



QPCR and Microarray Workshop

On November 2,3, and 4, 2009, EmbryoGENE, in collaboration with the Réseau Québécois en Reproduction (RQR), held a workshop on QPCR and microarrays. Fifteen students from all over Canada came to Laval University to learn about methods for RNA handling, microarray experiments, and QPCR validation.

Workshops on RNA handling, microarray experiments, and QPCR were given by Isabelle Dufort. Claude Robert, Isabelle Gilbert, and Anne-Laure Nivet also provided their expertise on microarray experiments and pathway analysis during the conference section

of the workshop. In the afternoon, lab exercises were supervised by Isabelle Dufort, Stephen Tsoi, and Catherine Gravel. The workshop was concluded by a session on bioinformatics analyses by Jason Grant, complete with a computer lab during which students had the opportunity to test their knowledge by analyzing microarray data. The goal of this workshop was to give participants the required knowledge to understand QPCR and microarray experiments and help them develop the skills to carry-out such experiments. Considering the comments received from students, we have to

say, mission accomplished!

In order to make the exercise section of the workshop as valuable as possible, registration was limited to 15 participants. Considering the positive response towards this workshop, we are considering repeating the experience in the future. We would like to thank all the participants who traveled to Quebec City to attend the workshop. Special thanks to Isabelle Dufort, for the organization of the workshop, Jason Grant for his presentation on bioinformatics and to all the instructors without whom this workshop would not have been possible.



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Platform Technology Progress

At the core of the EmbryoGENE research program is the development of unique tools for the study of the embryonic transcriptome and epigenome. Development of these two platforms is well underway; below is a summary of progress.

Transcriptomic platform

Taking advantage of the recent technological leap in the field of high-throughput sequencing, our first embryo library was sent for 454 Titanium sequencing at McGill University and the Génome Québec Innovation Center. A little over 1 million bovine reads were produced with an average length of close to 300 base pairs. These sequences are presently being analyzed by Philippe Rigault from the firm Gydle Inc. to produce and augment the bovine gene catalog including splice variants and isoforms. It is from this augmented gene catalog that oligos will be designed for the upcoming bovine microarray.

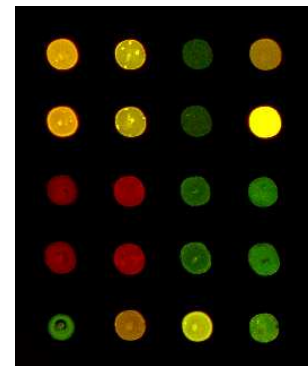
In the meantime, a prototype microarray is being produced to determine our ability to discriminate variants and evaluate manufacturing technology. Among the different technologies available for microarray manufacturing, Agilent's Sure-

print offers various advantages in terms of quality, number of probes and price and has thus been selected for the production of EmbryoGENE's microarrays. The first bovine embryo specific oligo microarray will be available in January 2010, followed by the porcine embryo microarray in spring 2010.

In parallel, we are developing the analysis pipeline that will ease data processing. Anyone who has experience working with microarrays can testify that production of a dataset is an easy task compared to downstream number crunching. The analysis pipeline needs to be available simultaneously with the microarray. We are making important progress with the Laboratory Information Management System (LIMS) that will be the core of EmbryoGENE's database. We are also working in collaboration with the FlexArray development team at McGill to adapt their microarray analysis software to our needs. EmbryoGENE's members are strongly encouraged to contribute to the development of this pipeline by providing constructive comments.

Epigenetic platform

Interest in the field of epigenomics field has increased dramatically recently and techniques are being developed for its study. As always when working with early embryos, the low amounts of starting material makes the adaptation of these techniques difficult. EmbryoGENE is thus developing a new technique for the identification of methylation hot spots in genomic DNA with the help of the mutS protein. Although this technique is still being evaluated, we expect it will enable the identification of useful sequences for the design of a microarray-based analysis tool. The epigenetic platform should be completed in 2011.



Dates for the 2010 Annual General Meeting

Planning is underway for the 2010 Annual General Meeting which will be hosted by the porcine node in Edmonton, Alberta from June 14-17, 2010. The venue will be the Varscona Hotel on trendy Whyte Avenue. We are aiming to follow the format of the 2009 AGM held in Quebec City with presentations from stakeholders and experts in our field, general discussions, and meetings of our Board of Directors and International Scientific Advisory Committee.

Although more formal directions will be issued in the coming months, should you wish to reserve a room at the Varscona in advance, we can take bookings at this point. Please contact Tracy at tracy.gartner@ualberta.ca to make early reservations.

To learn more about Edmonton, please visit www.edmonton.ca. For information on Whyte Avenue please you can check out www.oldstrathcona.ca. We are look-

ing forward to a productive meeting. Further details about registering and agendas for the meeting will follow in the coming months.

Dominic Gagné—Research Assistant, Molecular Biology



Dominic Gagné received his BSc in Biology and his MSc in Molecular Biology studying gene expression in myxomycetes from Laval University. From there, he

worked on cockroach neurobiology, fish physiology and genetics, as well as bacteriocin expression. He joined François Pothier's team for a year and then Marc-André Sirard's lab for 2 years at the end of the millennium working on bovine granulosa cells and oocytes. From 2000 to 2009, he worked in the Infectious Diseases Research Center under Michel G. Bergeron and Guy Boivin (Laval University). During his stay at the Infectious Diseases Research Center he worked on QPCR and multiplexing, pathogens and resistance detection, and on the develop-

ment of microfluidic devices and microarrays, all following good laboratory practice guidelines.

Joining Claude Robert's lab, he will unite his efforts with the team already in place to develop EmbryoGENE's epigenetic platform. Dominic will be taking over the duties previously performed by Catherine Gravel. We wish Catherine the best of luck as she moves on to work on the development of the imaging platform at Laval University. Thank you, Catherine, for all of your hard work towards helping EmbryoGENE reach its goals.

Strategic Network Enhancement Initiative

The Strategic Network Enhancement Initiative (SNEI) was developed by NSERC to assist Strategic Networks in meeting the goal of developing multidisciplinary and multi-sectoral partnerships in strategically important areas of research and to train the next generation of scientists for academia, government, and industry. All NSERC Strategic Networks awarded in 2007 were recently invited by NSERC to apply for additional funding under the SNEI. If our application is successful, EmbryoGENE will receive up to \$200,000 per year for 3 years to:

1. Build on strengths and support enriched training opportunities through highly qualified personnel (HQP) training supplements
2. Further the goals of NSERC's international strategy through improved international linkages with existing research groups or experts in the field
3. To enhance knowledge/technology transfer activities through enhanced extension activities and/or commercialization.

The application prepared by Embryo-

GENE tightly focused on how the Network could use the funding to meet the goals set out by NSERC. Through workshops and "in-house" training, SNEI funding would be used to provide opportunities to HQP currently outside of the Network to learn the intricate techniques and standard operating procedures developed by EmbryoGENE. At the same time, current HQP will be provided enhanced opportunities to take advantage of training opportunities offered by experts in various, complementary fields such as bioinformatics, functional genomics, epigenomics, and microRNA work. SNEI funding will also allow EmbryoGENE to improve international linkages through the exchange of unique samples for testing using the tools developed by the Network. A number of potential international collaborators interested in working with the Network have been identified from Brazil, the United States, France, Australia, Denmark, Italy, and Germany. Further to this, the application proposes EmbryoGENE involvement in a number of international symposia. To enhance knowledge transfer, the Network would arrange an international symposium on ethics and policy

-making on the subject of ART-derived animals in food chains. Further, the technology developed by the Network would be shared with industry through EmbryoGENE presence at a number of international meetings.

The application was signed off by our Board of Directors and sent to NSERC November 1, 2009 and a funding decision is expected by February 1, 2010. We sincerely hope our application is successful, thereby allowing us to build on the existent EmbryoGENE program and enhance Canada's leadership position in the field of livestock reproductive biology.



Faz Ashkar—PhD Student, Bovine ART



Faz Ashkar completed his MD degree at the University of Medical Sciences, Mashad, Iran. He practiced clinical medi-

cine as a general practitioner in public health and clinics for 5 years in Iran. While working in clinics he became interested in reproductive biology and biotechnology. Faz moved to Canada and was admitted to the Department of Biomedical Sciences, University of Guelph as an MSc student under the supervision of Dr. Allan King. His interest area is ART and biology of reproduction. His MSc project was on the biological effect of thyroid hormones supplementation in bovine IVP media and early embryo developmental potential. He demonstrated the presence of thyroid hormones throughout the entire bovine reproductive tract as the *in vivo*

site of pre-implantation embryo formation. Also, he studied the effect of supplementation of IVP medium with thyroid hormones which is usually missing in defined embryo culture media. His findings from his MSc project encouraged him to further investigate the impact of thyroid hormones on the early embryo. He has started his PhD in 2009 to work on the mechanism of action of thyroid hormones mainly focusing on transcriptional effect of thyroid hormones including the thyroid hormone specific genes as well as the general effect of hormones as mediators on the embryonic transcriptome.

Fernanda Caminha Dias—PhD Student, Bovine ART

Fernanda Caminha Dias received her Veterinary Medicine Degree (DVM) in 2005 from the Federal University of Mato Grosso do Sul, Brazil. Fernanda first came to Canada for an internship at the Agri-Food and Agriculture Canada research centre in Lethbridge under the supervision of Dr. John Kastelic. In 2006, Fernanda joined the MSc program at University of Saskatchewan under the supervision of Dr. Jaswant Singh. During her MSc Fernanda

investigated the effects of progesterone on oocyte competence.

After obtaining her MSc, Fernanda continued at the University of Saskatchewan under Dr. Singh's supervision, however now as a PhD student. She is currently part of the EmbryoGENE Strategic Research Network investigating the effect of ovarian superstimulation and the following coasting period on gene expression of granulosa and theca cells in the bovine



Angus Macaulay—MSc Student, Bovine ART



Angus Macaulay is a Guelph native who completed his BSc. in Biomedical Science at the University of Guelph. His undergraduate research focus was in exercise physiology, related to hydration and electrolyte balance in elite endurance athletes. Currently, Angus is a MSc candidate studying reproductive biology in the Biomedical Science department at Guelph under the supervision of Dr. King and Dr. Bartlewski. Angus' research focus pertains to development of bovine embryos in different *in vitro* environments, and the effects of

those environments on embryo quality and sex outcome. The major manipulations that are being evaluated are the effects of several different steroid hormones and their action on oocyte maturation and development. Assessment of other assisted reproductive technologies including evaluation of embryos produced using sexed sperm are also underway. As a part of the EmbryoGENE project, Angus will be producing male and female embryos to assess the transcriptome differences between embryos of different gender.

Dany Plourde—MSc Student, Bovine ART



Dany Plourde received his BSc in Agriculture, majoring in Animal Sciences from Laval University in Quebec City. During his undergraduate studies, Dany had the opportunity to work for some artificial insemination centres and to learn about classic genetics. As an MSc student, Dany is under the supervision of Dr. Claude Robert at Laval University and his project is defined under the Bovine ART Theme entitled “Transcriptome analysis of bovine em-

bryos produced under commercial conditions”. The main objective of this research project is to compare the transcriptome of bovine embryos produced under commercial conditions. The embryos produced *in vitro*, *in vivo* and *in co-culture* will be compared at the RNA abundance level using the bovine transcriptomic platform provided by EmbryoGENE. The project will be undertaken in collaboration with L’Alliance Boviteq.

Derek Toms—MSc Student, Porcine ART

Derek Toms received his BA in Engineering and Biology from Dartmouth College in New Hampshire. Following graduation, Derek spent a year working in the Department of Cellular Biology at Tufts School of Medicine in Boston. As an MSc student under the supervision of Dr. Julang Li in the Department of Animal and Poultry Science at the University of Guelph, Derek is investigating *in vitro* maturation of porcine oocytes from large and small antral follicles. He is looking at the role of glial-derived neurotrophic factor in oocyte maturation,

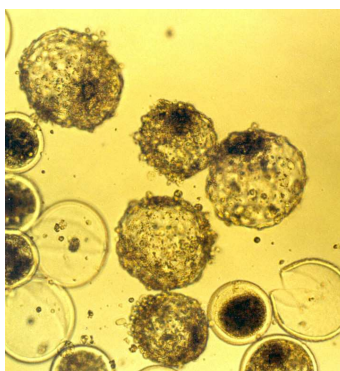
which has been shown to increase cumulus cell expansion and increase the percentage of small follicle-derived oocytes reaching the MII stage, and the use of a growth medium prior to maturation for small follicle-derived oocytes. Derek will be focusing on examining the effects these differing maturation conditions on transcript levels of *in vitro*-matured oocytes. Transcriptome analysis of *in vitro*-matured oocytes will be conducted in collaboration with Minitube



In Closing



**NSERC EMBRYGENE STRATEGIC
RESEARCH NETWORK**



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