for swine and poultry.

Several milestones have been achieved to date:

- Twenty candidate genes related to the yellow-seeded phenotype have been identified for further characterization.

- More than 100,000 expressed sequence tags have been sequenced and submitted to GenBank.
- Genomic libraries and gene expression studies are nearing completion for the identification of genes and other genetic elements involved in seed coat cell wall formation.
- Functional characterization of 40 selected seed quality genes is underway.

In a related project, Improving Brassica Oil Content (IBOC) researchers are investigating the genetic interplay between seed coat and the developing embryo in order to improve oil content in canola seeds.

PRINCIPAL INVESTIGATORS

Dr. Randall Weselake, University of Alberta

Dr. Gopalan Selvara, National Research Council

Dr. Raju Datla, National Research Council

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H.-G. Lembke KG (NPZ)

Dr. Wolfgang Friedt, University of Giessen

Dr. Fawzy Georges, National Research Council

Dr. Abdelali Hannoufa, Agriculture and Agri-Food Canada

Dr. George Haughn, University of British Columbia

Dr. Genyi Li, University of Manitoba

Dr. Peter Phillips, University of Saskatchewan

Dr. Habibur Rahman, University of Alberta

Dr. Gerhard Rakow, Agriculture and Agri-Food Canada

Dr. Christoph Sensen, University of Calgary

Dr. Saleh Shah, Alberta Research Council

Dr. Bogdan Slominski, University of Manitoba

PROJECT MANAGERS

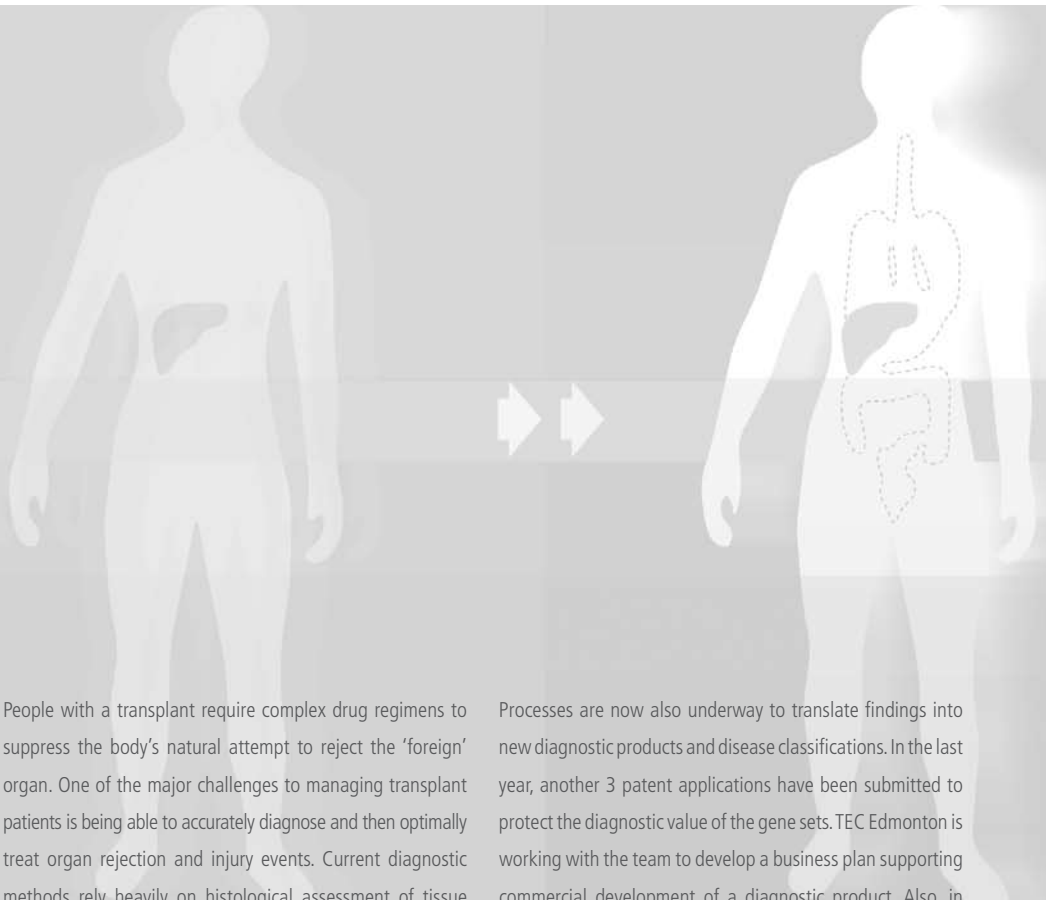
Dr. Jeff Parker, Genome Alberta

Dr. Faouzi Bekkaoui, NRC-PBI

Transplant Transcriptomics

Researchers of the Genome Alberta Transplant Transcriptome Project at the University of Alberta are using new gene-expression technologies to significantly improve the assessment and diagnoses of transplant rejection and injury events. Organ transplantation is the optimal treatment for patients, whose organs have failed as a result of conditions such as diabetes, heart disease, and hepatitis. Today, over half-a-million people in the world are alive because of life-supporting transplants.





People with a transplant require complex drug regimens to suppress the body's natural attempt to reject the 'foreign' organ. One of the major challenges to managing transplant patients is being able to accurately diagnose and then optimally treat organ rejection and injury events. Current diagnostic methods rely heavily on histological assessment of tissue biopsies taken from the transplanted organ. However, diagnostic error rates imposed by such methods approach 40% and the information gleaned through histology is limited.

Focusing on kidney transplantation, the University of Alberta team have identified a series of gene-expression sets that correlate with disease presentation, diagnoses as well as patient outcomes. Transcriptome (gene expression) measurements are quantitative, objective, and rich in mechanistic insights. The gene sets are shifting the way biopsied tissue is assessed and interpreted by providing: external validation of the conventional histopathology phenotype; refinement of the histopathology classification; creation of new phenotypes and disease classifications that combine molecules and histopathology; identification of disease mechanisms with basic and industrial potential, and; commercial opportunities for new diagnostics and therapeutics.

Scientific progress over the final year of the project has been significant. Studies have validated previous work and have demonstrated further advantages of incorporating gene-expression data into the histological diagnoses. For instance, using the gene-set approach the team has been able to detect cases of antibody-mediated rejection that have escaped detection by current conventional methods. The gene sets also relate to clinical outcomes thus providing predictive value to the new molecular approach—something that again, histological assessment does not provide. Further, the team has shown that their gene-expression sets have extremely high sensitivity and specificity values in terms of diagnosing various rejection and injury events.

Processes are now also underway to translate findings into new diagnostic products and disease classifications. In the last year, another 3 patent applications have been submitted to protect the diagnostic value of the gene sets. TEC Edmonton is working with the team to develop a business plan supporting commercial development of a diagnostic product. Also, in 2009, the group is hosting a conference to obtain consensus around incorporating the gene-set information into the current diagnostic system for kidney transplantation (the Banff System). This will be accepted by FDA and become the new 'gold standard' for diagnoses.

The team is now pursuing studies in heart and liver transplantation, primary heart disease, breast cancer, and Hepatitis C and B. They have been approved to submit a large-scale Interdisciplinary Team grant application to the Alberta Heritage Foundation for Medical Research in relation to this work. Additionally, Capital Health recently provided the team with \$1 million dollars (over 2 years) to continue their research.

Finally, during this last year the Alberta Transplant Applied Genomics Centre—an academic 'spin-out' Centre resulting from the GC investment—has become fully operational, now providing a full range of gene expression and pathology services to customers from academia and industry. Academic collaborations include centres from Harvard to Hannover. A large industry contract was recently established with Astellas Research Institute, and several others are emerging.

Building the Metabolomics Toolbox—A Job Well Done

The project led by Dr. David Wishart set out in 2005 to identify and quantify all major endogenous and exogenous metabolites found in the human body. Much like the Human Genome Project gave us an incredible base of knowledge to work from, the completion of the Human Metabolome by the team will have a similar impact on biomarker discovery, genetic disease testing, nutrition, metabolism, diagnosis, monitoring, and prognosis.





The project had the objectives in mind of a publicly available database of clinically relevant human metabolome data (HMDB) and a public repository of human metabolite samples (HML). Both databases are now available and are being routinely used thousands of times a day by biologists, biochemists, clinicians, chemists, pharmacists, pharmacologists, and other scientists from around the world.

The HMP received \$3.62 million from Genome Canada with matching funds of \$3.89 million from CFI, AICML, and University of Alberta. The matching funds were used primarily to purchase equipment and software needed to complete the approved project objectives which were all met as the project wrapped up its work and was preparing its final report towards the end of this fiscal year.

Overall, Genome Alberta is pleased to note that the HMP has received an excellent response from the scientific community. The work is being closely watched by many leading members of the Metabolomics Society, the FDA, the NIH, and other metabolomics researchers from around the globe. The project team has been actively working with major database providers and committees to help formalize data standards for metabolomics. Every effort was made to ensure that the HMP was being recognized internationally, that it was adherent to the needs and expectations of the metabolomics/bioinformatics community and that it served as the “made-in-Canada” foundation to the future of human metabolomics.

The real impact of the Human Metabolome Project and the influence of metabolomics on our daily lives will probably not be felt for another 2–3 years. This simply reflects the time it takes to get the FDA and other regulatory agencies or health boards to adapt to these new technologies. The announcement of the completion of the first draft of the human metabolome in January 2007 brought much attention to Canada and the skills of its scientists. This announcement put Canada on the map in terms of its accomplishments in metabolomics research and put us ahead of the curve relative to other metabolomics efforts around the world.

On behalf of Genome Canada and indeed many other organizations involved, Genome Alberta would like to thank everyone who put their time, effort and dedication into the project.

PRINCIPAL INVESTIGATORS

- Dr. David Wishart**, University of Alberta
- Dr. Fiona Bamforth**, University of Alberta
- Dr. Derrick Clive**, University of Alberta
- Dr. Russell Greiner**, University of Alberta
- Dr. Liang Li**, University of Alberta
- Dr. Brian Sykes**, University of Alberta
- Dr. Hans Vogel**, University of Calgary

PROJECT MANAGER

Ian Forsythe

The Gee! in Genome opened at the Telus World of Science in Edmonton on March 19, 2008.

The new look exhibit kicked off its National tour in our province and Genome Alberta was proud to be a co-sponsor of the exhibit along with Genome Canada, the Museum of Nature and the Telus World of Science.

On hand for the official opening were the Honourable Rona Ambrose (Federal Minister of Intergovernmental Affairs and Minister of Western Economic Diversification), the Honourable Doug Horner (Alberta Minister of Advanced Education and Technology), Emily Cooley (winner of the National Youth Science Fair Award), students and staff from Westglen Elementary and Ross Shepherd High School in Edmonton, and a host of other dignitaries, guests and media.



GENOME ALBERTA BOARD DIRECTORS

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