Living Ink Technologies: A CMB Start-up

By: Adam Heck

Ink. It’s a commodity society has grown so accustomed to; we do not even give it a second thought. Yet this everyday liquid is one of the most expensive liquids sold, coming in at a cool $10,000 per gallon. Add to that, ink (when ingested) is toxic and is derived from non-renewable resources and you have a large problem looming on the horizon. Enter Scott Fulbright and Steve Albers; two CMB alumni looking to make a difference on our wallets and Mother Nature with their recent start-up Living Ink Technologies.

Scott’s and Steve’s goal for Living Ink Technologies is to create a cheaper, more sustainable and safer form of ink made with components from algae rather than petroleum.

Both Scott and Steve entered the CMB program in 2009. Soon thereafter they realized academia wasn’t the place they wanted to end up. ‘Once we realized academia wasn’t for us, then it was just thinking of an idea/solution we could create a business for,’ Scott recalls. ‘For 3 years in the hallways and at lunch we would shoot ideas back and forth to each other. There a lot of bad ideas, but finally we found one that we thought could work.’ And work it certainly did.

Their idea was accepted into the CSU Institute of Entrepreneurship Program that helps start-ups of CSU students and alumni create a solid foundation to launch from. Shortly there after, Steve and Scott entered their start-up in a funding competition where they won $10,000 in seed money. From there, Living Ink Technologies took off.

Today, the company has developed a pen and printer capable of printing algae onto paper that can grow into the desired text or picture. They also ‘inked’ a deal with a local coloring book company to create an educational coloring book based on this technology and are gaining traction with several other major companies in both the US and Canada. On the R&D side, they have a lab on the foothills campus and were recently awarded a grant from the Department of Energy.

Getting a PhD is enough work in and of itself, but add starting a business and there were a lot of long nights. ‘We worked our butts off and did not see our wives for a couple of years,’ jokes Scott. ‘But really we just enjoyed what we were doing. And we were fortunate enough to have a lot of support from our advisors, friends and family and even the CSU and Fort Collins community.’

For more information about Scott, Steve and Living Ink Technologies readers can visit LivingInkTechnologies.com.
CMB Summer 2015 Graduates

Jared Fowles, Ph.D.- Utilization of a canine cancer cell line (FACC) panel in comparative and translational studies of gene expression and drug sensitivity. Advisor Dr. Dan Gustafson.

Junko Maeda, Ph.D.- Characterizations of chromosome aberrations, telomere dysfunction and radiosensitivity signatures in canine cancer cell lines. Advisor Dr. Takamitsu Kato.

Guadalupe Aguirre, M.S.— Copper homeostasis in Arabidopsis thaliana. Advisor Dr. Marinus Pilon.

Dua’a Al-thumairy, M.S.- Evaluating levels of lutinizing hormone receptor dimers and oligomers. Advisor Dr. Deb Roess.

CMB 2nd year students: Where are they now?

By: Hailey Conover

Neha Ahuja— Dr. Debbie Garrity’s Lab
Tom Bickett— Dr. Angelo Izzo’s Lab
Lyndah Chow— Dr. Steve Dow’s Lab; Methods to create induced pluripotent stem cells from several veterinary species, and to promote differentiation to relevant cell types.

Hailey Conover— Dr. Lucas Argueso’s Lab. “I spent one year researching the mutagenic effects of ribonucleotide incorporation into DNA. My research for the rest of my time at CSU will focus on genetic and environmental effects leading to meiotic gene Copy Number Variation.”

Kaitlin Doucette— Dr. Debbie Crans’ Lab
Nada Elhabush— Dr. Debbie Crans’ Lab
Genevieve Hartley— Dr. Steve Dow’s Lab; Immune regulation of PD-L1 expression on canine tumors.
Kelly Hassell— Dr. Karyn Hamilton/Dr. Ben Miller’s Lab
Adam Heck— Dr. Jeff Wilusz and Dr. Carol Wilusz’s Lab. “My PhD work will focus on how messenger RNA methylation affects mRNA decay and alters gene expression in cells. Specifically, I will be looking at how these changes in gene expression either maintain pluripotency or drive differentiation in induced pluripotent stem cells.”

Laird Klippenstein— Dr. Dan Gustafson’s Lab
Laylaa Ramos— Dr. Mercedes Gonzalez-Juarrero’s Lab. “My research will follow the cellular immune response of mini-piglets to the Bacillus Calmette-Guerin (BCG) vaccine from birth until adulthood at six months.”

Kate Rockenbach— Dr. Tai Montgomery’s Lab
Karima A M Shebani— Dr. Deborah Roess’ Lab
Josh Svedson— Dr. Tai Montgomery’s Lab
Allison Zimont— Dr. Christie Peebles’ Lab. “I am working to develop genetic tools for biological engineering in the photosynthetic cyanobacterium Synechocystis. Specifically, I am interested in exploring how circadian gene regulation may affect biochemical production during daily light:dark cycles.”

“When one door closes, another opens; but we often look so long and so regretfully upon the closed door that we do not see the one which has opened for us.” – Alexander Graham Bell
Katie Cronise:
"I'm from Maryland and I received my undergraduate and master's degrees from UMBC. I'm specifically interested in studying cancer biology. For fun I enjoy hiking, playing video games, and spending time with my girlfriend and our two cats."

Hannah Berry:
"I am from Charlotte, North Carolina and graduated from North Carolina State University in December with a degree in Environmental Technology. This past spring after graduation I continued working as a research technician in the Camelina sativa biofuel research lab at NC State and am very excited about other biofuel projects at CSU. I enjoy hiking, rock climbing, photography, and art in my free time and am looking forward to exploring Colorado."

Jessie Filer:
"I am originally from Ohio and completed my undergraduate work at Kent State University. I recently graduated from CSU with a Master's in microbiology and I am excited to be moving on into the CMB program this year."

James Curlin:
"I am originally from central Illinois, and I just graduated from Trinity College, a small liberal-arts school in Connecticut this past May. I am interested in a wide variety of research topics, so I am hoping to do some lab rotations that cover prion research, virology and cancer biology, though I am interested in other topics as well. For fun I enjoy camping, but also reading, playing board games, card games, and video games, as well as exercising at the gym."

Kaitlin Leddy:
"I am from Albuquerque, got a BS Bio/BA Chem from UNM, I am interested in Plant Biology studies at CSU and particularly in a few different labs that mainly focus on plants at a molecular level. My passions are climbing, backcountry skiing and gardening!"

Alex Pyuen
"My enrollment in the CMB program is a bit non-traditional. I am a soon-to-be fourth year veterinary student here at CSU and I am taking a one year leave of absence from the veterinary program to pursue a NIH-funded pre-doctoral research fellowship. Along with the research I am performing at the Flint Animal Cancer Center, I will also be taking some graduate courses through the CMB program to work toward a masters degree. In my spare time, I love going up into the mountains to camp and hike."

Katie Cronise:
"I'm from Maryland and I received my undergraduate and master's degrees from UMBC. I'm specifically interested in studying cancer biology. For fun I enjoy hiking, playing video games, and spending time with my girlfriend and our two cats."

By: Hailey Conover
Shea Moore-Farrell:
"I am a local Coloradan who was born and raised in the foothills west of Denver. For undergrad, I attended the University of Colorado - Boulder where I earned a bachelor’s degree in Molecular, Cellular and Developmental Biology. I have worked for 4 years since in varying capacities, ranging from research to programming to clinical medicine. I decided to attend graduate school at CSU because I believe that our global society is in desperate need of novel ideas and solutions to reduce our impact on the environment while continuing to progress technologically. For fun, I enjoy rock climbing, playing hockey, hiking/backpacking, and in the winter snowboarding."

Picking lab rotations is an important/exciting/stressful decision for first year grad students; that can sometimes become overwhelming. Fortunately, numerous people have been through this journey before. Hindsight being 20/20, here are some tips and advice to consider when choosing your lab rotations.

Preparing:
- Set up an appointment by email with potential rotation mentors. Introduce yourself and attach a current CV. If you have specific research interest in mind, formulate them in your email.
- Prepare for your meeting by reading the mentor’s latest papers. Usually, research papers can be downloaded from PubMed or the mentor’s website.
- At the meeting, be ready to discuss your background, research experience, any abstract or papers you have published.

Questions to Ask:
- Tell me about your research and the ongoing projects in the lab (the research interests listed online are typically out of date).
- What do you expect from a rotation student in your lab? What do you expect from a graduate student in your lab?
- What do you see as your role as a thesis advisor?
- If I did rotate here and we both felt that your lab would be a good thesis lab for me, would you have the resources (time, lab space, funding, etc) for me to be a grad student in your lab?
- I know that it takes most grad students at least 5.5 years to complete their degree. Do you foresee yourself being at the university for that time period?
- Tell me about the students who have graduated from your lab: what degree did they receive, when did they receive their degree, and what are they doing now? (Most PIs will be very happy to answer this question. If you do not get clear, direct answers be very careful.)
- Tell me about the workstyle of the rotations that students do in your lab. (do rotation students work with a postdoc, graduate student, technician on their project or do they have a small project of their own?)
- What projects/areas of research might be open to a rotation student/graduate student in the lab?

Ultimately, lab rotations are designed to help you figure out your preference of research, lab atmosphere, advisor personality/style and many other factors. Just because one rotation does not work out as well as you would like, don’t sweat it. Work hard, create connections and enjoy your time as a rotation student.
Mike Caballero

Congratulations to CMB PhD candidate, Mike Caballero, who received the Early Career Award at the 2015 Molecular Life of Diatoms Conference. Diatoms, a type of marine microalgae, drive food web productivity in oceans and lakes. Caballero presented his discoveries on how these photosynthetic organisms store energy during the day for use at night. Comparative genomic analysis of diatoms suggests that the majority of predicted gene products are unique relative to other eukaryotes. Functionally, this encodes unusual biochemistries such as making glucon chrysolaminarin for storage instead of starch or glycogen. Caballero is focused on identifying and characterizing proteins important for chrysolaminarin metabolism. This research may inform future efforts to manipulate diatom carbon metabolism to produce biofuels or bioplastics.

Miles McKenna

Miles McKenna is helping NASA accomplish its first of its kind twin study analyzing changes from one twin in space and one on Earth. Cell samples from Astronauts Scott Kelly arrived at Susan Bailey’s lab this summer. McKenna, a CMB PhD candidate, will focus on detecting any changes in telomeres between space-bound Scott Kelly and his Earth-bound identical twin brother Mark Kelly. Telomeres, found on the ends of chromosomes, protect against genetic degradation. Environmental stress such as radiation found in space can shorten telomeres and can increase risk of disease such as cancer. This study will help NASA determine whether long space voyages are safe. NASA would ultimately like to accomplish a human mission to Mars, which would take more than a year of space travel and subject astronauts to radiation.

Peter Winter

Peter Winter received his Ph.D. in Cell and Molecular Biology in 2011 under the tutelage of Dr. Deborah Roess. Since 2011, Peter has trained at the National Institutes of Health as an Intramural Research Training Award Postdoctoral Fellow. Specifically, Peter works in the National Institute of Biomedical Imaging and Bioengineering’s Section on High Resolution Optical Imaging under the supervision of Dr. Hari Shroff. Earlier this summer Peter was named as a 2015-2016 AAAS Science and Technology Policy Congressional Fellow. As the 2015-2016 OSA/MRS/AAAS Congressional Fellow, Peter will spend one year working as a special legislative assistant on the staff of a member of Congress or congressional committee. Activities will involve conducting legislative or oversight work, assisting in congressional hearings and debates and preparing briefs and writing speeches. Peter is excited to work on Capitol Hill and feels that the input of scientists and engineers in the federal policy-making process can be an invaluable resource. He intends to use his fellowship to learn more about the legislative process, and to leverage his scientific background on a range of policy issues, specifically the pursuit of comprehensive, evidence-based, federal science and technology policy, which he believes is vital to maintaining the United States standing in a changing global landscape.

Jordan Steel

After graduating with his doctorate in 2014 under the mentorship of Dr. Brian Geiss, Dr. Steel obtained a year-long post-doc in the MIP department at CSU in the lab of Dr. Rushika Perera. Subsequent to his post-doctoral fellowship, Dr. Steel then secured a tenure track faculty position in the biology department at Colorado State University Pueblo, where he has received a start-up package to open his own lab and continue his research endeavors. This fall, he will be teaching undergraduates and advising both undergraduates and graduate students in his laboratory. Since graduating, Dr. Steel has also added another member to his growing family!
CMB Upcoming Events/Opportunities

CMB Peer Mentor Club Welcome Back:
Date: Tuesday September 1st
Time: 7 pm
Location: TCBY (Off Drake and Shields)
What: All CMB students are invited to a peer-mentoring group. Frozen yogurt, crepes, and non-dairy options available for purchase. For more information, please contact Stephanie Morphet tammi.vacha-haase@colostate.edu

TILT:
Location: 801 Oval Drive
What: The Institute for Learning and Teaching provides professional development “one-day” seminars throughout the semester. Food is usually provided. It’s a great opportunity to add to your CV and learn something new. For more information, please contact Debora Colbert debora.colbert@colostate.edu or visit http://tilt.colostate.edu

Toastmasters International:
Toastmasters International is a world leader in communication and leadership development. CSU has generously offered to pay for a year long membership to the official founders; which you can become a part of this year. Meetings are held every other Thursday starting August 27th, 4pm-5pm, Johnson Hall, Room 129. For more information please contact Vanessa Selwyn yselwyn@rams.colostate.edu or visit toastmasters.org.

Fall 2015 Seminars:
Cell and Molecular Biology Seminar Series:
* Held Thursday’s at 12:00 p.m. (noon) in the Molecular and Radiological Biosciences Building, Room 312. For more information, please contact Lori Williams lori.williams@colostate.edu

Cell and Molecular Biology Graduate Seminar Series:
* Graduate Research Seminars are held Thursdays at 2pm in the Molecular and Radiological Biosciences Building, Room 123. For more information, please contact Dr. Howard Liber Howard.Liber@colostate.edu

Microbiology, Immunology, and Pathology Seminar Series:
* For more information, please contact Alan Schenkel alan.schenkel@colostate.edu or visit the MIP seminar series page

Molecular Cellular and Integrative Neuroscience Seminar Series:
http://mcin.colostate.edu/seminar.html

Chemistry Department Seminar Series:
http://www.chem.colostate.edu/seminars-current/

Biology Department Seminar Series:
http://www.biology.colostate.edu/seminars-current/

Biomedical Engineering Seminar Series:
http://www.engr.colostate.edu/bep/students/seminars.html

Bioagricultural Science and Pest Management:
http://bspm.agsci.colostate.edu/01-2/seminar-series/

UPCOMING CONFERENCES/METINGS

Rocky Mountain Virology Club Meeting
* September 25-27; Pinegree Park, CO

Rocky Mountain ASM Meeting
* October 17; Colorado Christian University, Lakewood, CO

13th Annual Rocky Mountain Bioinformatics Conference
* December 10-12; Snowmass, CO
Digital Droplet PCR
The Bio-Rad QX200 Droplet Digital PCR (ddPCR) System will be in the Microbiology building this fall for use by all CSU researchers. The ddPCR system makes it easy to detect and quantify nucleic acids with great sensitivity and accuracy. This emerging technology does not require standard curves and is helpful in detecting low levels or small differences of nucleic acids. We are fortunate to have this instrument; there is only one other in Colorado and approximately 500 worldwide. The Droplet Digital PCR Core will allow over 25 different research labs based in nine departments and four colleges to move forward in their projects more efficiently. The ddPCR Core will also provide training in design and analysis of ddPCR experiments. Satellite locations for the droplet generator and plate sealers will be located in Pathology, MRB and out at the foothills. Dr. Carol Wilusz will manage the ddPCR core.

Campus-Wide Flow Cytometry and Cell Sorting Facility (CSUFCF)
The CSU FCF aims to maximize the utilization of the flow cytometry and cell sorting equipment located across MIP, EHS, and the Veterinary Teaching Hospital. CSU FCF will ensure proper maintenance and improvement of existing equipment, provide hands on training on instrument capabilities and will stay up to date with new state of the art equipment. Dr. Chris Allen and Dr. Marcela Henao Tamayo will be meeting with instrument owners across campus to determine instrument needs and the flow cytometry based research done. They have already fixed errors on one machine and enabled the research of a grad student to continue. Flow cytometry enables researchers to count and sort cells, detect biomarkers, and engineer proteins among other capabilities. CSU is fortunate to have a HyperCyt instrument which allows samples to be analyzed from a 96 well plate thus cutting down on reading time from hours to minutes. A campus-wide core facility will lead to more publications, aid in future grants and result in expert users.

Experimental Pathology Facility
The goal of the Experimental Pathology Facility is to provide expertise in anatomic and clinical pathology for researchers studying animal models of human and veterinary diseases, both within Colorado State University and outside institutions. The facility will assist researchers with tissue and biological fluid analyses for studies requiring pathology interpretation. It will provide specialized pathology consulting and collaboration along with sample processing and education in pathology applications. Services will include histological and bioanalytical processing, development of immunological detection methods for cell and tissue preparations, and quantitative methods for determining disease severity, pathogenesis and treatment efficacy.
All of this will facilitate researcher access to previously inaccessible pathology expertise and instrumentation. Dr. Brendan Podell and Dr. Kelly Santangelo will provide oversight to the facility.

“The Emerging Innovations Cores have been funded by the CSU Office of the Vice President for Research

“To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science.” - Albert Einstein
GAANN: Teaching Fellowship
Kate Rockenbach, 2nd year Sloan Lab
“Before coming to Colorado State I knew I enjoyed working with High School aged students, helping them learn basic biology, but after teaching undergrad labs and recitations-- I still enjoyed it. The GAANN was a great option for me because it will help me gain the experience and portfolio that will allow me to be a competitive candidate for teaching undergraduate courses at other institutions so I can continue doing what I enjoy.”

Vanessa Selwyn, 5th year Telling Lab
“My two passions are teaching and research. The GAANN seemed like an excellent opportunity to gain more experience teaching while it helped offset the cost of my research during my PhD. I am grateful for the opportunity, and hope to show the students, that I will teach/mentor this year, that scientists come in all flavors of the rainbow!”

Victoria Harcy, 6th year Argueso Lab
“I am excited for this GAANN fellowship because of the opportunities it presents to further my teaching capabilities and collaborate with students.”

GAUSSI: Computational Biology Fellowship
Adam Heck, 2nd year Wilusz Lab
“I was very interested in computational biology and bioinformatics because I believe research, especially in the cell and molecular biology fields, has been/is trending towards more experiments that generate huge amounts of data. ...GAUSSI] opens a niche for researchers who can analyze this data to determine the statistical AND biological significance it shows.”

Faculty Grant List
Dr. Dean Crick, MIP, and Dr. Debbie Crans, Chemistry, Unraveling the Origin of Pyrazinamide’s Synergy With Other Anti-TB Drugs, 1R21AI119567-01.
Dr. Jim Bamberg, BMB, PrPC and NOX-dependent Signaling in Dementia, NIH R01AG049668-01.
Dr. Mike Weil, ERHS, Identification of Loci Modifying Atm Lymphomagenesis, NIH R01CA197801-01.
Dr. Eric Ross, BMB, Formation and biological activity of functional protein aggregates, NSF-MCB1517231.
Dr. Jake Deluca, BMB, and Dr. Stephen Markus, BMB, Combined Single Molecule and In-Cell Approaches To Understand Dynein-Mediated Mitotic Checkpoint Silencing, NSF-MCB 1518083.
Dr. Tai Montgomery, Biology, Molecular Characterization of MicroRNA-Mediated Drug Resistance, Boettcher Foundation.
Dr. Jan Leach, BSPM, Precise genome editing may improve rice crops, NSF.
Dr. Mark Brown, Clinical Sciences, and Melissa Edwards, CMB PhD Candidate, Applications of Cell and Molecular Biology, NFS-Innovation Corps.
Dr. Ramesh Akkina, MIP, An ultrasensitive in vivo latent HIV viral outgrowth assay, NIH-NIAID.

NEW CMB CODE AND POLICIES & PROCEDURES
By: Carol Wilusz
Earlier this summer the CMB Faculty approved some changes to the way the CMB program is run which is a step on the way to becoming a Special Academic Unit.
The new Code (which replaces the previous By-Laws) alters the administrative structure slightly, creating an Associate Director position and requiring that the Chairs of each of the four committees (Academic, Research & Outreach, Admissions, Seminar) be elected by the faculty to form the Executive Committee. Elections for Committee Chairs and Director and Associate Director will be held this fall. Other members of each committee are appointed by the Director, with advice from the Executive Committee. CMB students will have more opportunities to participate as they can now serve on all four committees. In addition, the Research Committee which oversees the Poster Symposium will now also be charged with facilitating student outreach and has been renamed the Research & Outreach committee. Students and faculty are encouraged to contact Howard Liber (hliber@colostate.edu) if they would like to serve on a CMB Committee.
The new Policies & Procedures document contains updates to the curriculum and describes the Preliminary Exam process in detail. A section listing all courses that CMB students might consider as electives should be useful for identifying graduate classes available at CSU.
All CMB students and faculty should be familiar with these two documents which are posted on the CMB Website - Policies & Procedures CMB Code.
CMB PUBLICATIONS

CONGRATULATIONS to those pushing science forward!
And don't forget to list the Graduate Program in Cell and Molecular Biology as your affiliation when you publish!


CMB receives Program Review Funds

By: Carol Wilusz

The CMB Program just completed the five year review process which revealed that our graduates are well-trained and productive researchers who go on to successful careers using their degree - we already knew this but it’s always nice to see the numbers: 100% of CMB PhD students (63/63) and 88% of MS students (17/19) went on to continue their training or found employment in a field related to Cell & Molecular Biology!

The program review also highlighted the challenges and benefits of being an interdisciplinary program and led to a successful application for internal funds to support new initiatives. These initiatives will facilitate more interaction among CMB Members as well as enabling introduction of a better system for tracking students through the program and after graduation. In particular, look out for news of a CMB Retreat in the spring, professional development seminars and new opportunities for CMB students to apply for funding for outreach and interdisciplinary research.

CMBSA Election Results

By: Carol Wilusz

President: Laird Klippenstein
Vice President: Adam Heck
Treasurer: Laylaa Ramos
Secretary: Hailey Conover

The CMBSA exists to encourage and unite students academically, socially, and in the area of community service by enriching scientific interactions through the promotion of interdisciplinary collaborations, working closely with the recruitment of new graduate students, and building a sense of unity. The CMBSA allows students to interact with others that they may not be in contact with otherwise, to get ideas and help with their own scientific interests and open up fields in which they may lack experience. Officials are elected for a one-year term. The next election will be July/August of 2016.

Faculty Editor:
Carol Wilusz

Student Staff:
Hailey Conover, Laylaa Ramos, Stephanie Morphet & Victoria Harcy

Editorial Board:
Vanessa Selwyn & Adam Heck

Publisher: Lori Williams