

Spring 2011



NSERC EMBRYOGENE RESEARCH NETWORK

GENEWS

## 2011 Annual General Meeting

We are pleased to announce that the third Annual General Meeting of the EmbryoGENE Network will be held June 7-9, 2011 at the Hôtel Château Laurier in Old Quebec, Quebec City. The scientific portion of the meeting will begin the morning on June 7th and will wrap up around noon on June 9th.

The International Scientific Advisory Committee will meet during the afternoon of June 9th and the Board of Directors will meet during the morning of June 10th. Information on how to register for the meeting and arrange transportation will follow shortly. See you there!

## Call for Proposals—2011/12

The third year of the EmbryoGENE Network will be concluded this summer by the Annual General Meeting (AGM). It is time to start planning for year 4 of the Network. Project proposals are due **April 29, 2011**. Projects will be reviewed and approved by the International Scientific Advisory Committee (ISAC) at the AGM in Quebec City this June. When EmbryoGENE was initially presented to NSERC, specific projects were identified and described in the EmbryoGENE application, which will serve as a guideline for ISAC. You are encouraged to refer to the original application to NSERC when preparing your proposal. Should you require a copy of the original research plan, please contact Julie Niemi-

nen or Tracy Gartner. For assistance in the development of your research proposal, please contact the with the development of your proposal, please contact the appropriate theme leader.

**Bovine ART:** Claude Robert

**Porcine ART:** Michael Dyck

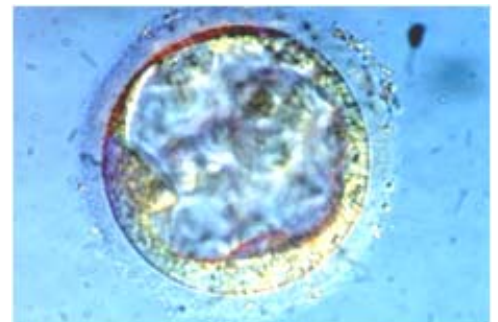
**Bovine Nutrition:** Marc-André Sirard

**Porcine Nutrition:** George Foxcroft

As a friendly reminder, progress reports for all ongoing projects are due by April 29, 2011. This reporting allows the ISAC to make decisions on funding continuation for these projects.

### Inside this issue:

Platform Updates	2
AGM Speaker—Dr. Giovanna Lazzari	3
New Members and Students	4/5
Workshop Announcement	5



## Transcriptomics Platform Update

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After processing more than 2 million bovine and porcine reads to extract targets for species-specific genes, embryo-specific genes, 3' UTR variants, and indel splice variants, the EmbryoGENE bovine and porcine microarrays were designed. The bovine microarray has been available to all members since last summer and to international collaborators through a Material Transfer Agreement. The porcine microarray will be available shortly following preliminary tests being conducted at the University of Alberta. In addition, augmented versions of the bovine and porcine genomes, which include information retrieved from sequencing results, were produced. These versions of the genomes will be available shortly through a genome browser that enables the visu-

alization of genomic data at the chromosome, gene, and oligonucleotide probe level and more. All the information obtained by the EmbryoGENE Network is periodically uploaded on the genome browser to facilitate analysis.

The transcriptomics platform also includes all the bioinformatics tools necessary for the analysis of microarray data, including ELMA (EmbryoGENE LIMS and microarray analysis), a QC module, and microarray analysis software. ELMA's goals are to store microarray data in a MIAME-compliant fashion and facilitate future meta-analyses. Upon completion of a microarray experiment, users are asked to provide all the information about their experiment through ELMA and to upload their microarray in-

tensity files. Protocols and standard operating procedures (SOPs) are also available in ELMA and are used for all microarray-related experiments. ELMA also produces the output file to be used by the analysis software. The QC module evaluates ELMA files to determine whether they can be used for further analyses. Distribution of signals for both channels is analyzed, as well as negative and spiked-in controls to determine hybridization quality. Datasets that meet all quality criterion can be uploaded into the FlexArray microarray analysis platform. FlexArray is a Bioconductor R-based software for the analysis of microarray data in a user-friendly environment. These tools greatly facilitate gene expression analysis within the EmbryoGENE Network.

## Epigenetics Platform Update

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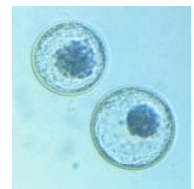
One of the major challenges when working with minute samples such as early embryos is the amount of material available for analysis. In most cases, common methodologies have to be adapted or severely modified to make these analyses possible. Two different methodologies are thus being developed for 1) the amplification of genomic DNA for future hybridization and 2) the selection of differentially-methylated targets for the design of a methylation microarray.

1. The amount of genomic DNA available to us is not sufficient for comparative studies on methylation microarrays. Amplification tech-

niques are currently being evaluated to generate enough material without creating important biases.

2. Because embryos are so valuable, techniques (Methylation-sensitive Representational Difference Analysis: Me-RDA and HpaII tiny fragment Enrichment by Ligation-mediated PCR; HELP) for the selection of targets were first tested with granulosa cells before being applied to embryos. Encouraging results were obtained and the libraries thus produced with day 12 embryos were sent for sequencing. Libraries are now being generated from a pool of 1,000 blastocysts. The current results have allowed us

to identify about 8,000 methylated regions from the granulosa cells library. We have 500,000 sequences that are being analysed from the libraries produced from the day-12 embryos. Since these libraries do not require *a priori* knowledge, we seek to identify methylated regions outside the typical CpG islands. The sequences identified from the libraries will be added to the 43,000 CpG islands that were found by *in silico* mining.



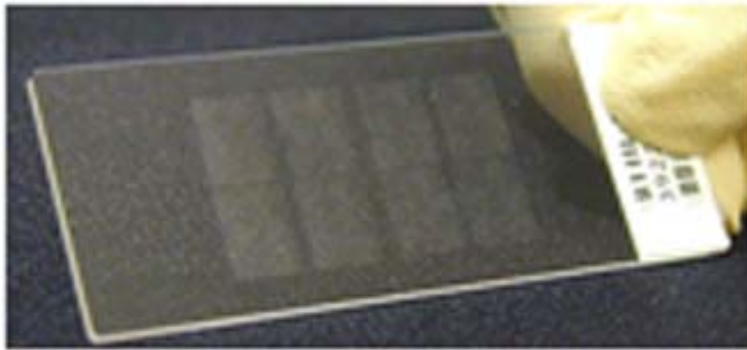
## Porcine Transcriptomics Microarray is now available

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The Porcine Node of EmbryoGENE, based at the University of Alberta, is pleased to announce that EmbryoGENE's Porcine Transcriptomics Array Platform is now available. This one-of-a-kind microarray has been designed by Gydle Inc. and is based on data generated from the processing of more than 1 million embryo-related gene transcription sequences. It features more than 43,000 "probes" for

embryo-specific porcine genes and gene variants. Each microarray includes Control probes that allow for integrated quality control when using the platform. To facilitate the management and analysis of data from the pig microarrays, all users will have access to the Network's web-based application, ELMA (EmbryoGENE LIMS and Microarray Analysis) which was developed by Dr. Jason Grant in the Pig Node

of EmbryoGENE . Upon completion of a microarray analysis, collaborators are asked to provide all the information about their experiments, as well as uploading their microarray intensity files, to facilitate future meta-analyses of microarray data. A preliminary series of benchmarking experiments have been conducted to test the performance of these arrays and we are very satisfied with the results. We are now ready to distribute these microarrays to EmbryoGENE collaborators, industry partners, and other interested parties. For those outside of the EmbryoGENE Network that are interested in this technology, access can be gained through an online service with Agilent and will be granted following signing of a Material Transfer Agreement between the University of Alberta and the interested party. We anticipate some exciting outcomes from this R&D program.



## Guest Speaker for AGM— Dr. Giovanna Lazzari

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Giovanna Lazzari holds a degree in Veterinary Medicine from the University of Milan and did her post-doctoral studies in Cambridge (UK), Babraham Institute, on female germ cell biology. Currently she is the Scientific Director of Avantea srl and teaches as a contract Professor at two Italian universities. Her research interests include biotechnology of reproduction, basic and applied research in mo-

lecular embryology with particular emphasis on oocyte and preimplantation embryo biology, reproductive toxicology, embryonic stem cells, and development of alternative toxicological tests. She is the project leader in 3 ongoing European collaborative research projects of the 7th Framework Programme (Esnats, Plurisys, Scr&Tox). We look forward to hosting Dr. Lazzari at the AGM and hearing about her research.



## Christopher Price—New EmbryoGENE Member

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Dr. Christopher Price completed his Bachelor of Science at the University of Nottingham, where he became interested in the research while working on an undergraduate project blood sampling lactating sows under the guidance of Dr. George Foxcroft. He later completed a PhD focussing on the role of steroids and inhibin in the control of gonadotrophin secretion and follicle growth in the cow at the University of Edinburgh under the supervision of Professor Robert Webb.

His post-doctoral work was completed in New Zealand with Pro-

fessor Ken McNatty's lab exploring the effect of the Booroola fecundity gene on the reproductive axis in rams.

Following a second post-doctoral fellowship at the University of Montreal, Christopher stayed on to become full professor in the Centre de recherche en reproduction animale, Faculté de médecine vétérinaire. His research interest is in the growth and differentiation of follicle in cattle, with an emphasis on granulosa cells. He is currently exploring the roles of the fibroblast growth factor superfamily.

## Ernesto Orozco—New EmbryoGENE Graduate Student

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Luis Baldoceda came to Canada from Peru where he received his B.Sc. in Animal Science from the Universidad Nacional Agraria La Molina of Lima, Peru. His undergraduate research focused on developing an ART protocol including vitrification of rabbit embryos as a simple method of cryopreservation that preserved embryo quality. Luis joined the MSc program at University of Laval in collaboration with the Agri-Food and Agriculture Canada research centre in Sherbrooke (Quebec) and Campus Alfred of University of Guelph (Ontario). Subsequently, Luis started his PhD at Laval

University under Claude Robert's supervision. Luis' EmbryoGENE project is on comparative genomic analysis of the Jersey breed aims at determining the success rates of embryo development in vitro and of frozen embryos transfer in comparison to other breeds. The gene expression of Jersey embryos will be contrasted in terms of phenotype and developmental capacity to determine if the genetics of the breed affect such characteristics. The project will be undertaken in collaboration with Boviteq and Jersey Canada.



## Ernesto Orozco—New EmbryoGENE Graduate Student

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Ernesto Orozco came to Canada from Mexico where he finished his BSc in Neurophysiology and an MSc in Animal Science. During his MSc, Ernesto worked on the design of a lentivector aimed at artificially expressing the mouse Figla gene in cultured eukaryotic cells. The model will be used to stably overexpress Figla in mouse embryonic stem cells in order to elucidate the functions of such gene in female germline development. Throughout his MSc, Ernesto took classes in reproductive physiology, molecular biology, and biochemistry.

Currently, Ernesto is a PhD student supervised by Marc-André Sirard at Laval University. Ernesto's project goal is to acquire information of the role and timing of genes related to bovine oocyte developmental capacity. The gene expression of early- and late-cleaving bovine embryos will be contrasted by using the EmbryoGENE bovine embryo microarray. This strategy will allow identifying potential target genes to finally assess their impact on early embryo development. The project will be undertaken in collaboration with Boviteq.



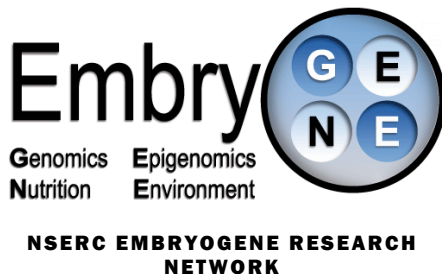
## Upcoming Microarray Analysis Workshop at Laval University

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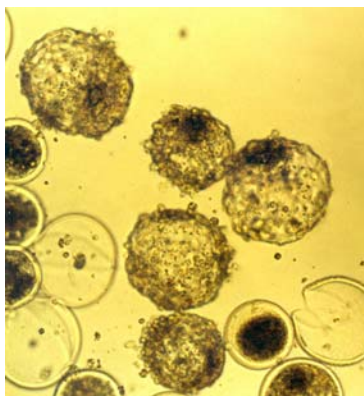
The bovine node of EmbryoGENE will be hosting a microarray analysis workshop on March 28 and 29, 2011. The workshop will focus on experimental design and LIMS, normalization and statistical analysis, microarray analysis software options, Geo Omnibus /Array Express submissions, pathway analysis, and computer lab exercises. The workshop is geared to students with EmbryoGENE projects but all members are welcome to attend. The information for registration was sent out by Julie Nieminen on February 24th. If you did not receive this information or have any questions about the workshop, don't hesitate to contact Julie at [Julie.nieminen@fsaa.ulaval.ca](mailto:Julie.nieminen@fsaa.ulaval.ca).

## In Closing

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Visit us at:  
[www.embryogene.ca](http://www.embryogene.ca)



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