



# STUDENTS' UNION AND UNDERGRADUATE RESEARCH INITIATIVE 2011 UNDERGRADUATE RESEARCH SYMPOSIUM Compiled by Emerson Csorba SU Vice President (Academic)

Six months ago, an Undergraduate Research Symposium supported by the Students' Union and Undergraduate Research Initiative was merely an idea. Apart from the Undergraduate Research Initiative – which had yet to launch – there was support for such an event only in pockets of the university. We knew that many undergraduates were doing research on campus, but that work was rarely highlighted. A department or faculty hosted a research symposium here or there, but nothing existed on a university-wide level. Our research showed that at top Canadian and American universities few research symposiums existed for *all* undergraduates. The University of Calgary Students' Union has hosted a symposium for the last seven years, but little else exists on such a large scale. The only other student-led undergraduate research symposiums were at Princeton and Harvard, but even those events were small in comparison to what was envisioned for the University of Alberta.

And so the journey began.

Six months later, the SU and URI Undergraduate Research Symposium has come together. Looking back, that time – September and October in particular – was replete with learning, teamwork, creativity and drive. The URS is truly a team effort. Just as outstanding research is often undertaken by a team of undergraduates, graduates and professors, the Symposium stems from hard work of students, faculty, university staff and many others. Speaking to old friends from high school, they tell me that professors in their classes mention the URS, suggesting that news of the event has spread across the academy. Indeed, I feel that the URS could transform into an event that distinguishes the University of Alberta on a national level.

The numbers don't lie. Over 130 students submitted abstracts for the symposium. Approximately 35 professors agreed to be judges. Faculties and other organizations on campus have collectively provided \$9,000 to the event for student awards. The *Globe and Mail* has given our event national attention. The Faculty of Science kindly provided the Centennial Centre for Interdisciplinary Sciences to host the November 18 poster competition.

The SU Marketing Department thought of a brilliant concept that has now become a reality. From November 14 to 18, all students on campus can enter a 1-2 line question on ballots across campus. The four students with the most interesting and thought-provoking questions will receive \$250, and the SU will endeavour to connect those students with an expert professor in the related field. Every other student who enters a question will be connected to the Undergraduate Research Initiative. We aim for 500 student entries.

Numbers do not tell the whole story, however. There are two things in particular I want to highlight: the URS Team and the Symposium theme.





#### THE TEAM

Back in June, I posted a news item on the SU website asking students to think about volunteering for the "URS Team." Moreover, I contacted the Associate Deans of Research and Teaching/Learning across campus to notify them about the student volunteer opportunity. Within two weeks, we had a team consisting of staff, faculty and over 20 students. Some of the students already had published research, others are currently doing research and a few students are looking to start their own. The URS Team is comprised of students of all ages and from a plethora of backgrounds. These students and faculty are:

Nicholas Adamski, Faculty of Engineering

Helya Aghazadeh, Faculty of Science

Baljot Chahal, Faculty of Physical Education and Recreation

Claudine Champion, Faculty of Physical Education and Recreation

Dustin Chelen, Faculty of Science

Collin Cupido, Faculty of Science

Stefan Dehod, Faculty of Arts

James Eastham, Faculty of Arts

Kyle Griep, Faculty of Engineering

Vanessa Hon, Faculty of Engineering

Steven Huynh, Faculty of Science

Navneet Khinda, Faculty of Arts

Dongwoo Kim, Faculty of Arts

Petros Kusmu, Faculty of Arts

Janet Lee, Faculty of Science

Florence Li, Faculty of Science

Alexis Lockwood, Experiential Learning Director, CAPS

Nisha Patel, School of Business

Dorothy Roberts, Faculty of Arts

Hassan Safouhi, Associate Dean (Research), Campus Saint-Jean

Jorden Smith, School of Library and Information Studies





Chloe Speakman, Faculty of Science

Saadiq Sumar, Faculty of Engineering

Navjot Thind, Faculty of Education

Nhu Trieu, Faculty of Science

Connie Varnhagen, Academic Director, Undergraduate Research Initiative

Jacky Xiang, Faculty of Engineering

Many of the students listed above put an inordinate amount of time into organizing the symposium. For instance, Jorden Smith, currently a Masters student in the School of Library and Information Studies, created an information guide for students preparing abstracts and poster presentations, which can be found at <a href="http://guides.library.ualberta.ca/undergraduateresearch">http://guides.library.ualberta.ca/undergraduateresearch</a>.

Without the collective effort of the individuals named above, the inaugural SU Undergraduate Research Symposium would simply not happen.





#### THE STORIES

Although the URS celebrates excellent research, the heart of the event is sharing stories. During one of our Saturday summer meetings (yes, the URS Team met on Saturdays, during *summer*), one of the team members, Chloe, mentioned that we should somehow collect student and faculty stories. As part of the URS student abstract submissions, the 130+ students each wrote a paragraph about how they became involved in undergraduate research and another describing their experiences. Each of the speeches at the November 17 dinner and keynote emphasize faculty and student stories. As well, we plan to share videos of students and professors speaking about their views of research and their experiences as researchers. These personal narratives should help connect audience members – and in particular, U of A students – to undergraduate research opportunities.

We received more than 130 student abstract submissions and fundraised \$9000 for student research awards. Someone had to review those abstracts, and someone had to provide those funds. Let me tell you about those people.





# THE REVIEWERS

From October 28 to November 7, the URS Abstract Review Committee worked non-stop to review the many student submissions. I cannot thank these incredible individuals enough. They are:

Dustin Chelen, Student, Faculty of Science

Collin Cupido, Student, Faculty of Science

David Lawrie, Faculty Member, Faculty of Science

Christina Rinaldi, Faculty Member, Faculty of Education

Chloe Speakman, Student, Faculty of Science

Nhu Trieu, Student, Faculty of Science

Deanna Williamson, Faculty Member, Faculty of Agricultural, Life and Environmental Sciences

## THE PARTNERS

A number of faculties have provided between \$500-\$2000 for student awards at the November 18 poster competition. These faculties truly care about the student experience, and I am grateful for their generous donations. These leaders are:

Faculty of Science: \$2000 (gold-level sponsor)

Campus Saint-Jean: \$1000 (silver-level sponsor)

Faculty of Agricultural, Life and Environmental Sciences: \$1000 (silver-level sponsor)

Faculty of Arts: \$1000 (silver-level sponsor)

Faculty of Nursing: \$1000 (silver-level sponsor)

Faculty of Physical Education and Recreation: \$1000 (silver-level sponsor)

Alumni Association: \$500 (bronze-level sponsor)

Faculty of Education: \$500 (bronze-level sponsor)

Faculty of Medicine and Dentistry: \$500 (bronze-level sponsor)

Faculty of Native Studies: \$500 (bronze-level sponsor)





## THE JUDGES

In addition to the faculties that have provided funds, the students on the URS Team and the members of the Abstract Review Committee, approximately 30 professors have agreed to judge at the inaugural symposium. Please note that the judges were selected based on student recommendations, with an emphasis on teaching quality. These individuals are:

Anne Boerger, Campus Saint-Jean, Histoire

Normand Boule, Faculty of Physical Education and Recreation, Medicine and Health

Mike Brett, Faculty of Engineering, Electrical and Computer Engineering

George Buck, Faculty of Education, Educational Psychology

Don Carmichael, Faculty of Arts, Political Sciences

Janice Causgrov-Dunn, Faculty of Physical Education and Recreation, Youth Physical Education

Lia Daniels, Faculty of Education, Educational Psychology

Gerda de Vries, Faculty of Science, Mathematical and Statistical Sciences

Steven Dew, Faculty of Engineering, Electrical and Computer Engineering

Renee Elio, Faculty of Science, Computing Science

Roger Epp, Augustana, Political Sciences

Genevieve Gauthier, Faculty of Education, Educational Psychology

Lise Gotell, Faculty of Arts, Women's Studies

Liz Ingram, Faculty of Arts, Art and Design

Linda Kerr, Faculty of Arts, History and Classics

Andy Knight, Faculty of Arts, Political Sciences

Robert Luth, Faculty Science, Earth and Atmospheric Sciences

Christine Mhina, Faculty of Arts, Swahili

Rachel Milner, Faculty of Science, Biochemistry

Roger Moore, Faculty of Science, Physics

Frank Robinson, Faculty of Agricultural, Life and Environmental Sciences, Agricultural, Food and Nutritional Science





Hassan Safouhi, Campus Saint-Jean, Mathematiques Betsy Sargeant, Faculty of Arts, Writing Studies Jonathan Schaeffer, Faculty of Science, Computing Science Dalbir Sehmby, Campus Saint-Jean, Anglais Brent Swallow, Faculty of Science, Resource Economics and Environmental Sociology Connie Varnhagen, Faculty of Science, Psychology Stanley Varnhagen, Faculty of Extension, Educational Technology Sheena Wilson, Campus Saint-Jean, Anglais Heather Zwicker, Faculty of Arts, English and Film Studies

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# POSTERS AT A GLANCE

Poster	Presenter	Title	Faculty
1	Yusra Batool	Frequency of CYP2C19 *2/*3 alleles	Science
		in global ethnic populations	
2	Joelyn Kozar,	Research on Avian Protection Project	Science
	Mallory Nault,		
	Patrick Welsh,		
	Steve Pasichnuk		0.1
3	Ying Ling	Regulatory Effects of CD1d+CD5+ B	Science
		Cells in the Context of Antigen	
		Incompatible Heart Transplantation in	
		Childron	
4	Chakanaka	Air Quality at Edmonton's Outdoor	Chaka Zinvemba:
-	Zinvemba & Marc	Festivals: Findings from Fine	Arts Marc Parsons
	Parsons	Particulate (PM2 25) Sampling	Science
		(August 2011)	
5	Leonie Brown	Microhabitat selection of urban	Science
		coyotes (Canis latrans)	
6	Kayla Courtney Yip	Parental Perceptions of Children's	Medicine and
		Dental Health among African	Dentistry
		Communities in Edmonton	
7	Andrea Bui	Assessing Muscle Contraction Forces	Physical Education
			and Recreation
8	Angela Shamchuk	Phenotyping individual variation in	Science
		larval zebrafish (Danio rerio)	
		behavioral response	<u> </u>
9	John Garrett	Average Electromagnetic Property	Engineering
10	Bovin Chong	The Method of Loci is spatial after all	Science
10	Bebecca Taylor	Case-based Learning and Challenges	Education
	Rebecca rayioi	Associated with the Concept of	
		"Correct" Answers	
12	Alexander Evans	Characterization of novel targets of	Science
		the sRNA RprA in Escherichia coli,	
		and its involvement in the Cpx two-	
		component system	
13	Kacie Norton	Investigating the male subfertility	Science
		defect caused by a mutation in Cecr2	
14	Shivani Upadhyaya	Mapping of the Zeste White 10	Science
		(ZW10) functional domain in	
		kinetochore tension checkpoint	
		response	
15	Lauryn Pounder	Development of a miniaturized assay	Science
		to screen for bacterial hypermutators	
1	1	in the environment	1





Poster	Presenter	Title	Faculty
16	Alicia Freeman	Does education make a difference:	Education
		Accuracy of teachers' and mothers'	
		judgments of grade one children's	
		reading ability compared to children's	
		performance on word reading	
		measures for children from higher	
		and lower maternal education	
		backgrounds	
17	Rafael Sumalinog	Vaccinia Virus F1L(I129F) Mutant	Science
		and Its Interactions with Pro-	
40		Apoptotic Proteins Bak, Bax, and Bim	
18	Pendleton Cox	Fidelity of DNA Replication	Science
19	Chantal Magnan	Protein kinase C $\beta$ , a possible	
		modifier gene in Cystic Fibrosis	(summer)
20	A Buttenschoen,	The University of Alberta – High	Science
	Other authors	Altitude Balloon (UA-HAB) Project	
	(alphabetically) Q		
	Farr, C Hoogson,		
	VV JOHNSON, I R		
	I I Roo		
21	Boniamin Davie	Time Motion Analysis of Varsity	Physical Education
21	Denjamin Davis	Hockey	and Recreation
22	Vedran Jelic	Towards an Atomic Movie - Coupling	Engineering
	Vedian Vene	ultrafast terahertz to a scanning	Lingineering
		tunneling microscope	
23	Caitlin Alexandra	Working memory of stair height is	Physical Education
_	Marchak	enhanced by motor experience of	and Recreation
		stepping	
24	Brittany Chubb	The effect of larval diet of the growth	Science
		and fitness of the Oriental fruit moth,	
		Grapholita molesta	
25	Baljot S Chahal	Exercise Intensity and Intra-	Physical Education
		abdominal Fat: A Systematic Review	and Recreation
26	Blair Warren	Racing Worms: Does Aerobic	Campus Saint-Jean
		Capacity Influence Ecological	
		Performance?	
27	Samantha Kuchera	Hope and Suffering- A Case Study	Nursing
28	Maimoona Tariq	Optimization of a method to analyze	Science
	Michalina Kirwal	opntnalmic acid in human serum	Calanaa
29	wichelina Kierzek	Elucidating the Molecular	Science
		Nutations of Phoenkalambar	
20	Androi Cotunoonu	Initiations of Phospholamban	Saianaa
- 30	Andrei Catuneanu	Suring Dualities and Topological	Science
		Recursion	





Poster	Presenter	Title	Faculty
31	Full Name:Michel	Arboreal Carton-Nests of the Termite	Augustana
	Marchand, Brian	Nasutitermes corniger as a Potential	
	Ellert	Roosting Sites in a Tropical Dry	
		Forest	
32	Janelle Smiley-	Solvent Exchange Mechanism in	Science
	Wiens	PNIPAm Microgel Based Etalons as	
		Revealed from Deswelling Kinetics	
33	Malika A Ladha	Characterization of Human Natural	Science
		Killer T Cells in Peripheral Blood,	
		Spleen and Lungs by Flow Cytometry	
34	Jessica Sacher	Exploitation of bacteriophage tail fibre	Science
		proteins as novel therapeutics against	
		bacterial infections	
35	Yael Mansour	Intralipid Reverses Vasodilation by	Science
		Propofol in Arteries from Aged Rats	
36	Vlatka Vukojevic	Production of Lactate in Response to	Sciences
		Physical Fatigue in Trout	
37	Cristian Cortes	Nanoengineering the quantum	Engineering
		properties of light with hyperbolic	
		metamaterials	
38	Dan Burton	High-Intensity Exercise Accelerates	Science
		the Development of Sarcopenia in	
		Aged Fisher 344xBrown Norway Rats	
39	David Hyunjoong	Technical, physiological, intra-	Medicine
	Kim	individual consistency and inter-	
		individual variation of augmentation	
		index and pulse wave velocity	
		measured by SphygmoCor in healthy	
		volunteers	
40	Lindsey Bergevin	Single-Channel Recordings of	Science
		NICOTINIC ACETVICNOIINE RECEPTORS IN	
44			
41	Vishnu Vasanthan	Histamine upregulates the production	Science
		of Matrix Metalloproteinase-9 in	
40	Aliaan	human astrocytic cultures	A rto
42	Chaoshrough	Edmonton: 1060a Roby Room	AITS
	Cheesbrough	Planning vs Current Practice	
12	Pruce Weekiewich	Propagation of Piomimotia Coloium	Engineering
43	DITUCE WASKIEWICH	Preparation of Biominetic Calcium Phoenbate Coatings on Different	Engineering
		Substrates	
11	Margarot Danko	Far from home and homeloce:	Nursing
-+-+	Inalyaiet Daliku	Percentions and experiences of	inuisiig
		homoloss international students	
15	Graham Bluth	Role of IFITM in inpate immune	Science
40		responses to influenza	
16	Name: Fred	Impact of predator assemblage on	Science
40	Name. Fieu Naddin	littoral zono microcrustance	





Poster	Presenter	Title	Faculty
47	Tori McNish	Art Museum/ Factory: The Social and	Arts
		Environmental Effects of an Adaptive	
		Reuse Building at Today Art	
		Museum, Beijing	
48	Lucy Xiaolu Ma	Detection of Single Nucleotide	Medicine and
		Polymorphisms in a Breast Cancer	Dentistry
		Susceptibility Gene (FGFR2) using	
		In-Gel Allele-specific PCR	
49	Logan Gilmour	Play Spaces	Science
50	Akua Gyambibi	Comparative and Quantitative	Medicine and
		Myology of the Prosimian Forearm	Dentistry
		and Hand	
51	Jessica Heidt	Group Characteristics in the Trauma	Science
		In Pregnancy Study: The need to	
50		rethink beyond age and gestation	
52	Charley Switzer	Developing Methods to Investigate	Augustana
		the Effect of Vitamin A on Innate	
50	Managa Dagatand	Immune Cells	Native Otvolian
53	Morgan Bamford	In the Role of Paternal Despot:	Native Studies
		Adams Archibald and the Red River	
EA	Daniamin Furman	The use of fluerescent pourdered	Colonaa
54	Benjamin Furman	The use of fluorescent powdered	Science
		pigments as a tracking technique for	
55	Dhillin Hou	Sildkes Childron's Aggression Vistimization	Arto
33	Fillip Liau	Status and School Engagement	Alto
56	Lauren MacDonald	From the Scrap Bag to Sears	Agriculture Life and
	Eachorn MacDonald	Roebuck: The Commodification of	Environmental
		Quilting from the 1920s to the 1940s	Science
57	Katherine Yackulic	Characterization of Vaccinia Virus	Science
_		A48 protein	
58	Rachel Jeong	Immunohistochemical analysis of	Medicine and
	0	mammalian locomotor networks	Dentistry
59	Kristen Peck;	Effect of insect herbivory on collared	Science
	Andrew Shaw (joint	pika foraging	
	poster)		
60	Dávid Szepesvári	An Artificial Intelligence Player for the	Science
		Game of Quoridor based on UCT	
61	Rhianna Charchuk	Microbial Community Structure of	Science
		Multi-year Ice	
62	Stefan Dehod	Sculpting Men: Mental Health of the	Arts
	_	Physically Fit	
63	Sandra Ngo	Effectiveness of current government	Agricultural, Life and
		recommendations in keeping trans-fat	Environmental
		content low in packaged foods	Sciences
64	Joshua Le	Study on the bacteria load on jeans	ALES
		not washed for 15 months	





Poster	Presenter	Title	Faculty
65	Catherine Kirwan	Improving the Diagnosis and	Science
		Management of Dementia in Primary	
		Care – An Innovative, Collaborative	
		Approach for Use by the WestView	
		Primary Care Network	
66	Chris Beavington	The Structural Studies of Bacterial	Science
		Lactoferrin Protein B from Neisseria	
		meningitidis	
67	Cian Hackett	Using Pollutant Release and Transfer	Medicine & Dentistry
		Register data for environmental	
		health research: a review of the	
		literature	
68	Claudine	Exploring Canadian new media	Physical Education
	Champion	(re)presentations of weight loss	
		surgery using content analysis	
69	Curtis Rollins and	Evaluating Differences in	ALES
	Amanda Long	Environmental Values and	
		Behaviours Among Undergraduate	
		Students: an Inter-Faculty	
		Comparison	
70	David L Ma	Phosphatidylcholine intake results in	Science
		different liver fatty acid composition	
		compared to free choline	
71	Jan Garcia	Improving the lifetimes of polymer	Engineering
		solar cells by selection of oxygen and	
70		Water barrier blocks	N la sera las as
12	Jessica ivicaliister	Vulnerability of Older Adults in the	Nursing
72	lool Cunto	The Effects of Department	Essulté Saint Jaan
13	Joel Gupta	Supplementation on Fatty Acid	Faculte Saint-Jean
		Motobolism in Insulin Posistant Poto	
74	Kurt William	Netabolishi in Insulin Resistant Rats	Solonooo
/4	Nult William	Three Tof mutants Enhancing Evo	Sciences
	Dougias Durilei	Colour Variagation of E1 an allele of	
		Pci in Drosonhila melanogaster	
75		It's all the same: Examining	Δrts
10		definitions of cyberbulling in students	7110
		parents and teachers	
76	Matthew Delanev	Utilizing the fAR-Play framework to	Science
		analyze game-play strategies for	
		augmented/alternate reality games	
77	Moses Funa	Endothelial Progenitor Cells Repairs	Science
	line coo r ang	Experimental Lung Damage Through	
		a Paracrine Activity	
78	Peter Charles	Structural Evidence For Isoform-	Science
	Holmes	Dependent pH Sensitivity In Troponin	





Poster	Presenter	Title	Faculty
79	Samantha Marie	'Little cooks': Gender, Class, and	Augustana
	Christensen	Food in Nineteenth-Century Reform	_
		Writing for Children	
80	Stephanie Jillian	Caspase 1 Inhibition in Inflammatory	Medicine & Dentistry
	Mah	Bowel Disease Reduces Epithelial	
		Cell Extrusion	
81	Suzanne Spady	American Sign Language –	Arts (Research done
		Phonological Awareness Test (ASL-	in Education)
		PAT): A Sign of Things to Come!	
82	Tho NHT Tran	Modal Identification of Ultrasonic	Medicine & Dentistry
		Guided Waves Propagating in	
		Cervine Tibia	
83	Tae Yeob (Ty) Kim	Cardiomyocyte-specific ATGL over-	Science
		expression prevents doxorubicin-	
		induced cardiac dysfunction in mice	
84	Tyler Sliwkanich,	A Scalable Platform for Text Analytics	Science
	Douglas		
	Schneider, Mitchell		
	Home		
85	Rebecca Visscher	A study of symptom and quality of life	Arts
		outcomes following treatment in a	
	·	tertiary care urogynecology clinic	
86	Julia Jing-ou Tan	Project Title	Science
07	Darkana Dadmian	On contatio Managemente a definite pour in	Calanaa Danartusantu
0/	Barbara Pedrycz	Oncostatin M receptor denciency is	
		associated with less monality and	N/A
		sopsis	
88	Shuai (Stone) Li	Novel effect of cellular retinoic acid	Medicine and
00		hinding proteins on proliferation in	Dentistry
		human malignant glioma	Dentiony
89	Sarah Aziz	Histone deacetylase inhibition	Science
	Caran Aziz	improves alucose regulation in	
		prediabetic mice	
90	Full Names: Andv	An Agricultural awareness based	Agriculture
	Jaikaran. Natalie	video produced as part of the	- igne anna e
	May, Jeff Douglas,	requirement of an introductory Animal	
	Marie Eriksson,	Science class (video)	
	Cara Noble		
91	Sina Kazemi	Analysis of shifts in glacial soil	Science
		microbes	
92	Emma Heydari	Screening candidate genes for the	Medicine
		pathogenesis of idiopathic	
		hypercalciuria in a pediatric cohort	
93	Joanna Couch	Effect of Luminal Factors from	Science
		Intestinal Inflammation on Colonic	
		Epithelial Cells	





Poster	Presenter	Title	Faculty
94	Sherrylynn Kerr	A Bite into the Media's Image of	Nursing
		Nursing in an Apocalyptic World	_
95	Charles Copeland	The effect of fungal infection and	Science
		drought on pine defense against fungi	
		vectored by Mountain Pine Beetle	
96	Xi Wang	Multi-Component Reactions	Science
	-	Catalyzed by lodine and Water for the	
		Synthesis of Quinoline Derivatives	
97	Amit Rahul	AP2δ induces axonal genesis through	Science
	Lutchme Persad	transcriptional regulation of ST8Sia2	
		and ST8Sia5	
98	Tiffany Riddle	Photosynthetic efficiency as	Science
		quantified by the photochemical	
		reflectance index	
99	Zachary John	New technologies for peripheral	Science
	Fritze	intravenous cannulation in children	
		and adults: Systematic review and	
		meta-analysis of controlled trials	
100	Yu Hao (Danny)	The Putative Regulation of β-catenin	Science
	Huang	O-GlcNAcylation by the Wnt and	
		PI3K Pathways	
101	William Lampe	Physiological and Psychological	Physical Education
		Measures of Fatigue in Varsity	and Recreation
		Swimmers	
102	Zachary Tan	PAX3 Expression and Regulation in	Medicine and
		Melanoma	Dentistry
103	Anwer Zohaib	Manipulating Instructions Strategically	Rehabilitation
	Siddiqi	Affects Reliance on the Ventral-	Medicine
101	<b></b>	Lexical Reading Stream	
104	Bradley Hauer	Evanescent Field Scattering as a	Science
		New Sensitive Detection Method for	
105		Atomic Force Microscopy	<u> </u>
105	Bennett Lambert	Effect of Naphthenic Acids on the	Engineering
400	Eria Desekse		Madiaire 9 Devilatore
106	Erin Boschee	Indications and Outcomes in	Medicine & Dentistry
		Children Receiving Renai	
		Replacement Therapy in a Canadian	
107	Lizz Kowazaki	PICU Clinical Ecosibility and Accortability	Colonaa
107	LISA Kawasaki	Clinical Feasibility and Acceptability	Science
		or Intermittent Electrical Stimulation in	
100	Mim S Eatmi	The Effectiveness of Team Passed	Solonoo
100	with S ratin		Science
		Learning on Learning Outcomes III	
		Evidence in Medical Education	
		(REME) Systematic Poviow	
1	1	(DEIVIE) Systematic Review	





Poster	Presenter	Title	Faculty
109	Catherine (Katie)	Isothermal Self-Replication of DNA	Science
	Mitran	using Destabilizing Probes	
110	Mitchell P Wilson	Etiology of Hydrocephalus as a	Medicine and
		Predictor of Shunt Revision in the	Dentistry
		Pediatric Population	
111	Victoria Olszak	Links among obesity, inflammation	Nursing
		and fatigue in individuals with cancer	
112	Megan Paranich	Geochemical Study of the Duck	Science
		Creek Formation (Western Australia):	
		Implications for Mesoproterozoic	
		marine evolution	
113	Stephanie Babwik	Development of a database to	Agriculture life and
		analyze sugar intake in pregnant	environmental
		women	sciences
114	Megan C Engel	A 215 Hour Orbital Period for the Low	Science
		Mass X-Ray Binary XB 1832-330 in	
		the Globular Cluster NGC 6652	
115	Sydney Patricia	In Vitro Transcriptional Analysis of	Science
	Rudko	Vaccinia Virus Replication Proteins	
116	Philippe Gaudreau	Computation of Tail Probability	Campus Saint-Jean
		Distributions via Extrapolation	
447	Osatt Dalaart Massar		0
117	Scott Robert Meyer	Examining the role of two key amino	Science
		acids within the enzyme Fumarate	
110	Frandira	Reduciase Marta (Cartaanizad:'Daniationa of	A rto
110	Conventos	First Lady Marta Sabagún in Movican	AIIS
	Altomirano	Political Cartoons	
110	Kristonher Wayne	Down the Rabbit Hole: Where	Medicine and
113	Dodd	Knockdown of Host Vaccinia Related	Dentistry (was
	Douu	Kinase-2 Leads to Increased Myzoma	Science at the time)
		Poxvirus Growth	
120	Jordan Lee	"I Am not An Animal I Can Write! A	Arts
	Clemens	Terror Management Exploration of	7110
	Clothene	Language and Human	
		Creatureliness"	
121	Kian Parsevan	Proposed Improvements for	Science
		Intraspinal Microstimulation Array	
		Fabrication and Insertion	
122	Jessie Gill	Influence of Swimming Duration and	Physical Education
		Intensity on Airway Hyper-	and Recreation
		responsiveness in Varsity Swimmers	
123	Marguerite Tiangco	Students' Views on Problem-Based	Medicine and
		Learning (PBL)	Dentistry
124	Jenna A Weber	Women As Sinew in Communities	Education
		(WASi Communities)	





### THE ABSTRACTS

And last but not least the abstracts from the 124 student submissions that were accepted for the symposium. They were selected based on a range of criteria such as the clarity of students' abstract writing, their methodological precision and creativity of ideas. The abstracts are as follows:

1.

Project Title: Frequency of CYP2C19 \*2/\*3 alleles in global ethnic populations Full Name: Yusra Batool Faculty: Science Department: Biological Sciences Degree and Year of Study: BSc Spec. Physiology and Developmental Biology, 2<sup>nd</sup> year Supervisor Name: Sharon Marsh

Inter-ethnic genetic differences can greatly impact the effect of therapeutic drugs on patients from different ethnicities, causing adverse or sometimes even toxic reactions to doses. Even though published research exists about the frequencies of different genes in separate populations, there is no instance of this data being compiled for different regions of the world, making it useful for health practitioners. One of these genes is CYP2C19, which controls the response of over 40 drugs, including Clopidogrel, which is used in the treatment of coronary artery disease. In this project, the allelic frequencies of CYP2C19 \*2/\*3 are mapped in different populations by reviewing and compiling previously published literature. It was found that the frequency of CYP2C19 \*2 and \*3 alleles was 200 to 400 percent higher in populations in Eastern Asia as compared to the white Caucasian population, while the frequency of these alleles in the Americas, Russia, parts of Africa, Europe and Australia was 50 to 200 percent higher. An exception was the island nation of Vanuatu, where the frequency of the \*2/\*3 alleles was greater than 400 percent higher than that in the Caucasian population. This shows that doses of drugs impacted by CYP2C19 should be monitored according to the ethnicity of the patients they are prescribed to. It can also help Health Ministries in different countries in decision making, saving capital from investment in potentially toxic or nonresponsive drugs.

2.

Project title: Research on Avian Protection Project Full name: Joelyn Kozar, Mallory Nault, Patrick Welsh, Steve Pasichnuk Faculty: Science Department: Biological Sciences Supervisor: Colleen St. Clair

Effluent produced by oil sands extraction in northeast Alberta, Canada, is stored on-site in large tailings ponds, currently covering approximately 170 km<sup>2</sup>. Tailings ponds pose a significant risk to waterfowl through both direct mortality via contact with the residual bitumen on the surface of ponds and potentially through sub-lethal toxic effects of ingesting tailings pond water. Recently, mass landings and mortality of birds occurred in May 2008 and October 2010. The landings in 2008 may have occurred because deterrents had not yet been placed for the season. However,





the 2010 landing event was harder to interpret. Mitigating avian mortality at tailings ponds in future requires a better understanding of the spatial and temporal factors that correlate with both landings and mortalities.

The Research on Avian Protection Project (RAPP) addresses these knowledge gaps with objectives to (1) review the methods of monitoring and deterrence used in other industrial applications, (2) support the development of a standardized monitoring program implemented throughout the oil sands regions, (3) experiment with novel methods to automate monitoring and deterrence of birds, and, ultimately, (4) recommend best practices for oil sands operators. Four undergraduate students addressed these objectives in the following ways.

Joelyn Kozar reviewed data collected at Suncor between 1979 and 1992 and examined the effect of changes in deterrent types and deployment methods on the frequency of landings and mortalities. Mallory Nault reviewed the literature on bird deterrence at industrial sites and identified novel methods for experimentation in the oil sands. Patrick Walsh reviewed the literature on toxicity to birds of oil and other constituents of process-affected water. Steve Pasichnuk reviewed the use of cameras to monitor birds and recommended the use of infrared illumination, video cameras, and automatically panning tripods to monitor ponds at night. Nocturnal monitoring is a particular challenge because activity by migratory birds is higher then, but monitoring by direct observation is not possible. Together, the excellent and innovative research by these undergraduate students supports the design and implementation of subsequent project components. This poster summarizes those contributions and our future plans.

3.

Project Title: Regulatory Effects of CD1d+CD5+ B Cells in the Context of Antigen Tolerance Following ABO-Incompatible Heart Transplantation in Children Full Name: Ying Ling Faculty: Science Department: Biological Sciences Degree and Year of Study: BSc General, Year 2 Supervisor Name: Simon Urschel

Infants show significantly better graft acceptance and survival after heart transplantation and are even able to tolerate ABO-incompatible hearts, although these mechanisms are unclear. In mice, a CD1d+CD5+ B cell subset was found to have regulatory capacities and was named 'B10 cells' for their production of IL10 in vitro. In humans, this phenotype is more frequent in young children. We aim to determine whether human CD1d+CD5+ B cells are functionally similar to B10 cells in mice. Using flow activated cell sorting, CD1d+CD5+ B cells were sorted from pediatric splenocytes and cultured parallel to residual B cells using T-dependent and independent B cell stimulation. IL10 concentrations were quantified from the supernatants using an ELISA. Proliferation was assessed through carboxyfluorescein-succinimidyl-ester stained splenocytes with CD1d+CD5+ B cells at 0%, 100%, 200%, 300% and 500% of their natural proportion using T cell and B cell stimulation. Both CD1d+CD5+ B cells and residual B cells showed IL10 production. Proliferation of B cells and T cells in absence of CD1d+CD5+ B cells was markedly increased; it slightly decreased with double and triple proportion of these cells.





The assays were repeated with an adult sample and showed similar but less pronounced results. In summary, these results indicate that regulatory B cells include but are not limited to the CD1d+CD5+ subset described in mice. Their high prevalence in early childhood likely contributes to better graft acceptance. Larger data sets throughout various age groups are required to confirm findings and identify additional regulatory B cell phenotypes.

4.

Project Title: Air Quality at Edmonton's Outdoor Festivals: Findings from Fine Particulate (PM2 2.5) Sampling (August 2011) Full Name: Chakanaka Zinyemba & Marc Parsons Faculty: Chaka Zinyemba: Arts Marc Parsons: Science Department: Earth and Atmospheric Science Degree and Year of Study: Chaka Zinyemba : BA Human Geography 4th year Marc Parsons: Bsc Statistics 3rd year

Supervisor Name: Damian Collins

The purpose of this study was to assess the contribution of ETS and cooking smoke to ambient air pollution during Edmonton's 2011 outdoor festivals. There are currently no laws in effect in Edmonton protecting non-smokers from environmental tobacco smoke (ETS) during festivals or in public spaces. Many festivals include temporary food establishments, which emit particulate matter (PM) from cooking equipment. Airborne PM of the size 2.5 micrometers (PM2.5) is a reliable indicator of the presence and concentration of ETS. To the best of our knowledge, this is the first study to measure exposure to PM at outdoor festivals. Data collection involved recording observations of PM, and real-time PM monitoring using a TSI SidePakAM510 Personal Aerosol Monitor. 29 hours of data were collected across three festivals, with PM2.5 levels logged every 30 seconds. Tobacco smoking within three metres of the observers was recorded 590 times (equating to 20 smokers/houron average).

5.

Project Title: Microhabitat selection of urban coyotes (Canis latrans) Full Name: Leonie Brown Faculty: Science Department: Biological Sciences Degree and Year of Study: Honors Ecology, 4<sup>th</sup> year Supervisor Name: Colleen St.Clair

The coyote (Canis latrans) is the only top predator to successfully adapt to urban areas, resulting in high rates of human-coyote conflict and management challenges in cities across North America. While many studies have described the habitat use and diet of coyotes in cities, none so far have examined what particular habitat characteristics create attractive urban habitat for coyotes. We aim to describe the microhabitat selection of coyotes in Edmonton to enhance public education and improve non-lethal management. To this end, we GPS-collared 11 urban coyotes (six with mange, five without) in Edmonton, Alberta using 3-hour fix rates. For each individual coyote we investigated high-use sites, defined as  $\geq$ 4 GPS fixes within 20 m, and measured habitat characteristics. Coyotes tended to select natural areas for home range placement and selected high-use sites with high shrub cover, anthropogenic and natural food,





natural sites near buildings, and residential sites without fences. Interestingly, coyotes with Sarcoptic mange used more residential habitat and selected high-use sites with more anthropogenic food than healthy coyotes. Management practices such as reducing disease transmission by securing garbage and compost and erecting fences and thinning shrubs in concerned residents' backyards may help reduce human-coyote conflict in many cities in North America.

6.

Project Title: Parental Perceptions of Children's Dental Health among African Communities in Edmonton Full Name: Kayla Courtney Yip Faculty: Medicine and Dentistry Department: Dentistry Degree and Year of Study: Nutrition and Food Bachelor of Science (3<sup>rd</sup> Year) Supervisor Name: Maryam Amin

Objectives: This study aimed to explore the perceptions of African immigrant parents of their children's dental health and the factors that may influence their awareness. Methods: Participants were parents and their 3 to 6 year old children who had lived in Canada for 10 vears or less. Demographics and child's dental information were collected in a 19-guestion survey. Parents were asked to assess their child's dental health and identify the indicators and ways they use to recognize dental decay. A dental exam was performed for children in a community location. Parental awareness was determined by comparing children's normative status (clinically measured dental health status) with parents' perceived status. Results: In total, 76 parents and 110 children completed the study. The mean defs were 33.71 years (±5.7) and 4.23 years  $(\pm 1.3)$ , respectively. More than half of the children had never visited a dental office before. Twenty eight percent of African parents associated only a black spot as a symptom of dental caries. About 60% of parents referred to parental checking as the method used to assess their child's dental health. Fifty percent of the children had at least one carious lesion. Parents employed limited indicators for caries detection, which often referred to an advance form of this disease. Conclusions: Parental perception of their child's dental health did not seem to be a reliable proxy of actual status. Dental visits for preventive reasons should be promoted. Also, parents should be educated regarding indicators and effective ways of detecting caries.

7.

Project Title: Assessing Muscle Contraction Forces Full Name: Andrea Bui Faculty: Physical Education and Recreation Department: N/A Degree and Year of Study: Bachelor of Science in Kinesiology, 5th Year Supervisor Name: David F. Collins Accurate assessment of muscle contraction forces is important for functions of daily living. Information about force may come from muscle receptors (sensory feedback) or the brain (voluntary command). Humans are poor at assessing contraction force when relying solely on





sensory feedback. We propose that accurate perception of forces requires continuous comparison of sensory feedback with voluntary commands. PURPOSE: We tested the hypothesis that i) when subjects remain relaxed they would significantly overestimate forces generated during electrically-evoked target contractions but ii) when subjects hold a voluntary contraction they would accurately match electrically-evoked target contractions. METHODS: Ankle dorsiflexion torgue was measured in 10 subjects. Contractions were collected in pairs, with an electrically-evoked "target" followed by a voluntary "match" contraction. Tibialis anterior was stimulated with 2s trains. Subjects either remained relaxed (n=40) or maintained a small voluntary contraction (n=40) during the "target." RESULTS: When relaxed, all 10 subjects significantly overestimated forces generated during the "targets." On average, "matches" (23+13% MVC) were twice as large as "targets" (11+3% MVC) (p<0.001). When subjects held a small contraction (4+2% MVC), 1 accurately matched, 4 underestimated and 5 overestimated. In this contracted condition, there was no significant difference between the "targets" (15+4%MVC) and "matches" (18+10%MVC) (p>0.05). IMPLICATIONS: We suggest that the nervous system constantly compares peripheral feedback with descending motor commands to accurately judge contraction forces through changing muscle conditions, such as fatigue.

8.

Project Title: Phenotyping individual variation in larval zebrafish (Danio rerio) behavioral response Full Name: Angela Shamchuk Faculty: Science Department: Biological Sciences Degree and Year of Study: General sciences, 4<sup>th</sup> year Supervisor Name: Keith Tierney

Analysis of odor or chemical evoked animal behavior is often complicated by the variation in responses between individuals tested. This holds true for zebrafish (Danio rerio), a model organism used with increasing popularity in these types of behavioral assays. In this study, we investigated the individual variation between larval zebrafish responses to an experimental blank, water alone. We tested water alone since it is a control for baseline behaviour in response to a change in subtle change in their environment, and thus form the basis for future studies that include the delivery of water, but also a chemical stimulus. We used a novel apparatus that reduces external interference while injecting the solutions of interest into the fish environment to observe behavioral responses. Basal zebrafish movement was recorded 20 minutes prior to and for the 20 minutes that followed the water addition. Despite constant delivery conditions, there was a high level of response variation between fish. However, by comparing the frequency and duration of typical bursting and freezing movements, we have found trends in behavior that allow individual responses to be grouped into specific behavioral phenotypes This study will help set a standard control for larval zebrafish odor-evoked behavior and permit future investigations of loss of smell which is a common marker for human neurodegenerative diseases, such as Alzheimer's.





Project Title: Average Electromagnetic Property Estimation of Breast Tissue Full Name: John Garrett Faculty: Engineering Department: Electrical (w| Biomedical Option) Degree and Year of Study: 4<sup>th</sup> year Supervisor Name: Elise Fear

My research project estimates the average electromagnetic properties of breast tissue by analyzing the transmitted signal between two ultra-wideband antennas placed on either side the breast. This research was part of the Tissue Sensing Adaptive Radar project, which creates electromagnetic property maps of breast tissue using two microwave antennas. A very helpful aspect to improving image quality is incorporating average property knowledge into the imaging algorithms.

The old method of estimating average properties used two antennas, and took measurements at different distances (i.e. different compressions.) This way, the two images could be subtracted from each other to remove skin reflections and antenna effects. This method however was very sensitive to multipath interferences in the breast, which occurs in more complex structures.

My method should overcome these limitations by employing a time-gating/antennacompensation technique. The time-gating aspect removes the effects of multipath in the timedomain, while the antenna compensation aspect removes the effects of the antennas. Currently, I have shown that this method produces accurate results with simulations data, and that it provides reasonable estimations with patient data. The next step is to use man-made phantom breasts with known properties to fully validate my method.

Overall, this research will allow for the creation of superior electromagnetic property maps by incorporating knowledge of the average properties into the imaging algorithms. Currently, this is especially hard with complex structures where multipath is present, but I believe that my research will be able to deal with larger amounts of multipath.

10.

Project Title: The Method of Loci is spatial after all. Full Name: Bevin Cheng Faculty: Science Department: Psychology Degree and Year of Study: Specialization in Psychology, 4<sup>th</sup> year. Supervisor Name: Jeremy Caplan

The Method of Loci (MoL) is an ancient and well known strategy for verbal serial-order memory whereby a person imagines navigating a familiar space, placing verbal materials as they go





(Yates, 1966). One might imagine, then, that the spatial properties of the environment used would influence the efficacy of recall. Alternatively, the navigation metaphor might not affect verbal memory in any material way, but rather, serve as a hook that simply gets people to study and retrieve verbal lists better, but in the usual, non-navigational way. Our participants were briefly (about 5 minutes) familiarized with each of three environments with very different topologies: an apartment (similar to what would traditionally have been used), an open field and a radial-arm maze. Following environment training, participants were asked to apply MoL, with the just-learned environment, to five 11-word lists. Serial recall was best for the apartment environment and worst for the radial-arm maze environment, both when scoring items recalled and scoring items recalled in their correct position. This appears to be the first evidence that MoL is spatial, in that the spatial characteristics of the choice of environment has an influence on verbal serial list memory.

11.

Project Title: Case-based Learning and Challenges Associated with the Concept of "Correct" Answers. Full Name: Rebecca Taylor Faculty: Education Department: Secondary Education Degree and Year of Study: BED. After-degree, 2<sup>nd</sup> Year Supervisor Name: Genevieve Gauthier

Case-based learning is the use of cases to teach problem solving and reasoning skills and is a common practice in professional health education. Case-based learning is complex and openended in nature and as a result has the potential to meet the challenges of today's learning environments. Case-based learning pose challenges to traditional educational assessment practices because providing the "correct" answer is not the primary goal of this type of teaching. The purpose of this type of learning is to teach clinical reasoning and decision-making processes.

We used a program called BioWorld to assess and analyze the performance of expert pharmacy teachers and case creators. The cases the experts performed were designed to assess the learning and reasoning skills of third-year Pharmacy students. We chose to study case-solving processes of pharmacy experts to demonstrate that the process of solving a case is not straightforward. We found that the pharmacy experts did not produce the answers they proposed for the case, nor following repetition, did they produce either the same answer as their first case attempt or the proposed "correct" answer. These results raise questions about what should be assessed in this type of learning environment, and further question the validity of one "correct" answer to any type of complex problem.





Project Title: Characterization of novel targets of the sRNA RprA in Escherichia coli, and its involvement in the Cpx two-component system. Full Name: Alexander Evans Faculty: Biological Sciences Department: Molecular Genetics Degree and Year of Study: 4th Supervisor Name: Tracy Raivio

The Cpx two-component system is a membrane signaling system which is crucial for the cell's ability to respond to membrane stressors such as misfolded proteins, and thus is important to our understanding of bacterial signaling, virulence and physiology. Based on a microarray done by Price and Raivio (in preparation), five small RNA genes were predicted to be regulated by the Cpx two-component system's response regulator CpxR. These small RNA genes were subjected to experiments to determine what role they play in survival of membrane stressors, and what effect they have on the Cpx two-component system's activity. Among other findings, it was determined that the overexpression the small RNA gene rprA led to a 50% decrease in the expression of the CpxAR system, and thus was theorized to have an inhibitory effect on the twocomponent system. Since RprA's only known target is the rpoS mRNA, which encodes the alternative sigma factor  $\sigma S$ , follow-up studies were done in an  $\Delta rpoS$  strain. It was shown that the effect of rprA overexpression on Cpx activity was not abolished in the  $\Delta$ rpoS strain, and that RprA must therefore have another target. Through use of two computation sRNA target prediction programs, a list of possible RprA targets was procured. Further investigation on the effect of rprA overexpression on Cpx activity in strains lacking these predicted targets will be done to determine if any of the predicted targets are veritably RprA targets.

13.

Project Title: Investigating the male subfertility defect caused by a mutation in Cecr2 Full Name: Kacie Norton Faculty: Science Department: Biological Sciences Degree and Year of Study: Honors in Molecular Genetics, 4<sup>th</sup> year Supervisor Name: Heather McDermid

Cecr2 is involved in the modification of DNA, resulting in changes in gene expression. Changes in gene expression are a key part of normal development, because they determine the proper differentiation of cells in the developing organism. Embryos that have a mutation in both copies of the gene Cecr2 often show the fatal neural tube defect exencephaly, where the cranial neural tube fails to close properly resulting in the brain being exposed and subsequently degraded. This disorder is also seen in humans, where it is known as anencephaly. However, in our mouse model this only occurs in 74% of mouse embryos with a Cecr2 mutation. In the surviving 26%, many males show sub-fertility. I have confirmed and further characterized the severity of this sub-fertility phenotype, and investigated the cause of this defect through a variety of experiments. My results show that sperm number and motility are not affected, but males with





the mutation are less effective at fertilizing eggs. This was seen by observing eggs after mating and looking for the presence of pronuclei, which only form upon fertilization. When these eggs were cultured to the blastocyst stage in vitro, no defects in early development were seen. Therefore, it appears that the subfertility in Cecr2 mutant males is due to a problem with fertilization that is not related to sperm number or motility.

14.

Project Title: Mapping of the Zeste White 10 (ZW10) functional domain in kinetochore tension checkpoint response Full Name: Shivani Upadhyaya Faculty: Science Department: Biological Sciences Degree and Year of Study: BSc in General Science, 2<sup>nd</sup> year of study Supervisor Name: Gordon Chan

When cells divide, it is essential that each cell receive copies of every chromosome. Consequently, many safety mechanisms, such as the mitotic checkpoint, exist to prevent cells from dividing until the conditions for equal division of the duplicated chromosomes is achieved. Both kinetochore attachment to mitotic spindle microtubules, and proper alignment of chromosomes at the metaphase plate, resulting in tension across sister kinetochores of chromosomes, must be present for cell division. hZW10, a component of the essential RZZ complex, accumulates to the kinetochores in absence of either kinetochore-microtubule attachment or tension (Famulski et al., 2007). Previous studies have identified the kinetochore localization domain in hZW10 (Famulski et al., 2008). To define the functional domain, we analyzed the response of several hZW10 insertion mutants to loss of tension by utilizing a tension assay that induces loss of tension while retaining attachment. It utilizes MG-132, which arrests cells in metaphase, and taxol, which causes loss of tension across sister kinetochores. We screened mutants by transfecting HeLa cells with the hZW10 mutants and subsequently drugging with MG-132 (kinetochores with full tension), or MG-132 and taxol (kinetochores with no tension). Three mutants were found to be unresponsive to the loss of tension; hZW10 did not localize to the kinetochores in response to loss of tension. This suggests that the amino acids disrupted by these insertion mutants are within the tension responsive domain of hZW10. Therefore, we conclude that the domain responsible for the kinetochore tension checkpoint response of hZW10 is between amino acids 208-226.





Project Title: Development of a miniaturized assay to screen for bacterial hypermutators in the environment Full Name: Lauryn Pounder Faculty: Science Department: Biological Sciences Degree and Year of Study: 4<sup>th</sup> Year BSc Specialization in Evolutionary Biology Supervisor Name: Yan Boucher

Bacterial hypermutator strains have spontaneous mutation rates that are greater than average, and evolve more quickly as a result. Inactivation of the mismatch repair system (MMR), via a mutation in the mutS gene, generates hypermutator strains that can be detected using antibiotic resistance assays. These assays are efficient at detecting hypermutator strains, but they are not time- or cost- effective. We have adapted the antibiotic assay into a two-part miniaturized version, to quickly screen hundreds of strains simultaneously for rifampicin resistance. Using a Vibrio cholera C6706 mutS knock-out mutant as a control, we were able to identify 41 of 384 Vibrio strains as potential hypermutators. These strains will be screened further using full-scale assays with both rifampicin and ciproflaxin to confirm their hypermutator phenotype.

16.

Project Title: Does education make a difference: Accuracy of teachers' and mothers' judgments of grade one children's reading ability compared to children's performance on word reading measures for children from higher and lower maternal education backgrounds. Full Name: Alicia Freeman Faculty: Education Department: Educational Psychology Degree and Year of Study: Bachelor of Elementary Education - 4th year Supervisor Name: Denyse Hayward

With respect to reading development, classroom teachers are the primary source informing instructional decisions, student progress, teaching techniques and determining if students require specific interventions. Thus, accurate teacher judgments of student's reading abilities are important to ensure reading success for all students. Accuracy is particularly crucial in grade one, since formal testing at this grade level is rare. Yet, studies show teachers tend to overestimate the reading abilities of their students, especially students with weaker academic skills.

Another important factor in children's reading development is maternal education. Higher education is linked to (a) children attaining better scores on reading measures, and (b) differences in the ways mothers interact with their children during literacy activities. Additionally, mothers' with lower education tend to be less accurate at rating their child's reading abilities.

We examined the relationship between teacher and mother ratings of grade one children's reading abilities based on the children's actual reading abilities to determine if level of education has an effect.





We found positive, statistically significant correlations for teachers and parents ratings with child performance on reading tests: Teachers (r = 0.73, p < 0.001); Parents – high education (r = 0.47, p < 0.001); Parents – low education (r = 0.60, p < 0.001).

Our results differ from previous studies. We found that teachers did not appear to overestimate grade one children's reading abilities and parents of lower education were as accurate in their ratings of child reading ability as parents with high education. Implications of these findings will be presented.

#### 17.

Project Title: Vaccinia Virus F1L(I129F) Mutant and Its Interactions with Pro-Apoptotic Proteins Bak, Bax, and Bim Full Name: Rafael Sumalinog Faculty: Science Department: Infection and Immunity (Biological Science) Degree and Year of Study: Honours Bachelors of Science, 4<sup>th</sup> year Supervisor Name: Michele Barry

Apoptosis, or programmed cell death, is a tightly regulated process that plays a key role in protecting hosts against pathogens, and results in plasma membrane blebbing, chromatin condensation, and mitochondrial dysfunction. Apoptosis is controlled by the members of the Bcl-2 family of proteins, all sharing at least one BH (Bcl-2 homology) domain, which is important for protein-protein interaction. An apoptotic trigger can cause the prototypical pro-apoptotic members Bak and Bax to form higher-order polymers at the mitochondrial outer membrane, facilitating the release of pro-apoptotic factors. The BH3-only protein Bim assists apoptosis by activating Bax and enabling mitochondrial Bax localization. Vaccinia virus encodes F1L, a potent anti-apoptotic protein that localizes at the mitochondrial outer membrane and inhibits Bak-, Bax-, and Bim-induced cell death. F1L contains divergent BH domains, and the crystal structure shows that F1L adopts a Bcl-2-like fold, with a binding groove that is crucial for interacting with Bcl-2 family members. To determine the interaction between F1L and Bim<sub>L</sub>, Bak and Bax, EGFP constructs were generated containing wildtype F1L and its cognate binding pocket mutants. HEK293T cells were co-transfected with the EGFP constructs along with FLAG-tagged Bim<sub>L</sub> and co-immunoprecipitated. The samples were run on SDS-PAGE and western blotted. EGFP-F1L (I129F) interacted with Bim, to a greater extent, and to a weaker extent with Bak, than wildtype F1L. Similar co-transfections were also done with HeLa cells for flow analysis, which showed that F1L(I129F) shows variable abilities to inhibit Bak-, Bax-, and Bim-induced apoptosis compared to wildtype F1L.





Project Title: Fidelity of DNA Replication Full Name: Pendleton Cox Faculty: Science Department: Biological Sciences Degree and Year of Study: Bachelor of Science in Molecular Genetics, 3<sup>rd</sup> year Supervisor Name: Linda Reha-Krantz

DNA polymerase is a highly accurate protein, rarely allowing mutations to occur within a cell. This study looks at how DNA polymerase avoids replicating damaged DNA, in which I examined if GC to AT mutations were a result of the deamination of cytosine. WT DNA polymerase avoids replicating uracil; however the L412M mutant polymerase has decreased replication fidelity (F. Kamal) which may be due to the replication of uracil. Recovered mutations consist of A to G, G to A, T to C, A to T and an insertion of A. There is not enough data to come to any definite conclusions, although interestingly enough, identical mutations in two samples were recovered.

19.

Project Title: Protein kinase C  $\beta$ , a possible modifier gene in Cystic Fibrosis Full Name: Chantal Magnan Faculty: UBC Faculty of Medicine (summer) Degree and Year of Study: Honours Molecular Genetics 3<sup>rd</sup> year (University of Alberta) Supervisor Name: Andrew Sandford

Background: Cystic Fibrosis (CF) is a lethal hereditary disease affecting the lungs and intestinal tract. CF is caused by mutations in the Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) gene. However, the type of CFTR mutation does not completely account for the variability of disease severity in CF. Meconium ileus (MI), a blockage of the intestine at birth, only appears in CF newborns, but only ~15% of CF patients are born with it, this can only be partially explained by the CFTR genotype. Thus, non-CFTR genes (modifier genes) also influence the risk for MI.

Using a Genome Wide Association Study (GWAS), Single Nucleotide Polymorphisms (SNPs) were identified that were associated with MI. Three of these SNPs were present in the Protein Kinase C  $\beta$  (PRKCB) gene.

Hypothesis: The rs7195728 polymorphism of PRKCB is associated with expression levels of the gene.

Methods: Thirty-seven non-CF lung tissue samples were selected from the Hogg Registry based on rs7195728 genotype. RNA was extracted from the 37 non-CF and 8 CF human lung samples. PRKCB mRNA expression levels were quantified by real time qPCR. PPIA expression was measured in the same samples to normalize for RNA levels.





Results: CF lung had higher expression of PRKCB than non-CF lung (p=0.0068). In addition, the CT genotype of rs7195728 was associated with higher expression of PRKCB than the CC genotype in non-CF lung (p=0.0122).

Conclusion: The rs7195728 polymorphism is associated with mRNA expression levels of PRKCB, and these data strengthen the evidence that this locus is a modifier of disease severity in CF.

20.

Project Title: The University of Alberta – High Altitude Balloon (UA-HAB) Project Presenting author: A. Buttenschoen, Other authors (alphabetically) Q. Farr, C. Hodgson, W. Johnson, I. R. Mann, L. Mazzino, I. J. Rae Faculty: Science Department: Physics Degree and Year of Study: 4<sup>th</sup> Supervisor Name: I. R. Mann

The University of Alberta – High- Altitude Balloon (UA- HAB) Project funded by the Canadian Space Agency's (CSA) Space Learning Program to design, build, test and fly a student payload onboard the NASA- funded High- Altitude Student Platform (HASP). The High Altitude Student Platform HASP) is designed to carry up to twelve student payloads, including the UA- HAB payload. The HASP payload will be launched from Fort Sumner, New Mexico, and to an altitude of about 36 kilometers with flight durations of 15 to 20 hours using a small volume, zero pressure balloon. The UA- HAB payload is an experiment designed to detect the signatures of cosmic rays entering the atmosphere. Using three Geiger- Muller tubes under different amounts of shielding, this Maple Leaf Particle Detector is able to provide both timing and energy information of these cosmic rays.

The UA- HAB provides a unique opportunity for both undergraduate and graduate students to gain hands- on experience in all phases of a space- related mission. The primary goal of UA- HAB is to build knowledge and skill amongst Canadian students in experimental space science using low- cost mechanisms to access space. The detailed design, build and test of the payload provide a unique insight into the processes required for a space mission to proceed through the conceptual (Phase 0 and A), design (Phase B and C), and build and flight (Phases D and E) of a space mission – including through the NASA reporting and test requirements experience with the quality and flight assurance of such a mission, Finally, the students experience and develop scientific methods and hypothesis testing through the analysis of the flight data.





Project Title: Time Motion Analysis of Varsity Hockey. Full Name: Benjamin Davis Faculty: Faculty of Physical Education and Recreation Department: N/A Degree and Year of Study: Bachelor of Phys. Ed. (Sport Performance and Athlete Health) 4<sup>th</sup> Year Supervisor Name: Gordon Bell

The project was to record and analyze the movements performed by each position over three high level (varsity) hockey games to determine the tendency of movements for players in a game during 5-on-5 play. Movements were broken into 10 categories which were described and agreed upon by the researchers involved. Video of each game was then analyzed to determine the movement frequency, and average time the movement was performed by each position. Movements per shift was determined for each position and matched up with the average time each position performed that movement. Shift numbers and times were also determined for each player and will be used for future analysis. Heart rate monitors were also worn by the players to determine the amount of aerobic vs. anaerobic activity they performed throughout the game.

22.

Project Title: Towards an Atomic Movie - Coupling ultrafast terahertz to a scanning tunneling microscope Full Name: Vedran Jelic Faculty: Engineering Department: Department of Computer and Electrical Engineering Degree and Year of Study: Engineering Physics, 5th Supervisor Name: Frank Hegmann

The terahertz (THz) region of the electromagnetic spectrum lies between the infrared and microwave regions. Terahertz light has a low energy wavelength of about 1mm – ideal for studying processes that occur within atomic structures. Fabricating novel nano-scale materials has become an established practice and pulsed terahertz is the leading approach to do non-contact characterization of these new materials (eg. a materials conductivity). Our current research aims to use a technique known as time-resolved terahertz spectroscopy in conjunction with a scanning tunneling atomic microscope (STM) to develop a combined spatial-temporal imaging process for THz probing of nanoscale materials. Essentially, we record the atomic response after an excitation process by studying the intensities of terahertz frequencies at a particular point in time while taking an image with the STM. Then through spectral analysis of the THz we quantitatively characterize the material's properties. The STM images taken at various times form an animation of some atomic excitation process, giving rise to a physical interpretation. I will present and explain some of our recently acquired data and cover the physical interpretation of the imaging technique.





Project Title: Working memory of stair height is enhanced by motor experience of stepping Full Name: Caitlin Alexandra Marchak Faculty: Physical Education and Recreation Department: N/A Degree and Year of Study: BSc in Kinesiology - 3rd year Supervisor Name: Brian Maraj

Short-term memory (or working memory) is often used to guide movements of the limbs. For example, we reach for objects and step over obstacles a few seconds after we have viewed them. The primary goal of the research is to examine the characteristics of working memory when walking up stairs. Working memory, in some form, must be used in walking up stairs because this task can easily be done in the dark once initial information about step height is collected through either briefly viewing the stairs or through the experience of stepping on one or two steps. There are two main objectives of this study: 1) to determine how long visual information about step height can be held in working memory to accurately guide stepping movements, and 2) to determine whether the experience of stepping on stairs leads to a more persistent form of working memory compared to that established by vision alone. We investigated these two questions byexamining the characteristics of leg movements when subjects walk up a short flight of stairs after working memory of step height is established either visually or by the action of stepping on a small number of stairs can be used to guide subsequent stepping in the absence of vision better than the working memory created visually.

24.

Project Title: The effect of larval diet of the growth and fitness of the Oriental fruit moth, Grapholita molesta Full Name: Brittany Chubb Faculty: Science Department: BSc General. This research is being conducted in the Entomology department Degree and Year of Study: BSc General - Biology major and Earth and Atmospherics minor. Supervisor Name: Maya Evenden

The Oriental fruit moth (OFM) is an economically destructive pest of stone and pome fruit. The larvae feed on the succulent growth of twigs early in the season and consume the fruit once the twigs mature. Infested fruit decompose rapidly and are unfit for human consumption, causing large yield loss to crops. British Columbia is the only temperate fruit growing region free of this pest. The Sterile Insect Release Program (SIR) located in Osoyoos, BC mass rears and sterilizes a related lepidopteran fruit pest, the codling moth (Cydia pomonella) for release into Okanagan apple orchards. The SIR program has succeeded in reducing populations of codling moth to below economic thresholds throughout the Okanagan Valley. Apple crops in BC are at risk from invasion of OFM and mass rearing of OFM to use for sterile release is currently being considered by SIR. This research will assess the suitability of the current SIRP coddling moth diet with a diet that is normally used to rear OFM. The success of OFM reared on both synthetic





diets is compared to one of crab apples as a control. To assess the suitability of the diets for OFM, measurements of survival, mating success and fecundity of moths reared on each diet are taken. This experiment will evaluate the suitability of the codling moth diet already used by SIR in rearing the OFM.

25.

Project Title: Exercise Intensity and Intra-abdominal Fat: A Systematic Review Full Name: Baljot S. Chahal Faculty: Physical Education and Recreation Department: N/A Degree and Year of Study: BSc in Kinesiology/3<sup>rd</sup> year. Supervisor Name: Normand G. Boulé

Background. Recent studies have suggested that the effect of exercise on intra-abdominal fat (IAF) - a strong independent predictor of mortality - is quite variable and that greater exercise intensities may be associated with greater reductions in IAF.

Objective. To conduct a systematic review of literature of randomized trials directly comparing the effects of different intensities of exercise on IAF while controlling for energy expenditure.

Methods. Databases (Medline, EMBASE, Web of Science, SCOPUS and PubMED) were searched to find all exercise or exercise and diet studies in which IAF was measured using computed tomography or magnetic resonance imaging up to and including June 2011. Studies with medication, surgery and participants with diseases affecting body fat distribution were excluded.

Results. The literature search yielded 3259 potential records after duplicates were removed. Of these, five studies met the inclusion criteria. The included studies used similar continuous aerobic exercise interventions to deliver both the high and low intensity prescriptions. The higher intensity exercise groups lost a similar amount of IAF (standardized mean difference, SMD=-0.09, p=0.52) despite losing less subcutaneous abdominal fat (SAF) (SMD=0.29, p=0.04). For IAF changes however, there was a high amount of inconsistency ( $I^2$ =43.5%) that approached statistical significance (P=0.13). Sensitivity analyses showed that the variability was accounted for by a single study, which had the smallest sample size and oldest participants.

Conclusion. Despite lower amounts of SAF loss, higher intensity exercise interventions lead to similar reductions in IAF. Notably, these studies did not represent all methods of delivering high intensity exercise.





Project Title: Racing Worms: Does Aerobic Capacity Influence Ecological Performance? Full Name: Blair Warren Faculty: Campus Saint-Jean Department: N/A Degree and Year of Study: Sciences 2nd year Supervisor Name: Hélène Lemieux

The relationship between ecological performance and mitochondrial respiration provides a unique lens to evaluate the action of selection. The study of the process of selection is essential for comprehension of the natural environment and allows insight into the evolutionary past of the animal kingdom. Mitochondria are an important selection target as they ensure most of the energy production for muscle contraction in the animal kingdom. Furthermore, Dugesia tigrina is an interesting species as it is found to have a histologically primitive muscle (Sarnat H. 1984). The project evaluated the performance of Dugesia tigrina by recording the speed at which the animal was able to reach a food stimulus (beef liver) after a week of starvation. The mitochondrial capacity of the animal was measured using high-resolution respirometry in the permeabilized animal. A multiple titration protocol allowed to evaluate the capacity of different components of the mitochondrial electron transport system, i.e., complexes I, II, IV, and the phosphorylation system. The average speed showed a positive correlation with the mitochondrial electron transport system capacity

This poster will detail the findings on the correlation between mitochondrial capacity and speed in the planarian Dugesia tigrina.

27.

Project Title: Hope and Suffering- A Case Study Full Name: Samantha Kuchera Faculty: Nursing Department: N/A Degree and Year of Study: BScN Second Year Supervisor Name: Wendy Duggleby

#### Background

Hope is an important psychosocial resource for family caregivers of persons with advanced cancer. As part of a study evaluating a Living with Hope Program for family caregivers, participants completed a daily journal for two weeks responding to: What challenges did you face today and what gives you hope for today and tomorrow?

### Purpose

To present insights from one written journal regarding finding hope in adverse conditions. A single revelatory case study was used to explain the phenomena within the social context described.

Data collected involved demographic information, a Herth Hope Index (HHI) (Hope), the SF12 (Quality of Life) and their journal. The participant's journal was transcribed, removing identifying





information, photocopied and returned. Journal themes were identified and cross-referenced with the HHI and SF12 scores forming overall themes of challenges and hope.

#### Findings

The participant a 63 year old women living in rural Saskatchewan with her husband diagnosed with advanced cancer.

Overall themes were fear of the unknown, self reflection and self transcendence. External threats invoked fear of the unknown resulting in vulnerability. Masks and control created false security. This decreased communication resulting in isolation and suffering. Self reflection through journaling fostered self transcendence, broadening the perspective on the threat. A new purpose was identified, decreasing vulnerability, leading to positivity, and engendering hope. Support networks and conscious choice influenced the use of masks or self reflection.

#### Conclusion

Journaling facilitated self reflection on challenges and fostered self transcendence, engendering hope. Future research may target alternative modes of self reflection to increase hope.

28.

Project Title: Optimization of a method to analyze ophthalmic acid in human serum Full Name: Maimoona Tariq Faculty: Science Department: Physiology Degree and Year of Study: BSc in Biological Sciences, 4<sup>th</sup> year Supervisor Name: Elaine Leslie

Reduced glutathione (GSH) is an endogenous tripeptide (y-Glu-Cys-Gly) and an important cellular antioxidant. Ophthalmic acid (OA) is a GSH analogue where Cys is replaced with 2aminobutyrate. OA is found endogenously but its physiological role is unknown. Metabolomic studies of mice undergoing acetaminophen (APAP)-induced acute liver failure (ALF) identified OA as a biomarker of oxidative stress, indicative of hepatic GSH consumption. The purpose of the current project was to optimize preparation of serum samples for OA analysis by liquid chromatography-tandem mass spectrometry. Three methods were tested for the extraction of spiked OA from healthy human serum. The first extraction method used a NES buffer composed of N-ethylmaleimide, sulfosalicylic acid and EDTA. The second method used trichloroacetic acid, liquid-liquid extraction with dichloromethane and evaporation; OA was not detected with this method. The third procedure used ice-cold methanol (MeOH), followed by evaporation. The MeOH method was the most sensitive and was chosen for further optimization. Preliminary tests of two APAP-ALF patient samples indicated OA was present at an undetectable level, under the conditions used. Future work will optimize the amount of sample analyzed by varying preconcentration steps and injection volume. In addition to extraction methods, stability of OA was also investigated. Standard curve samples were stored at -20°C for 4 days and 4°C for 12 days and no degradation occurred, indicating OA is very stable. After optimizing serum preparation for determining OA concentration, we intend to compare OA levels in healthy human and APAPinduced ALF patient samples.





Project Title: Elucidating the Molecular Mechanisms of Heart Disease-linked Mutations of Phospholamban Full Name: Michelina Kierzek Faculty: Science Department: Biochemistry Degree and Year of Study: 4th Supervisor Name: Howard Young

The contraction-relaxation cycle in muscle is mainly determined by calcium concentrations in the cytosol. An increase in cytosolic Ca<sup>2+</sup> leads to muscle contraction. For relaxation to occur, Ca<sup>2+</sup> is actively removed from the cytosol into the sarcoplasmic reticulum by the Sarco(Endo)plasmic Reticulum Ca<sup>2+</sup> ATPase (SERCA). Phospholamban (PLB) is a small membrane protein that reversibly inhibits SERCA. When PLB is bound to SERCA, the rate at which Ca<sup>2+</sup> is removed from the cytosol is reduced. PLB plays a critical regulatory role in the normal contraction-relaxation cycle. Hereditary mutants of PLB have been identified that cause heart disease in humans: arginine9-to-cysteine (R9C), arginine14-deletion (R14del) and leucine39-to-stop (L39stop). R9C and R14del are cytoplasmic domain mutants. It has been demonstrated that R14del results in a mild loss of inhibition compared to wild-type PLB, while R9C results in complete loss of inhibitory function. In mixtures of mutant and wild-type, R9C and R14del have a dominant effect on SERCA function by interfering with the normal interaction of wild-type PLB with SERCA. To investigate this further, various cytoplasmic domain PLB mutants were combined with wild-type and co-reconstituted with SERCA. SERCA activity in the presence of these PLB mixtures was measured. We found that changes in the hydrophobic character of PLB's cytoplasmic domain underlie the preferential behaviour of R9C and R14del. Another mutation, L39stop, is a truncated form of PLB. We made several truncation mutants. Met50stop and Leu52stop were successfully characterized as mild loss-of-inhibition mutants. By examining cytoplasmic domain and truncation mutants of PLB, we can gain insight into how defects in a critical cardiac protein contribute to the development and progression of heart disease.

30.

Project Title: String Dualities and Topological Recursion Full Name: Andrei Catuneanu Faculty: Science Department: Physics Degree and Year of Study: B.Sc. Honors Mathematical Physics (4<sup>th</sup> year) Supervisor Name: Vincent Bouchard

Topological string theory is a theory of maps from Riemann surfaces to a target space. The theory defines fundamental topological invariants of the target space called Gromov-Witten invariants. The "remodeling conjecture" postulates that when the target space is a toric Calabi-Yau threefold, the generating functions for its Gromov-Witten invariants are given by the Eynard-Orantin





topological recursion. The conjecture is motivated by a string duality known as mirror symmetry. In the case that the target space is C<sup>3</sup>, we showed that the free energies computed with the Eynard-Orantin topological recursion reproduce precisely the Gromov-Witten invariants of C<sup>3</sup>.

31.

Project Title: Arboreal Carton-Nests of the Termite Nasutitermes corniger as a Potential Roosting Sites in a Tropical Dry Forest Full Name:Michel Marchand, Brian Ellert Faculty: Augustana Department: Science Degree and Year of Study: Bachelor of Science 4<sup>th</sup> year Supervisor Name: Doris Audet

This study was undertaken to assess the distribution of arboreal carton termite nests, Nasutitermes corniger, as potential roosts for Lophostoma species. Lophostoma are considered to be an indicator species whereas arboreal termites are considered to be a keystone species. The number, volume, height, activity, and evidence for the presence of bats were assessed for each nest. A total of twenty transects were ran, ten in the riparian forest and ten in the dry thorn forest, covering a total of 20,000 m2 of forest. Riparian habitats contained significantly more nests per transect than did the dry thorn forest (t=2.809; d.f.=18; P=0.012). Additionally, riparian habitats contained more active nests per transect than did the dry thorn forest (t=1.622; d.f. =18; P=0.122). Overall, the greater success of N. corniger in the riparian forest indicates the greater potential of roost availability for Lophostoma species in riparian habitats.

32.

Project Title: Solvent Exchange Mechanism in PNIPAm Microgel Based Etalons as Revealed from Deswelling Kinetics Full Name: Janelle Smiley-Wiens Faculty:Science Department: Chemistry Degree and Year of Study: Specialization in Chemistry 3<sup>rd</sup> year Supervisor Name: Micheal J. Serpe

Classically, an etalon is a device composed of two thin mirrors "sandwiching" a dielectric material. Etalons reflect/transmit specific wavelengths of light depending on the distance between the mirrors, and the refractive index of the dielectric. Poly (N-isopropylacrylamide)-co-acrylic acid (pNIPAm-co-AAc) microgel etalons are colored materials, constructed using pNIPAm-based microgels as the dielectric. When immersed in water at various temperatures and pHs, the color the device exhibits varies. The color tunability comes from the temperature and pH dependent diameter of the pNIPAm based microgels that make up the etalon. In previous studies, we investigated the kinetics of the etalon color change by introducing the etalons to a methanol:water solution, and monitoring the time dependent color change. For the color change: 1) methanol needs to enter the etalon; 2) and water needs to exit. The rate of





these processes is dependent on how freely the solvent exchange can occur, which was shown to be dependent on the thickness of the outer mirror. Here, we monitored the color changes as the etalon was heated at different rates. From the data, deswelling times can be determined at the different heating rates, and the deswelling time at an infinite heating rate ("temperature jump") can be determined from extrapolation of the data. From these experiments, we can decouple the rates of methanol entering the film, and water exiting, as water exit is the only factor determining the deswelling kinetics from heating experiments. From the results, we determined that the deswelling rate slowed as the thickness of the outer mirror increases.

33.

Project Title: CHARACTERIZATION OF HUMAN NATURAL KILLER T CELLS IN PERIPHERAL BLOOD, SPLEEN AND LUNGS BY FLOW CYTOMETRY. Full Name: Malika A. Ladha Faculty: Faculty of Science Department: Department of Biological Sciences Degree and Year of Study: Bachelor of Sciences; third year Supervisor Name: Lori J. West

<u>Introduction</u>: Natural killer T (NKT) cells are thought to regulate alloimmune responses after organ transplantation. Various NKT cell subsets have been described in humans; however, whether all these subsets have a regulatory function is unclear. In order to investigate this, we set up and optimized a flow cytometric assay to detect and characterize human NKT cells.

<u>Methods</u>: Fluorescent CD1d- $\alpha$ -GalCer tetramers and CD3 antibodies were used to detect NKT cells in adult blood (n=8), spleen (n=2) and bronchoalvelar-lavage (BAL; n=2) samples by flow cytometry. NKT cells were characterized by surface expression of CD4, CD8 and CD161.

<u>Results</u>: In peripheral blood, 0.028% of CD3+ cells were NKT cells (median, range: 0.013-0.087%). Within this population, the frequency of CD4+ and CD8+ cells varied (53%, 18-86% and 8%, 3-40%, respectively). In addition, a double negative (DN) subpopulation was noted in all peripheral blood samples (18%, range: 0-69%). CD4+ NKT cells were mainly CD161- (82%, 45-90%) while DN NKT cells were mainly CD161+ (96%, 73-100%). The frequency of CD161+ within the CD8+ subset varied among samples (64%, 5-97%). NKT cells were also detected in spleen samples (0.04% and 0.016%). Only one BAL sample contained CD3+ cells of which 0.032% were NKT cells.

<u>Conclusions</u>: In this preliminary study, we demonstrated detection and characterization of NKT cell subsets in human peripheral blood, spleen and lungs. Future work includes: characterizing NKT cell subsets in samples from heart and lung transplant recipients, and developing functional assays to study the cytokine profile for each subset.

Project Title: Exploitation of bacteriophage tail fibre proteins as novel therapeutics against bacterial infections




Full Name: Jessica Sacher Faculty: Science Department: Biological Sciences Degree and Year of Study: Bachelor of Science in Honors Microbiology– year 5 Supervisor Name: Christine Szymanski

Bacteriophages are viruses that prey on bacteria; found everywhere bacteria are found, they represent the most numerous entity on earth. Phage therapy has several advantages over antibiotics, such as the ability of phages to evolve with bacteria to combat bacterial drug resistance, but they are not without disadvantages. As an alternative, purified phage tail fibre proteins (TFPs), which are responsible for bacterial recognition by phages, are currently being studied as a novel form of antimicrobial therapy. Among many reasons, purified TFPs hold promise as antimicrobials because they can be generated easily and cost-effectively in large amounts and do not risk transferring genes that may contribute to bacterial virulence, as has been an issue with whole-phage therapy. In this study, we investigated the properties of a TFP purified from a phage specific for Campylobacter jejuni, a human gut pathogen. This TFP has been shown in our lab to create zones of clearing on agar plates with C. jejuni growth. In this study, we explored whether this effect resulted from the degradation of sugars known as capsular polysaccharides (CPS) that coat C. jejuni cells. Interestingly, the purified TFP appeared to act independently of the presence of CPS, while the corresponding intact phage was only able to infect cells expressing CPS. The results of this study suggest that bacteriophage tail fibre proteins have antimicrobial activity independent of the infectious virus from which they come from, a phenomenon that could be exploited as a novel approach to the safe, cost-effective treatment of bacterial disease.

35.

Project Title: Intralipid Reverses Vasodilation by Propofol in Arteries from Aged Rats Full Name: Yael Mansour Faculty: Science Department: Physiology Degree and Year of Study: Honours 2<sup>nd</sup> Year Supervisor Name: Sandra Davidge

Propofol is a common general anesthetic agent known to induce hypotension in the aging population. Our lab has shown that propofol increases endothelial-dependent relaxation in mesenteric arteries of aged rats, which may contribute to hypotension. We have also suggested that Intralipid can potentially reverse propofol-induced vasodilation. We hypothesize that treatment of mesenteric arteries of aged rats with Intralipid will (i) mitigate the enhanced endothelial-dependent relaxation in the presence of propofol and (ii) reverse direct propofol-induced relaxation through a "lipid sink" effect. Distal mesenteric arteries were isolated from Sprague Dawley rats (14 months of age) and mounted in a wire myograph system. Arteries were pre-constricted to achieve a baseline from which relaxation responses were measured. Endothelial function following propofol pre-treatment (10<sup>-6</sup> and 10<sup>-5</sup> M) was assessed using either acetylcholine or its stable analog methacholine (10<sup>-8</sup>-10<sup>-6</sup> M) in the absence or presence of Intralipid (0.0002 and 0.002%). Reversal of direct propofol-induced relaxation (10<sup>-6</sup>-10<sup>-4</sup> M)





was assessed using Intralipid (0.002-0.2%) and was compared to other vehicles known to solubilize propofol: Cremophor EI and DMSO (0.002-0.2%). Intralipid did not alter endothelial-induced relaxation in arteries pretreated with propofol. However, Intralipid reversed direct propofol-induced relaxation to a greater amount, compared to DMSO and Cremophor EI. These findings suggest that Intralipid treatment reverses direct propofol-induced relaxation but does not alter endothelial-induced relaxation in arteries pretreated with propofol. Thus, Intralipid may have the potential to reverse vasodilation after propofol is administered in the clinical setting, reducing propofol's hypotensive effect in the aging population.

36.

Project Title: Production of Lactate in Response to Physical Fatigue in Trout Full Name: Vlatka Vukojevic Faculty: Sciences Department: Biology Degree and Year of Study: Bachelor of Sciences, 3<sup>rd</sup> Year Supervisor Name: Keith Tierney

Experiments were performed to test the hypothesis that physical fatigue as a result of strenuous exercise will result in marked increases in lactate plasma concentrations in trout. The consumption of glucose as metabolic fuel in times of physical stress, such as during exercise, results in the production of lactate through the intermediate pyruvate (Pratt and Cornely, 2011). However, as only an approximate 6-8% of glucose metabolism results in lactate production (Pagnotta and Milligan, 1991), it is not expected that an analysis of glucose versus lactate concentrations will show a direct conversion between the two. Exercise requires utilization of white muscle tissue which produces lactate (Pagnotta and Milligan, 1991). This production of lactate in white muscle tissue leads to expectations that plasma lactate concentrations in trout will increase as a result of exercise . Previous experiments have indicated lactate concentrations in trout peak immediately following exercise, differing from those of other species such as flounder which require 2 hours to peak (Pagnotta and Milligan, 1991). Critical swim speed, which is a lengthy and demanding test where fish are sum in a "treadmill" until exhaustion, is an indicator of the maximum swim speed a fish can reach prior to the onset of physical fatigue (Yu et al., 2009). From this, the relationship between measured critical swim speeds and plasma lactate concentrations are expected to correlate, suggesting that the buildup of lactate may be a factor in determining when fish stop swimming.





Project Title: Nanoengineering the quantum properties of light with hyperbolic metamaterials Full Name: Cristian Cortes Faculty: Faculty of Engineering Department: Electrical and Computer Department Degree and Year of Study: Engineering Physics, Nanoengineering Option. 5th year. Supervisor Name: Zubin Jacob

The past 50 years of experimental work has ushered in many technological advances which have allowed us to manipulate things at a much smaller scale, a scale closer to the size of atoms and, of course, one that is much smaller than the wavelength of visible light. These recent developments have enabled a new profound study on the interaction between light and matter with the use of metamaterials. In particular, a new class of materials known as hyperbolic metamaterials (HMMs) exhibits an extreme directionally dependent response to incoming light in that it behaves like a dielectric (e.g. glass) in one direction while behaving like a metal (e.g. silver) in another perpendicular direction. Moreover, it is possible to visualize the consequences of this novel material by observing how the regular spherical, single-frequency curve used to describe the allowed states of light inside an isotropic (directionally independent) medium (e.g. air) changes to that of a hyperboloid as seen in figure 1. This novel material has already shown a multitude of interesting properties related to classical optics such as subwavelength imaging through the hyperlens as well as enhanced light transmission, among others[1]. We wish to report our latest findings which show a dramatic reduction in the spontaneous emission lifetime (the time it takes for an electron to drop down an energy level and emit light) of guantum emitters of light embedded inside of an HMM. This opens the door to many new device applications such as a single photon source using metamaterials.

38.

Project Title: High-Intensity Exercise Accelerates the Development of Sarcopenia in Aged Fisher 344xBrown Norway Rats Full Name: Dan Burton Faculty: Science Department: Biological Sciences Degree and Year of Study: Bachelor of Science in Honors Microbiology, 5<sup>TH</sup> Year Supervisor Name: Deborah Mckenzie

Sarcopenia is the inevitable loss of muscle mass and strength that occurs with natural aging. It is recognized that exercise provides a countless number of health advantages. However, recent research suggests excessive exercise may actually accelerate degeneration of muscle tissue and strength in older animals. Three of the quadriceps muscles from 36-month-old Fisher 344xBrown Norway rats were examined. Specifically, the muscles studied were the vastus lateralis, rectus femoris, and vastus medialis from rats that have been exercised to various degrees. The rats were separated into three experimental groups, which were distinguished according to their level of exercise: sedentary, moderate intensity, and high intensity. Exercise





was initiated at 24-months of age. Our research group has hypothesized that abnormalities in the mitochondria play a role in sarcopenia, therefore, we study two enzymes involved in the mitochondrial electron transport system (ETS): cytochrome C oxidase (COX) and succinate dehydrogenase (SDH). Muscle fiber regions affected by mitochondrial abnormalities no longer produce COX and would, then, up-regulate the production of SDH. Therefore, these two enzymes can be used as markers of abnormal mitochondrial metabolism within the muscle. To test my hypothesis that high-intensity exercise initiated in old rats negatively impacts muscle, accelerating sarcopenia, I have been quantifying the number of muscle fibers exhibiting abnormal mitochondrial phenotypes. Cross-sectional sections (100-10µm sections) were cut using a cryostat and placed on microscope slides. Specific slides from the series were stained for COX or SDH activity, allowing for accurate microscopic analysis of the muscle fibers. With this research, the mechanisms by which aging and age-related diseases progress can be further understood, helping us advance our knowledge in reversing the natural aging process.

39.

Project Title: Technical, physiological, intra-individual consistency and inter-individual variation of augmentation index and pulse wave velocity measured by SphygmoCor in healthy volunteers Full Name: David Hyunjoong Kim Faculty: Medicine Department: Physiology

Degree and Year of Study: Graduated with B.Sc. in 2011

Supervisor Name: Branko Braam

Augmentation index (Alx) and pulse wave velocity (PWV) are arterial stiffness parameters where greater values indicate stiffer arteries. Hence, they strongly predict cardiovascular diseases. They are measured noninvasively by applanation tonometry via SphygmoCor. The study's purpose was to assess technical variation of radial Alx; and physiological, intraindividual and inter-individual variability of radial, carotid Alx (both corrected to heart rate of 75) and PWV. The study contained 17 healthy subjects [ages 19-50 yrs; both genders]. Technical and physiological variability were assessed by varying tonomter's angle on right radial artery and through exercise-induced increased pulse, respectively. Subjects were re-measured a week after to assess intra-individual variability. Control condition parameter values among different subjects were compared to evaluate inter-individual variability. Alx and PWV exhibited technical, physiological and intra-individual consistency [1-Way ANOVA; all P>0.05]. The average pulse height (Avg PH) of pressure waveform was negatively correlated with radial Alx and PWV when considering all control data [Pearson; all P<0.05]. Regarding inter-individual variation, there were substantial differences in mean Alx [8±18%; range -27 - 31] and PWV [8±1m/s; range 6 -10] among subjects. Overall, there are insignificant physiological, technical and intra-individual variability and significant inter-individual variability for both AIx and PWV, which is consistent with other studies. Thus, reference values of Alx and PWV according to age and gender must be considered to properly assess cardiovascular risks. Also, Alx and PWV will be measured accurately with optimal Avg PH (greater than 400 units) and other factors like constant pulse height.





Project Title: Single-Channel Recordings of Nicotinic Acetylcholine Receptors in Larval Zebrafish Full Name: Lindsey Bergevin Faculty: Science Department: General Sciences Degreee and Year of Study: 5 Supervisor Name: Declan Ali

Nicotinic acetylcholine receptors (nAChRs) are highly expressed at the vertebrate neuromuscular junction (NMJ) where they are required for muscle fiber activation. Improper NMJ development can lead to poor fiber recruitment and weak muscle contraction. Understanding the factors that underlie NMJ development, including the properties of individual receptors, is critical for a full understanding of muscle function. This projects uses electrophysiology to investigate the properties of Zebrafish nAChRs at different developmental stages (36 hours, 48 hours, and 120 hours)

This research is novel in that previous work on NMJ development has not distinguished between the receptors that are present in zebrafish red and white muscle fibers, which have been found to have different physiological properties. Thus, by investigating the NMJ development of both red and white fibers, a more complete developmental profile can be created and the physiological differences between the two fibers can be further investigated. Using the outside-out patch clamp technique, we were able to isolate a small number of nAChRs from the muscle fiber and record their activity by activating them with acetylcholine (ACh). Preliminary results suggest the receptors found in red fibers have different properties than those present in the white fibers. This builds on previous research in our lab, which found muscle end plate potential current (mEPC) differed developmental profile of single channel.

Once completed, our findings will provide a clear developmental profile of single channel properties from red and white fibers in Zebrafish, and reveal previously unknown differences between the NMJs at red and white fibers.

41.

Project Title: Histamine upregulates the production of Matrix Metalloproteinase-9 in human astrocytic cultures Full Name: Vishnu Vasanthan Faculty: Science Department: Undeclared Degree and Year of Study: Bachelor's Degree of Sciences Supervisor Name: Jack Jhamandas

A key hallmark of Alzheimer's disease (AD) is the accumulation within the brain of pathogenic  $\beta$ amyloid (A $\beta$ ) in soluble and insoluble forms. A proposed approach to treating AD is the promotion of A $\beta$  catabolism to reduce amyloid burden in the brain. Matrix Metalloproteinase 9 (MMP-9), a Zn+ containing endoprotease, possesses the capability to break down A $\beta$ . In a





previous study, astrocytes have shown an increased release of MMP-9 in the vicinity of AB plaques, suggesting that MMP-9 may be secreted as a neuroprotective mechanism in AD. In an unrelated study, histamine, an aminergic neurotransmitter in the brain, was identified to increase MMP-9 release from keratinocytes via the histamine H1 receptor. Thus, we hypothesized that histamine, through specific receptor subtypes, promotes the production and release of MMP-9 from astrocytes, which could aid in Aβ catabolism. To determine histamine's capability of stimulating MMP-9 release from astrocytes, we exposed cultures of human astrocytes (U373 cell line) to varying histamine concentrations (50nM-1µM) for different time periods (24h and 48h). Quantitative analysis of MMP-9 production, performed via gelatin zymography, showed that MMP-9 production and release from astrocytes was increased in a dose-dependent manner. Furthermore, the specific histamine receptor involved was identified using histamine receptor antagonists (Fexofenadine, H1; Ranitidine, H2; Clobenpropit, H3). We determined that only fexofenadine inhibited histamine-induced MMP-9 production in a dose-dependent manner, suggesting that histamine-induced astrocytic MMP-9 production is mediated through the H1 receptor. In future studies we will examine the precise neuroprotective mechanisms whereby MMP-9 promotes Aβ catabolism or attenuates its toxicity.

42.

Project Title: Locating Elementary Schools in Edmonton: 1960s Baby Boom Planning vs. Current Practice Full Name: Alison Cheesbrough Faculty: Arts Department: EAS Degree and Year of Study: Bachelor of Arts, Human Geography, 4<sup>th</sup> Year Supervisor Name: Theresa Garvin

This project is a historical overview of school site planning in Edmonton, Alberta. Schools are public buildings that influence how neighbourhoods and communities develop, but little research has been done in Canada on school site planning and the forces that shape these location decisions. The study looks at the ways school site location planning has changed in Edmonton and what factors have influenced those changes by comparing two planning eras: the 1960s vs. the 2000s. The study considers the macro scale of placement within a neighbourhood or groups of neighbourhoods, rather than micro scale issues of site selection for drainage, accessibility, or health concerns. The study combines qualitative interviews with current school planners with archival research and data from both Edmonton Public and Edmonton Catholic schools. Findings include: 1) school locations are substantially different in the current era compared with eras of sustained building such as the 1950s and 1960s. 2) multiple social, political, and economic forces have contributed to the changes that are evident.





Project Title: Preparation of Biomimetic Calcium Phosphate Coatings on Different Substrates Full Name: Bruce Waskiewich Faculty: Engineering Department: Chemical and Materials Engineering Degree and Year of Study: Supervisor Name: Hongbo Zeng

Calcium phosphate (CaP) films and their coating methods have been of high interest for the use in orthopedic implants due to their bioactive and biocompatible properties. In this work, we developed a novel but simple coating method to deposit CaP coatings on different substrates, includina hydrophobic polystyrene (PS), hydrophilic silica, positively charged 3aminopropyltriethoxysilane (APTES) and negatively charged mica. The developed method involves repeatedly dipping substrates in calcification solution, drving in a clean atmosphere. and washing with de-ionized water. Each dip/dry cycle takes about 1 hour. Complete, uniform films were produced over silica within 10 dip/dry cycles. Films over mica and APTES were not completely uniform, consisting mainly of circular shaped applomerates of 1.5-1.8 µm diameter. A smooth film was produced over PS, but it only formed over a small circular area in the middle of the surface. The deposited calcium phosphate films were further characterized using an optical microscope, atomic force microscope (AFM), Scanning Electron Microscopy coupled with Energy Dispersive X-ray (SEM-EDX) Spectroscopy, and X-ray Diffraction (XRD). From SEM-EDX and thin film XRD analysis, it was found that the CaP films consisted mainly of hydroxyapatite (HA:  $Ca_{10}(PO_4)_6(OH)_2$ ) and brushite (CaHPO<sub>4</sub>·2H<sub>2</sub>O). The films have a calcium deficient Ca/P ratio of 0.8. Our results provide new insight into the development of biomimetic calcium phosphate coatings with biomedical applications, which also have great applications for intermolecular and surface forces measurement using Surface Forces Apparatus (SFA) to elucidate the adhesion mechanism between CaP coatings and different biomaterials or cells.z

44.

Project Title: Far from home and homeless: Perceptions and experiences of homeless international students Full Name: Margaret Danko Faculty: Nursing Department: N/A Degree and Year of Study: BScN Collaborative Honors program, 3<sup>rd</sup> year Supervisor Name: M.S. Richter

The homeless population in Edmonton increased approximately threefold in 2008 since the first count in 1999. The majority of homeless people are between the ages of 31 and 54 (63%), and 19% between 17 and 30 years of age. It is a subgroup of this latter group that was of interest in this project. Little is known about homelessness in post secondary student populations. In order to study how homelessness in university students is viewed within the university community, a sequential mixed method design was used. First, a survey was completed by a sample of university students, followed by individual interviews where students and key persons at the





university were able to share their experiences surrounding housing issues. The qualitative findings drew on a number of themes, mainly, the suitability, adequacy, and affordability of housing, and the deleterious effects that housing issues has on psychological, physical, and emotional health. This presentation will focus on a subset of the study population, international students, and their specific needs related to cultural suitability of housing. The data showed that there are a number of compounding factors, such as misinformation, visa restrictions, and spatial needs related to culture that negatively impact this specific group of students. Information generated will be used to raise awareness of this issue, decrease stigma related to homelessness, and encourage community engagement to plan appropriate services to decrease the prevalence of homelessness in the student body.

45.

Project Title: Role of IFITM in innate immune responses to influenza. Full Name: Graham Blyth Faculty: Science Department: Biological Sciences Degree and Year of Study: Immunology and Infection- 4<sup>th</sup> year Supervisor Name: Kathy Magor

Ducks are the natural host to the influenza A virus, and display a potent innate immune response to infection. Upon infection, interferon is produced and many interferon stimulated genes (ISGs) are upregulated. Few ISGs have been characterized in any species, and their role in ducks in response to influenza A virus infection is unknown. Interferon induced transmembrane (IFITM) proteins have been identified in other species and are known to restrict replication of many viruses. We identified a duck IFITM-like gene, in a subtractive hybridization screening to identify genes upregulated in the immune response to influenza A virus. The IFITM-like gene is upregulated about 70-fold in lung tissue following infection with highly pathogenic H5N1 avian influenza. Using molecular techniques, we obtained the full sequence of the gene, and cloned it into an expression vector. We will determine the role of the IFITM-like gene into a chicken fibroblast cell line, infecting the cells with influenza A virus, and determining the amount of viral replication. We predict that the IFITM-like gene is involved with the duck innate immune response to influenza A virus, and will restrict viral replication.

46.

Project Title: Impact of predator assemblage on littoral zone microcrustacea Name: Fred Noddin Faculty: Science Department: Biological Sciences – Ecology Degree and Year of Study: Specialization in Ecology, Biological Sciences, Year 4 of 5 Supervisor: William Tonn

Abstract: The assemblage of predators in an ecosystem can alter community structure. Therefore, in aquatic ecosystems, microcrustacean community composition should differ among





lakes in which the top predators differ. In this study, I compared microcrustacean communities among lakes in three treatments: fishless, stocked with trout, and unstocked - but containing small bodied fish. The results support earlier findings that size-selective predation by fish drives zooplankton community structure. In stocked and unstocked lakes, trout and native fish are not gape limited, and the microcrustaceans were dominated by smaller sizes. In fishless lakes, the invertebrate Chaoborus sp. was the dominant predator. They are gape limited; consequently, microcrustaceans were larger in fishless, Chaoborus-dominated lakes. Microcrustacea were most abundant in unstocked lakes, suggesting that small-bodied native fish had an indirect positive effect on microcrustaceans, controlling Chaoborus populations, while having less direct impact on microcrustacea than Chaoborus or trout.

47.

Project Title: Art Museum/ Factory: The Social and Environmental Effects of an Adaptive Reuse Building at Today Art Museum, Beijing Full Name: Tori McNish Faculty: Arts Department: Art and Design Degree and Year of Study: History of Art, Design and Visual Culture, 4<sup>th</sup> year Supervisor Name: Lisa Claypool

The museum has become an important place in every society, grounding the culture it represents in its past while also making visible the continuance of that culture into the present and future. A museum that is housed in a building that is also of cultural or historical significance most strongly embodies the idea of the unification and continuation of the past into the present.

I will demonstrate how the sustainable building practice of adaptive reuse can be an appropriate way of displaying cultural heritage while also helping to preserve natural resources and the environment, utilizing the Today Art Museum in Beijing as a case study. The Today Art Museum is housed in a Mao-era factory that was adapted and transformed into a contemporary Chinese art museum. This type of sustainable architecture is unusual in China, as China is losing its architectural and urban heritage with the major destruction and reconstruction of some of its largest cities in a quest to modernize. The concept of adaptive reuse is a sustainable mode of building that also comes from ancient Chinese building practices. In this way, a connection is made with a sustainable future stemming from a specifically Chinese past. Aspects of China's cultural chronology are made evident with the display of contemporary Chinese artworks juxtaposed with the historical significance of the factory structure of Today Art Museum, which is embodied by Wang Jianwei's permanent sculptural rooftop installation, Viewing the Exhibition.





Project Title: Detection of Single Nucleotide Polymorphisms in a Breast Cancer Susceptibility Gene (FGFR2) using In-Gel Allele-specific PCR Full Name: Lucy Xiaolu Ma Faculty: Medicine and Dentistry Department: Oncology Degree and Year of Study: General Science, Second Year Supervisor Name: Linda M. Pilarski

This work uses allele-specific polymerase chain reaction (ASPCR) performed in semi-solid polyacrylamide gel posts to genotype a single nucleotide polymorphism (SNP) (rs1219648) in a gene (FGFR2) strongly associated with breast cancer susceptibility. Genomic DNA samples were sequenced to be controls with known SNP genotypes. A prototype instrument (~ \$1000) was used for ASPCR and melt curve analysis (MCA). ASPCR, gel reagents and genomic DNA were photopolymerized in a mold, creating a gel post array (each post < 1 µL) where DNA amplification occurred. An intercalating dye's fluorescence was detected with a CCD camera, providing real-time ASPCR and MCA data. ASPCR primers were designed with one common and one allele-specific primer. Experiments were performed with multiple samples of each genotype (wild type homozygous, mutant homozygous and heterozygous) with respective matching and mismatching primers. ASPCR was optimized so that reactions where the primer matched the sample amplified DNA, giving a peak at the proper  $T_m$  in the MCA. Product  $T_m$  was confirmed by MCA in the LightCycler. Product size was confirmed by agarose gel electrophoresis. Reactions where the primer mismatched the sample did not amplify DNA, giving no peak in the MCA. The presence or absence of product could serve to indicate a sample's SNP genotype. The ability to include multiple primer sets in different gel posts and perform PCR simultaneously allows this method to be used in point-of-care devices for low cost medical diagnostics to evaluate breast cancer risk profiles in women when they are first seen by their physician.

49.

Project Title: Play Spaces Full Name: Logan Gilmour Faculty: Science Department: Computing Science Degree and Year of Study: 3<sup>rd</sup> Year Honours Computing Science Supervisor Name: Eleni Stroulia

All interactive platforms can be concisely described in terms of events, generated by the user's actions to the user interface, and the changes that happen to the user interface in response to them. Although this overarching model has not evolved since the first generation of graphical user-interface platforms, the variety of the possible types of action and changes to the user-interface is in constant flux. Currently, interactive content on platforms like the iPad is encoded





in one of many full-featured programming languages which are vastly more complicated than required.

We have developed a document format containing both appearance and action/response information that simplifies the creation of rich user experience through complex combinations of animations and multimedia control. The language models interactive stories as sequences of pages, each of which is laid out with a background image that serves as the map (whether actual or metaphorical) on which points of interest are placed. Each point of interest supports some interaction, such as invoking an audio or video segment, controlling its loudness and color intensity, changing the perspective through which the map is seen or bring up a short card with a segment of the story.

Our implementation of this format on the iPad tablet let us create an interactive exploration of the role of spatial relations in the development of literacy. Our success implies that a significant amount of user interface programming needed to take advantage of current hardware could be simplified into a document format editable, by less technical users.

50.

Project Title: Comparative and Quantitative Myology of the Prosimian Forearm and Hand Full Name: Akua Gyambibi Faculty: Medicine and Dentistry Department: MD Undergraduate Degree and Year of Study: Doctor of Medicine, Year 1 Supervisor Name: Pierre Lemelin

Several observations reported in the literature, namely the relative development of digital flexors and some intrinsic hand muscles in lorises and the dominance of the ulnar deviators in vertical clingers, are based purely on qualitative evidence. We aim to substantiate these observations through analysis of quantitative muscle data from a broad sample of strepsirrhine and tarsier species. The forearm and hand of 17 fresh-frozen specimens representing six families and 12 species were dissected. Selected muscles without their tendon(s) were weighed fresh and wet (48 hours in 10% formalin solution) to the nearest 0.01 g. Muscle weights were compared by limb compartment and functional group, as well as with the actual body mass of the specimens. Forearm muscle and body masses are highly correlated (r = 0.98) and scale with a slope of 1.16, which is slightly lower than the 1.23 slope reported by Demes et al. (1998) for hindlimb muscles of prosimians. The digital flexors and flexor muscle compartment of Nycticebus represent 46% and 55% of total forearm muscle mass, well within the range of other prosimians. Relative mass of the ulnar deviators of vertical clingers is lower than that of pronograde quadrupeds of similar size. In contrast, the mass of adductor pollicis of Nycticebus is greater compared to other taxa (52% of hand muscle mass), which correlates with the extreme thumb divergence of lorises. Despite lacking predictable quantitative variation, the deep flexor muscles of prosimians show important differences in tendinous arrangement that parallel differences in grasping behavior.





Project Title: Group Characteristics in the Trauma In Pregnancy Study: The need to rethink beyond age and gestation Full Name: Jessica Heidt Faculty: Faculty of Science Department: Department of Biological Sciences Degree and Year of Study: Bachelor of Biological Sciences- Fourth Year Supervisor Name: Kathy Hegadoren

Introduction: The Trauma In Pregnancy Study (TIPS) is a longitudinal prospective cohort study, the purpose of which is to determine the effects of trauma (e.g. motor vehicle crash, falls, work-related injury or severe psychosocial stressor) during pregnancy on selected pregnancy outcomes, maternal health and child development.

Methods: The TIPS study involves two groups of pregnant women: women who experienced a trauma during pregnancy (case group, N=122) and low risk "healthy" women (control group, N=107). Both groups of women are followed throughout the rest of their pregnancy and for 18 months postpartum via telephone interviews and questionnaires. At 18 months all infants are assessed for general, motor, social and cognitive development at the Neonatal and Infant Follow-up Clinic at the Glenrose Rehabilitation Hospital. Additionally, the relationship between maternal trauma in pregnancy and salivary cortisol levels in mother and babies at 6 and 18 months will be examined.

Results: This preliminary report is limited to an examination of between group characteristics. Significant differences were found in multiple demographic variables including frequency of pregnancy-related health problems, infectious illnesses during pregnancy, smoking, and socioeconomic status.

Conclusion: Although our original intent was to match participants for age and gestation at enrolment, it is clear that there are many other differences between the groups. In our final analyses, we will have to employ advanced statistics to control for the salient variables between groups. In general these data suggest that previously identified risk factors for complications in the perinatal and postpartum periods cluster in our case group.

52.

Project Title: Developing Methods to Investigate the Effect of Vitamin A on Innate Immune Cells Full Name: Charley Switzer Faculty: Augustana Department: Science Degree and Year of Study: BSc, 3 Supervisor Name: Sheryl L. Gares





Reports in the nutrition literature indicate that ingestion of vitamin A dampens inflammation and decreases tissue damage in animal models and in humans with chronic inflammatory diseases like arthritis or atherosclerosis (heart disease). These chronic inflammatory diseases are caused by ongoing and inappropriate activation of the immune system. The focus of this project was to use an innate immune cell line of macrophages called RAW to develop methods to determine if the metabolically active form of vitamin A, retinoic acid (RA), changes or decreases the way these cells respond to the kind of signals they would experience if a bacterial infection were ongoing. Soluble immune factors called cytokines are secreted in particular patterns during immune responses and the type of pattern guides the immune response to be either inflammatory or anti-inflammatory. I developed tests called immunoassays to assess the cytokines secreted by unactivated, activated and RA-treated macrophages. The second part of the project involved 'staining' cells to assess whether the activation state of the cells changed upon stimulation or with treatment with retinoic acid. The final component of the project was to develop an assay to assess cellular function. An important function of activated macrophages is to 'clean up' or ingest bacteria and other debris using a cellular process called phagocytosis. An assay was developed to semi-quantify phagocytic function of macrophages. These methods may now be applied to studying the effects of RA on cell lines to determine how this important nutrient influences the innate arm of the immune system.

53.

Project Title: "In the Role of Paternal Despot: Adams Archibald and the Red River Métis Lands Issue 1870-1872" (cannot attend poster competition) Full Name: Morgan Bamford Faculty: Native Studies Department: N/A Degree and Year of Study: BA (Honours) in Native Studies, with Sociology Minor. Graduated June 2011. The submitted work was my honours thesis for which I received credit in NS 498. Supervisor Name: Nathalie Kermoal

The period of 1870 to 1872 in Manitoba was one of great changes: the new province entered the Dominion and needed to be organized into an efficient political entity. The settlement of lands was a high priority for the federal and new provincial government. At this time, the Métis people outnumbered non-Aboriginal peoples in the region and the federal government made special provisions for their land rights under the new province through the Manitoba Act and more specifically, Sections 31 and 32. A Nova Scotian Member of Parliament – Adams Archibald – was appointed to the role of Lieutenant-Governor of Manitoba and the Northwest Territory. He served until resigningin late 1872. Archibald was tasked with establishing the provincial political and social institutions and settling disputes relating to land under Sections 31 and 32 of the Act. This thesis looks at Archibald's role in implementing Sections 31 and 32 and at his term in Manitoba. It concludes with a discussion of the pressures Archibald faced and the implications of his term and eventual resignation both on the province at large and on the Métis people.





Project Title: The use of fluorescent powdered pigments as a tracking technique for snakes Full Name: Benjamin Furman Faculty: Science Department: Biology Degree and Year of Study: Animal Biology Specialization, 4<sup>th</sup> year. Supervisor Name: Cindy Paszkowski

We describe a new technique for tracking snakes that is an alternative to radio-transmitters and thread trails. We coated the bodies of three species of garter snakes (Thamnophis) in fluorescent powder, then followed and marked the trails with a UV light at night. The use of a UV light allowed us to see very detailed paths left by the snakes. This technique was effective for snakes > 10 g in weight and we tracked some individuals > 200 m. Because a portion of the paths ended in burrows, this technique may prove useful for locating hibernacula sites. Fluorescent powder tracking is a useful tool to determine where, and how, snakes move in a localized habitat.

55.

Project Title: Children's Aggression-Victimization Status and School Engagement Full Name: Phillip Hau Faculty: Arts Department: Psychology Degree and Year of Study: 3 Supervisor Name: Wendy Hoglund

Peer aggression (i.e., bullying) and victimization (i.e., being bullied) are well-established risks for children's healthy adjustment in school (Park, 2006). Research indicates that children's aggression-victimization status may influence their levels of engagement in school (Buhs et al., 2006; Burk et al., 2007; Iyer et al., 2010). However, few studies have examined how aggression-victimization status relates to both emotional and behavioural engagement in school during middle childhood among low-income, ethnically diverse children. The current study examines the associations between aggression-victimization status and school engagement with a sample of low-income, ethnically diverse children in Kindergarten to grade 3 who were assessed on three occasions over one school term. Gender differences in these associations are also examined.

Participants included 461 low-income children in Kindergarten to grade 3. Baseline data were collected in January 2010 (wave 1). Follow-up data were collected in March (wave 2) and June (wave 3) 2010.

School engagement was assessed from children's self-reports on the emotional and behavioural subscales of the School Engagement Questionnaire (Furrer & Skinner, 2003).





Peer victimization and aggression were assessed from children's self-reports on the relational and physical subscales of the Social Experiences Questionnaire (Crick & Grotpeter, 1996).

At each wave we calculated children's aggression-victimization status based on whether children's scores were 1 standard deviation above the mean or not. We tested separate ANOVAs to assess differences in levels of school engagement by aggression-victimization status. As expected, aggressive-victimized children showed the lowest levels of engagement. Non-aggressive, non-victimized children reported the highest levels of engagement. In addition, boys were more likely to be in the aggressive victim and aggressive, non-victimized status groups relative to girls

This study will contribute to the understanding of how peer aggression and victimization costs relates to children's school engagement.

56.

Project Title: From the Scrap Bag to Sears Roebuck: The Commodification of Quilting from the 1920s to the 1940s.

Full Name: Lauren MacDonald

Faculty: Agriculture, Life and Environmental Science

Department: Human Ecology

Degree and Year of Study: Clothing and Textiles, Design and Product Development Minor, 4<sup>th</sup> year

Supervisor Name: Arlene Oak, Vlada Blinova

This project consists of an academic paper, a small exhibit of historic quilts, and a collection of four new garments and accompanying illustrations. The paper outlines how the growing popularity of quilting and other handicrafts in the 1930s became associated with the commodification of hobbies. For those unemployed during the Great Depression, hobbies were perceived as a valuable and moral way of spending time. The paper examines how this perception was used by corporations (e.g. Sears Roebuck) to market their products to consumers. This research considers how the popularity of quilting was revived in the 1930s, how corporations became increasingly involved with hobbies, and the reciprocal effects of commodification on hobby activities.

In conjunction with this paper, the exhibit of quilts from the Rosenberg Quilt Collection (within the Department of Human Ecology's Clothing and Textiles Collection) displays Depression-era quilts that feature re-used textiles in traditional and non-traditional quilt patterns. Finally, the collection of four newly designed garments is an off-shoot of the larger study into quilting materials and techniques of the 1930s. These contemporary garments indicate how past ideas of reuse and sustainability can be updated to be relevant today. The garments and quilts are exhibited in the Human Ecology Building's lobby in the exhibition "Waste Not Want Not: Creating through Recycling". This research demonstrates links between academic study in social history, the use of material culture objects as representations of past experiences and forms of knowledge, and the creation of new items that draw inspiration from historical conditions, techniques, and materials.





Project Title: Characterization of Vaccinia Virus A48 protein Full Name: Katherine Yackulic Faculty: Science Department: Biological Science Degree and Year of Study: Bachelor, 4<sup>th</sup> year Supervisor Name: David Evans

Vaccinia virus is a large dsDNA virus in the Orthopoxvirus genus of the Poxvirus family. Vaccinia replicates in the cytoplasm of both stationary and dividing cells. Its ability to replicate in non-actively dividing cells, where deoxynucleotides (dNTPs) are not present at high levels, is partly due to genes encoded in the viral genome for active nucleotide biosynthesis. A48R is a thymidylate kinase gene required by vaccinia for production of dNTPs during DNA replication. Other than its biochemical function little is known about this protein. The host cell only produces thymidylate kinase during replication, therefore a vaccinia virus lacking A48R would be expected to have reduced replication in non-dividing cells, while still growing well in rapidly replicating cells. This has potential applications in cancer therapeutics. The goal of this project was to investigate and help characterize the role of this gene in the viral life cycle. A threefold approach was taken. First we generated an A48R knockout vaccinia virus (WR strain), which was confirmed by PCR. Secondly, a Flag epitope tag was cloned onto the C-terminal end of the A48R gene. Using this tag we determined that it localized to the cytoplasm of infected cells. A48 was also tagged with a His epitope tag to express a recombinant protein in E. coli. This protein was successfully expressed, but was found to be insoluble under several growth conditions. Future work will include characterizing the growth properties of an A48R-deficient virus as well as using co-immunoprecipitation to identify potential protein-protein interactions of A48.

58.

Project Title: Immunohistochemical analysis of mammalian locomotor networks Full Name: Rachel Jeong Faculty: Medicine and Dentistry Department: Physiology Degree and Year of Study: BSc General, graduated June 2011. Supervisor Name: Simon Gosgnach

Central pattern generators (CPGs) are neural networks that generate basic rhythmic movements such as locomotion and respiration. The CPG for hindlimb locomotion is located in the ventromedial region of the lumbar spinal cord. Although its general location is known, the structure and mechanism of function of the locomotor CPG have not been well characterized. Recently, discrete interneuronal populations in the spinal cord have been identified via genetic characterization of transcription factor expression at embryonic time points. Several of these genetically-defined cell populations have been shown to play specific roles in locomotor activity. Previous studies in our lab have shown that one of these groups, the dl6 interneurons can be subdivided into two electrophysiologically distinct subpopulations. The first is likely involved in initiating rhythm while the second coordinates motoneuron output. In this study we test the





hypothesis that the neurons responsible for generating locomotor rhythm are excitatory, an essential characteristic if they are to drive the locomotor rhythm. To this end we isolated the spinal cord from neonatal transgenic mice in which dl6 interneurons express the reporter protein GFP. Sections of the cord were prepared and incubated with antibodies that selectively label inhibitory neurons. These experiments allow us to further characterize the function of specific interneuronal populations and determine how functional locomotor outputs are produced. This will be essential in understanding the organization of the locomotor CPG, which will help devise therapies aimed at enhancing the functional recovery of movement after spinal cord injury.

59.

Project Title: Effect of insect herbivory on collared pika foraging Full Name: Kristen Peck; Andrew Shaw (joint poster) Faculty: Science Department: Biological Sciences Degree and Year of Study: BSc Honors in Ecology (Kristen); BSc Honors in Animal Biology (Andrew) Supervisor Name: David Hik

In highly seasonal alpine environments, year-round inhabitants depend on stored resources in the winter, either in the form of internal stores (such as fat) or stored food. Collared pikas (Ochotona collaris) are a small mammal species inhabiting alpine boulder fields which store vegetation in the summer for winter food. The type and amount of resources collected for winter caches significantly influences their over-winter survival. Previous studies have found that collared pikas are selective in the size and type of plant they collect. This study looks at collared pika forage selection in relation to insect herbivore damage using both observational and experimental designs. Insects are expected to be more widespread and successful in alpine environments with climate change. Since they impact the vegetation collected by pikas this may directly change pika forage quality in the future. We quantified the frequency of insect damaged to undamaged leaves for several common forage species in vegetation communities used by individual pikas. Winter cache contents were sampled and sorted to quantify the proportion of insect-damaged to undamaged leaves selected that year. We then offered the pikas a choice between undamaged, insect damaged or fake insect damaged leaves for forage material in cafeteria trials. The preferences of the pikas in the cafeteria trials are compared with preference in stored vegetation to determine whether collared pikas are selective for insect-damaged or undamaged leaves. The major trends and implications of this research will be discussed.





Project Title: An Artificial Intelligence Player for the Game of Quoridor based on UCT Full Name: Dávid Szepesvári Faculty: Science Department: Mathematics (research project in Computing Science) Degree and Year of Study: BSc Honors Mathematics, 3rd year Supervisor Name: Rich Sutton, Csaba Szepesvári

In this project we designed and implemented an artificial intelligence player for the board game called Quoridor. The program is based on a machine-learning algorithm called UCT (Upper Confidence bounds applied to Trees). This is a novel technique that showed some great successes recently in games like Go, or Hex, therefore it is of considerable interest to test it on other games, too. However, the algorithm has a number of tunable parameters that its performance can depend on to a large extent. In this project, the goal was to systematically test the choice of the most important parameters. For this, the algorithm was tested in self-play against some "default" settings that were chosen based on preliminary experiments. The testing of the algorithm was done on a cluster computer in a distributed fashion. The results were used to tune the parameters. Furthermore, multiple special techniques to speed up the computations were implemented and the speed-gains were measured. These special techniques focus on the computation a subproblem needed in the algorithm: the computation of shortest paths on sequences of incrementally changed shortest path problems. Unfortunately, the experiments showed that the gains from these more advanced techniques are not significant because the board size in Quoridor is too small. Another optimization of UCT is to use a learning technique to tune the playout policy. A specific learning technique is implemented, but its testing remains for future work.

61.

Project Title: Microbial Community Structure of Multi-year Ice Full Name: Rhianna Charchuk Faculty: Science Department: Biology Degree and Year of Study: Bachelor of Biology, Fourth Year Supervisor Name: Brian Lanoil

Global climate change has reduced the amount of multi-year ice in the Arctic by an average of approximately 8% per decade for the last two decades. Multi-year ice is an important habitat in the Arctic composed of multiple layers that remain frozen through the summer with a new layer added on the bottom every winter. The increased age of multi-year ice creates distinct ecological habitats in each layer due to differences in temperature, salinity, and nutrient availability. We hypothesize that each section of the multi-year ice core will have a distinct ecological habitat. Therefore, this study focuses on the microbial communities in each 30cm section of two multi-year ice cores to determine how they vary with depth. I will focus on cell abundance, community structure and composition as a first step of understanding the function





of each different community. Salinity and temperature were also measured in each section, this allows for determining the volume of the brine channels that microbes inhabit.

62.

Project Title: Sculpting Men: Mental Health of the Physically Fit (cannot attend poster competition) Full Name: Stefan Dehod Faculty: Arts Department: Sociology Degree and Year of Study: Senior Supervisor Name: Robyn Braun

Eleven men of notably above average fitness level who worked out for image-enhancement reasons and did not use anabolic steroids were interviewed. The interviews varied between 30 minutes in length and 75 minutes in length. Interview questions pertained to the participants' workout histories, current motivations, reasons for which they believed they excelled at the gym, reasons for training naturally, and finally how their life had changed since undergoing a transformation of their physical self to their current figure.

Consistently all the men who trained naturally noted the amount of tremendous effort and time entailed to reach their current figure– in direct contradiction to the messages portrayed in the popular media. Of greater significance was the emerging theme of a distinction between ones outward physical appearance and what actually constitutes a healthy body. Though this certainly was not the case for all interviewed, many were able to excel the greatest at aesthetic goals when they focused on overall health and fitness, leaving image-enhancement as a welcome byproduct of their efforts. Finally, though all were happier since undergoing their physical transformation it was rare that this happiness went unqualified. For some, their increased happiness only pertained to their physical self (feeling it did not translate into other aspects of their life) whereas others were happier due to an improvement in their over all life circumstances. Findings will be shared in greater detail through a poster.

63.

Project Title: Effectiveness of current government recommendations in keeping trans-fat content low in packaged foods Full Name: Sandra Ngo Faculty: Agricultural, Life and Environmental Sciences Department: Nutrition and Food Science Degree and Year of Study: Nutrition and Food Science, fourth year Supervisor Name: Ellen Goddard

As of 2009, the Trans-Fat Monitoring Program performed by Health Canada had ceased. Health Minister Leona Aglukkaq declared industry efforts to be satisfactory so recommendations to ban trans-fats from the food supply were not followed. However, Health Canada still advises the industry to limit trans-fat content to <2% of total-fat in margarines, lards and spreads and <5% of total-fat in all other foods. This paper follows up on current industry efforts in meeting these





limits. Of the 305 packaged food products that underwent a label review, compliance rates rose from 76.3% to 89.1% as compared to 2008 and 2009 data. All 2011 products had been examined by Health Canada at least once before. A secondary part of this study was the analysis of the relationship between trans-fat content, changes in trans-fat content, and unit price. Unit price was found to be uncorrelated to either trans-fat content as a percentage of total fat as well as changes in trans-fat content as a percentage of total-fat. Combined, data indicates that industry efforts to reformulate are fairly successful and that reformulation costs are not reflected in price. Additional research is needed to track current Canadian intake of trans-fats to ensure that trans-fats have not appeared in food categories outside of packaged foods.

64.

Project Title: Study on the bacteria load on jeans not washed for 15 months Full Name: Joshua Le Faculty: ALES Department: Human Ecology Degree and Year of Study: Business, 1<sup>st</sup> year Supervisor Name: Rachel McQueen

Raw denim is denim that is untouched after the dyeing process. The jeans are recommended to be worn daily for 6 months without washing to allow the jeans to naturally distress and mold to the user. The study is an exploration into whether daily wear of an unwashed pair of raw denim worn in excess of 15 months is hazardous to one's health. Currently, there is a great amount of anecdotal data in the raw denim community that suggests wearing unwashed jeans for an extended period of time is not hazardous to one's health. The poster will present the comparison between the bacterial loads of three areas: the crotch region of the jeans, just left or right from the centre back seam and near the zip opening at the front of the jeans. This study does indicate that overall it may not been necessary to wash jeans as frequently as some may think. Most bacterial organisms transferred onto jeans come from the person wearing them, and providing there are no cuts or signs of abrasion to the skin, the bacteria load on the jeans washed after 13 days did not differ from those found after 15 months of wear. It's important to note that these findings are from just one individual and other people will have quite different densities and types of bacteria present on their own body.

65.

Project Title: Improving the Diagnosis and Management of Dementia in Primary Care – An Innovative, Collaborative Approach for Use by the WestView Primary Care Network Full Name: Catherine Kirwan Faculty: Science Department: Biological Sciences Degree and Year of Study: Bachelor – 4<sup>th</sup> year Supervisor Name: Jasneet Parmar, Bonnie Dobbs

Increasing incidence and prevalence of dementia, and high rates of missed diagnoses in primary care, emphasize the need for collaborative models of care for these patients in primary care. A three phase study included a retrospective chart review of patients with dementia





(Phase 1), focus groups and administration of structured questionnaires (Phase 2), and development of a proposed model complete with staff resources, reviewed by care providers in a series of consensus meetings (Phase 3) for input and endorsement. Findings validate the need for improvements in dementia care (Phase 1) and provide support for a collaborative model of care (Phase 2). Results from health care professionals (Phase 3) reveal strong endorsement for the developed model and provide insightful suggestions for implementation of this model. The research was designed to address the growing need for more responsive care of individuals with dementia in the primary care setting. Recommendations for the model include the creation of a Care Coordinator position to assist patients and caregivers in navigating the system, and systematic use of the dementia assessment and management resource kit developed by the research team. Barriers to implementation were identified including the need for, but challenges associated with, regular collaborative meetings among the health care professionals. Phase 4 will involve the implementation of this care model in the WestView Primary Care Network.

66.

Project Title: The Structural Studies of Bacterial Lactoferrin Protein B from *Neisseria meningitidis* Full Name: Chris Beavington Faculty: Science Department: Biochemistry Degree and Year of Study: Doctor of Medicine Year 1 Supervisor Name: Joanne Lemieux

Lactoferrin binding protein B (LbpB) is a peripherally associated bi-lobed outer membrane protein necessary for *Neisseria meningitidis* uptake of host iron from human Lactoferrin (Lf) *in vivo*. By solving the structure of LbpB, conserved regions of the protein necessary for interaction with Lf can be identified for use in meningococcal antigen engineering.

Several LbpB constructs including intact proteins, N-lobes, and C lobes were generated and purified using general chromatography columns. Using X-ray crystallography, the structure of the N-lobe of LbpB was previously solved by our group. However, due to lack of sequence similarity with any homologous protein, crystals of the C-lobe of LbpB were subject to heavy metal soaking in order to promote phasing necessary for solving the structure.

To circumvent this difficult task, site directed mutagenesis to insert accessible cysteine residues capable of heavy metal interaction was used to promote binding of metals during crystal soaking. Eight specific sites in the C-lobe were separately chosen for mutagenesis, and the accessibility of each newly incorporated residue was determined by the ability of the mutant C-lobe to bind a fluorescent dye, mimicking heavy metal association.

In the future these eight cysteine residues will be incorporated into the C-lobe in an effort to phase the crystals and determine the structure of the intact LbpB. With this structure, and the structure of Lf, a model of the complex could be used to identify regions of LbpB necessary for interaction with Lf. This is the first step toward novel vaccine designs against bacterial meningitis.





Project Title: Using Pollutant Release and Transfer Register data for environmental health research: a review of the literature Full Name: Cian Hackett Faculty: Medicine & Dentistry Department: Paediatrics Degree and Year of Study: Bachelor of Science, 4th Year Supervisor Name: Alvaro Osornio-Vargas

Pollutant Release and Transfer Registers (PRTRs) are national databases of chemical releases reported by industry to governments, created to provide the public with information on toxic pollutants. In order to evaluate the use of PRTRs broadly and in Canada, we conducted a literature review, using key words including "PRTR" and its derivatives to search for scientific literature and media articles using PRTR data. Only 35 studies examined associations between PRTR data and health data, 139 used PRTR data in other ways, 17 used Canadian PRTR (NPRI) data, and 203 Canadian media articles referenced the use of the NPRI. Different nations' PRTRs were represented, including Australia, Canada, Japan, Spain, the UK, and the US, but the literature was dominated by the use of the US's TRI. Analysis revealed an increase in the published use of TRI data 14 years after its inception. Studies exploring health outcomes were primarily limited by completeness of the data, risk modeling and confounding variables. Despite differing methods, most found a positive relationship between air pollutants and harmful health effects. With demonstrated public interest from media articles referencing NPRI use by government, industry and NGOs, it was surprising to find only limited scientific literature that used NPRI data. These results indicate potential for the use of PRTRs, after reporting requirements stabilize and appropriate research methods can be developed. Though PRTR data is the most complete pollutant data available, the limitations of the data present study design challenges for environmental health research.

68.

Project Title: Exploring Canadian new media (re)presentations of weight loss surgery using content analysis Full Name: Claudine Champion Faculty: Physical Education Department: N/A Degree and Year of Study: Bachelor of Physical Education, 4<sup>th</sup> Year Supervisor Name: Nicole Glenn and John Spence

Weight loss surgery (WLS) is the fastest growing treatment for morbid obesity. However there is little information about how it is represented in the news media and no investigation which has considered on-line media, including reader comments. The purpose of this exploratory study was to examine new media (re)presentations of WLS within a Canadian context. This inquiry was guided by the following research questions: What are the dominant messages; who is speaking; who is the intended audience; what is the predominant tone? We also sought to understand how messages in the articles and comments corresponded. This inquiry was





undertaken using qualitative content analysis which aims to make inferences about a text and to classify the textual material. Articles were identified on CBC.ca by searching: WIEGHT LOSS SURGERY, BARIATRIC, GASTRIC and LAP BAND. A total of 19 articles and 667 corresponding comments were included in the analysis. Findings revealed that the majority of the articles were supportive (i.e., tone) of WLS. Comments, on the other hand were predominantly aggressive in tone, including degroatory and discrimative language such as obese people are fat pigs or are extremely lazy. Comments frequently addressed issues related to obesity and weight-loss rather than WLS, which was the dominante focus of the news articles. This is the first study in this area to examine new media, specifically readers comments. Understanding how the Canadian media portrays WLS as well as reader responses reveals the potential public understanding/construction of this important phenomenon. Findings form this study suggest weight-based stigma is prevelent and public understandings of weight-loss are dangerously simplistic (i.e., eat less/move more) and likely contribute to the last acceptable form of discrimination.

69.

Project Title: Evaluating Differences in Environmental Values and Behaviours Among Undergraduate Students: an Inter-Faculty Comparison Full Name: Curtis Rollins and Amanda Long Faculty: ALES Department: Resource Economics and Environmental Sociology Degree and Year of Study: Agricultural and Resource Economics, final year (Curtis); Environmental Economics and Policy, final year (Amanda) Supervisor Name: Peter Boxall

This study examines differences in environmental values and pro-environmental behaviours (recycling, for example) of students across different academic majors and educational backgrounds. Other variables examined include gender, years of education, urban/rural upbringing, and basic value orientation. Data was gathered from University of Alberta students (n = 532) in 2010 and 2011 via a self-reporting survey, and was analyzed using econometric techniques. Notable results indicate that pro-environmental values, years of education, altruism, and enrolment in an environmental program are linked with increasing levels of pro-environmental behaviour. Higher participation in pro-environmental behaviour is noticed across the entire sample for actions which involve a direct cost-savings to the student, and also for actions requiring comparatively less effort than others. In conclusion, it appears that execution of pro-environmental action is determined by a wide spectrum of influences, and that even though individuals with different backgrounds participate at different levels, numerous policy options may increase environmentally conscious actions partaken by most consumers.





Project Title: Phosphatidylcholine intake results in different liver fatty acid composition compared to free choline Full Name: David L. Ma Faculty: Biological Science Department: Science Degree and Year of Study: General Science 2<sup>nd</sup> year Supervisor Name: Catherine Field

My project involved feeding different amounts and forms of the nutrient choline. Choline provides methyl groups to synthesize docosahexanoic acid (DHA) and arachidonic acid (AA) from dietary 18-carbon omega-3 and omega-6 fatty acids, respectively. These long chain essential polyunsaturated fatty acids (LCPUFA) are essential for growth and neuro-cognitive function in infants. My research tried to investigate whether feeding choline to lactating rats is essential for formation of LCPUFA in liver storage (triglycerides) and structural (phospholipids) lipids in their offsprings' livers. To determine if the form is important, we provided the same amount of choline in the free form (most common form in supplements) as phosphatidylcholine (PC), which was taken from soy (usual PC form) and eggs (novel form). We found that feeding free choline compared to no choline did not alter lipid composition, suggesting that the mothers were able to compensate for lower choline in their diets to ensure that their pups received choline. However, our results showed that feeding the novel PC our group produced from eggs resulted in higher concentration of AA and DHA in liver lipids. This suggests there was better conversion of dietary linoleic acid to AA and dietary linolenic acid to DHA compared to free choline. My results suggest that consuming choline from our novel egg-derived PC during lactation is more beneficial to the infant's supply of essential fatty acids than free choline. Since eggs are a major source of PC and an important agricultural commodity, they could potentially be used to make PC supplements.

71.

Project Title: Improving the lifetimes of polymer solar cells by selection of oxygen and water barrier blocks Full Name: Jan Garcia Faculty: Engineering Department: Chemical and Materials Engineering Degree and Year of Study: 4<sup>th</sup> yr. BSc. Chemical Engineering (Computer Process Control Option) Supervisor Name: Phillip Choi

Solar energy is one of the most promising sources of sustainable energy. Unfortunately, the high processing costs of traditional silicon-based solar cells hinder solar technology's widespread use. Polymer solar cells are gaining attention as a cheap, flexible, and light-weight alternative. However, low efficiencies and short lifetimes remain challenges for polymer solar cells. Block copolymers are a promising solution to efficiency problems due to their unique self-assembling properties. Block copolymers consist of two or more blocks of different





homopolymers covalently linked together. To address the challenge of short lifetimes, blocks that act as barriers against water and oxygen must be incorporated. In this research project, molecular dynamics simulations are used to assess different materials for their suitability as barrier blocks against oxygen and water. The relative affinity of each barrier block candidate to the entry surface of oxygen and water is used as the primary indicator for their suitability. Materials considered in increasing order of suitability are buckminsterfullerene, poly(ethylene oxide), poly(ethylene terephthalate), and poly(ethylene naphthalate). The nano-scale structures formed by the barrier block candidates with other polymer solar cell components are also presented.

72.

Project Title: Vulnerability of Older Adults in the Emergency Department Full Name: Jessica McAllister Faculty: Nursing Department: Nursing Degree and Year of Study: 4<sup>th</sup> Year Bachelor of Science in Nursing Supervisor Name: Belinda Parke

*Background:* Older adults have the highest rate of emergency department (ED) visits compared to all other age groups (Aminzadeh & Dalziel, 2002). Being an older adult in the ED can be a risky experience, as they have complex care needs, such as a declining physiological compensatory mechanisms, suggesting a need for additional measures to ensure quality nursing care (Parke & Chappell, 2010). The research poster in an honors project associated with *Visualizing an Elder-Friendly Emergency Department: A Focused Ethnography Using Photographic Methods* (PI Dr. Belinda Parke; Co-PI Carolyn Hoffman).

*Aim:* To explore barriers and facilitators to safe, quality ED care for older adults from the registered nurse's (RN) perspective

*Methods:* The study is a focused critical ethnography, which views culture through four dimensions: care systems and processes, physical design, policies and procedures, and social climate (Parke & Chappell, 2010). Data was collected through 2-hour photographic walkabouts with 4 RNs in an Alberta emergency department. The 4 walkabouts involved observations, narrative, and digital photographs. Interviews were transcribed; coding and thematic analysis was completed using NVivo data management software.

*Emerging Themes:* Through analysis, 4 themes emerged that the RNs expressed to impede older adult care in the ED. They include emergency mentality, equipment: non-existent or not really available, nursing care struggles, and the progression of potential negative physiological effects.

*Nursing Implications:* Emergency Department RNs have to be concerned with all aspects of the environment to ensure safe quality care for older people.





Project Title: The Effects of Raw Pea Seed Coat Supplementation on Fatty Acid Metabolism in Insulin Resistant Rats Full Name: Joel Gupta Faculty: Faculté Saint-Jean, Sciences Department: Physiology/Agriculture and Nutrition Degree and Year of Study: BSc, (French), Year 1. Supervisor Name: Catherine Chan

Background: Legume consumption improves glycemic control in type 2 diabetics. The focus of this study is to determine what effects raw pea seed coats with low (loPAC) or high proanthocyanidin content (hiPAC) in high fat diets have on fatty acid metabolism because of known disturbances in insulin resistant states.

Methods: Rats were fed a high fat diet inducing type 2 diabetes, then switched into three different groups of experimental diets for four weeks: control high fat (same as the initial diet), high fat with hiPAC, and high fat with loPAC. Rats were euthanized and liver tissue samples were used for western blotting and PCR arrays. Plasma samples were subjected to metabolomic comparisons.

Results: Metabolomics analysis suggested alterations in fatty acid oxidation and ketone metabolism. PCR array experiments for enzymes involved in lipid metabolism showed that *bdh1* mRNA levels compared to control were down-regulated by 2.1- and 2.7 fold in hiPAC and loPAC groups, respectively. A down-regulation of 2.2- and 3.8-fold in hiPAC and loPAC, respectively, was observed for mRNA levels of the *Gpd2* gene. *Prkaa1* (the catalytic subunit of AMPK) mRNA levels were up-regulated by 5.3-fold in hiPAC and 2.5-fold in loPAC. Western blot/gas chromatography analysis showed no significant differences

Conclusions: Fat metabolism in relation to diabetes may have been altered in the pea seed coat supplemented diets. Although PCR data showed changes in mRNA levels, corresponding quantities of protein observed in western blots suggested that levels of these enzymes were unaffected. Changes in enzyme activity cannot be ruled out.

74.

Project Title: Sequence and Phenotype Analysis of Three *Taf4* mutants Enhancing Eye Colour Variegation of *E1*, an allele of *Pci*, in *Drosophila melanogaster* Full Name: Kurt William Douglas Buhler Faculty: Sciences Department: Biological Sciences Degree and Year of Study: Honors in Molecular Genetics, 4th year. Supervisor Name: John Locke

In *Drosophila*, the *Taf4* gene product is a transcription factor associated with RNA polymerase II, an enzyme producing mRNA from a DNA template. Genetic mutations in the *Taf4* gene inhibit expression (silencing) of a transgene on chromosome four. This





transgene, called *E1*, normally shows random silencing of the *white+* gene function and results in a mosaic pattern of expression in the adult fly eye. The *Taf4* mutations silence the expression of white+ even further. We plan to confirm the effect of these mutants by conducting a variety of crosses, and quantify the level of variegation by measuring eye pigment levels in *Taf4* mutant flies. We will also sequence the *Taf4* genes in our mutants to identify the changes to the DNA sequence. Additional sequencing of two outside alleles should also confirm the role of *Taf4* in gene silencing. Once lesions are uncovered, their predicted effects on the mutant protein product will be investigated. Like previous research on Drosophila genes, we hope this characterization of *Taf4* and *E1* will provides insight into similar mechanisms of gene regulation in humans.

75.

Project Title: It's all the same: Examining definitions of cyberbulling in students, parents and teachers Full Name: Lily Le Faculty: Arts Department: Psychology Degree and Year of Study: Bachelor of Arts (Cooperative Work Experience Program), 4<sup>th</sup> year Supervisor Name: Connie Varnhagen

Cyberbullying is associated with many negative emotional outcomes including suicide, termed *cyberbullicide* by Hinduja & Patchin (2009). Cyberbulling can include posting humiliating pictures on Facebook, sending threatening text messages, or impersonating someone on MSN Messenger. A variety of definitions of cyberbullying have been posited, but David-Ferdon & Hertz (2007) point out that there is no concise operational definition of cyberbullying, making it difficult to draw valid conclusions on important aspects of the topic, like prevalence rates. Moreover, cyberbullying is most widespread among young people, yet there are no studies that focus on how cyberbullying is defined by this group or their parents and teachers. This study examines how students, parents and teacher define cyberbullying in their own words.

Students in grades four to eleven, and their parents and teachers (N=544) were asked to complete the sentence, "A bully is..." and "A cyberbully is..." Responses that described an aggressive action or defined cyberbullying as "the same" as bullying were coded using Nvivo 9.2. Cyberbullying definitions were coded "the same" if they referred back to the bullying definition (eg. "It's the same as bullying, but using computers").

The poster will indicate the difficulty in defining cyberbullying, saying it is "the same" as bullying or providing incorrect definitions such as, "someone who hacks into your computer." These results will be illustrated through tag/word clouds, graphs, and direct quotes of some of the interesting responses received. The results indicate that the definition of cyberbullying requires more understanding and further research.





Project Title: Utilizing the fAR-Play framework to analyze game-play strategies for augmented/alternate reality games. Full Name: Matthew Delaney Faculty: Science Department: Computing Science Degree and Year of Study: 4th year BSc Honors Computing Science Supervisor Name: Eleni Stroulia

FAR-Play is a framework for creating and playing location based

Augmented/Alternate Reality Games (AARG). AARGs are interesting in that they span both the real and alternate reality worlds in a way that can influence the way we see and/or interact with our world. The recent proliferation of smart phones equiped with GPS, digital compass, camera, and a web browser makes it easy for anyone to participate in a AARG. FAR-Play is intended to make creation and deployment of such games as simple and intuitive as possible for people with little to no programming experience. Furthermore, fAR-Play can be used to capture the details of how people are playing each game, which can later be analyzed to gain insight into game-play.

77.

Project Title: Endothelial Progenitor Cells Repairs Experimental Lung Damage Through a Paracrine Activity Full Name: Moses Fung Faculty: Science Department: N/A Degree and Year of Study: BSc, 2<sup>nd</sup> Year Supervisor Name: Bernard Thébaud

Lung diseases characterized by arrested alveolar development or alveolar destruction such as bronchopulmonary dysplasia (BPD) and emphysema currently lack effective treatments. Angiogenic growth factors promote lung growth and maintain alveolar structure throughout postnatal life. Recent data from our lab suggest that endothelial colony forming cells (ECFCs), a self-renewing highly proliferative subtype of endothelial progenitor cells, contribute to lung development and repair. Increasing evidence suggest that stem cells exert their therapeutic potential through a paracrine effect. We hypothesized that cell-free conditioned media from ECFCs prevents lung injury in an experimental O<sub>2</sub>-induced BPD model in newborn rats. In vitro, we examined the effects of conditioned media on vessel forming potential and alveolar epithelial cell wound healing. Conditioned media from human-umbilical cord blood ECFCs (ECFC CdM) significantly restored the vessel forming ability of hyperoxia (95% O<sub>2</sub>) exposed fetal human lung ECFCs on matrigel and improved wound closure of freshly isolated fetal rat alveolar type II cells in a scratch-assay. In vivo, the therapeutic potential of ECFC CdM was assessed in Sprague Dawley rats exposed to hyperoxia (95% O<sub>2</sub>) from postnatal day (P) 1 to P14. Daily intraperitoneal injections of ECFC CdM until sacrifice at P21 significantly preserved alveolar development as assessed by lung morphometry. Furthermore, ECFC CdM therapy significantly attenuated pulmonary hypertension, a major complication of severe BPD, as assessed through





improved pulmonary artery acceleration time on echocardiograms and decreased right ventricular hypertrophy. Our findings suggest that ECFCs prevent lung injury and pulmonary hypertension through a paracrine effect and this may lead to novel therapies for lung diseases such as BPD and emphysema. Our data may also be relevant for ischemic diseases such as myocardial infarct or stroke.

78.

Project Title: Structural Evidence For Isoform-Dependent pH Sensitivity In Troponin I Full Name: Peter Charles Holmes Faculty: Science Department: Biochemistry Degree and Year of Study: BSc. Specialization Biochemistry, 5th Supervisor Name: Brian Sykes

Ischaemic heart disease is the leading cause of death worldwide. Blood flow restriction causes intracellular acidosis in the human heart, compromising calcium sensitivity and force development in cardiac tissue. Cross-bridge formation is reliant on the "switch region" of cardiac troponin I (cTnI) binding the N-domain of cardiac troponin C (cNTnC) during an organized series of conformational changes in the myofilament after calcium saturation of cNTnC. Recent studies suggest a histidine substitution in the switch region of cardiac troponin I, designed to mimic the skeletal isoform (sTnl), plays an important role in reducing pH sensitivity in cardiac muscle. We used multi-dimensional heteronuclear NMR spectroscopy to determine the acid dissociation constants for sTnI His 130 and the cNTnC Glu residues in bound and unbound states. Acid dissociation data suggest an electrostatic interaction between cNTnC and sTnI centered on the Glu20-His130 interface. We demonstrated that the binding of sTnI to cNTnC is pH dependent: affinity is tighter at ischaemic pH than physiological pH. pH-influenced sTnI affinity for cNTnC appears directly related to His 130 side-chain protonation. Backbone and side-chain assignments for a cNTnC-sTnI complex were completed and NMR data for structural calculations were obtained. Molecular observations validate the hypothesis that pH sensitivity of cardiac tissue is due to the lack of a His residue in the switch region of Troponin I.

79.

Project Title: 'Little cooks': Gender, Class, and Food in Nineteenth-Century Reform Writing for Children Full Name: Samantha Marie Christensen Faculty: Augustana Department: Humanities Degree and Year of Study: Bachelor of Arts in English, 4<sup>th</sup> year Supervisor Name: Roxanne Harde

In "Marigold House," a short story written by Sarah Orne Jewett in 1875, Nelly Ashford and her friends spend countless hours cooking meals and organizing dinner parties in the play house in Nelly's backyard. The girls learn "much about housekeeping and cooking which they will not forget," and gathering in the Marigold House to proudly share the meals they've collectively prepared becomes an empowering and meaningful experience (Jewett 571). In this instance,





food exists beyond its carnal purpose for human nourishment; it acts as an element of social and gender classification, and as a perpetuator of female domesticity. The social aspects of food continually surface throughout nineteenth-century children's literature, and the experiences of Jewett's "little cooks" sparked my interest in exploring food as an extension of social structure. My paper will engage a study of food and its implications of class and gender in nineteenth-century American reform writing for children. I will focus on texts by Jewett and other nineteenth-century women writers. I will analyze the functions of food and cooking in children's literature and make connections between domestic experiences with food and gender and class. I will also draw on theoretical works by Nancy Hartsock, Susan Bordo, and Michel Foucault, which will be useful in understanding the significance of food as it was perceived by the Early American public.

80.

Project Title: Caspase 1 Inhibition in Inflammatory Bowel Disease Reduces Epithelial Cell Extrusion Full Name: Stephanie Jillian Mah Faculty: Medicine & Dentistry Department: Division of Gastroenterology Degree and Year of Study: 3<sup>rd</sup> Year of general science Supervisor Name: Julia Liu

IL-18 and IL-18 are pro-inflammatory cytokines implicated in the pathogenesis of inflammatory bowel disease. Pyroptosis is a caspase -1 dependent inflammatory cell death which secretes active IL-1ß and IL-18. We hypothesize that pyroptosis causes excess epithelial cell extrusion observed in IBD. The study aims to examine the effect of caspase 1 inhibitor on epithelial cell extrusion in IL-10 -/- mouse, the rodent IBD model. 28 week old IL-10 mice were divided into 2 groups: treatment group received a 10 day course of intraperitoneal (ip) injection with inhibitor Ac-YVAD-CMK at 10mg/kg body weight, and control group of 10 day i.p. injection of saline. Epithelial cell extrusion was assessed using confocal laser endomicroscopy (CLE) and multiphoton confocal microscopy (CM). Cross sectional CLE and CM images were reconstructed for analyzing gap density. A minimum of 5 villi per animal were counted. For CLE, a 2cm terminal ileal segment was exteriorized, topically stained with 0.5mmol/L acriflavine. For CM, terminal ileal samples were fixed in 4% paraformaldehyde, stained with DAPI and Phallodin, and mounted in 2,2'-thiodiethanol. The mean epithelial gap density from CLE for control (N=3) and inhibitor treatment group (N=3) is  $29 \pm 2.0$  and  $17 \pm 2.2$  gaps/1000 cells, respectively (P=0.012). The mean epithelial gap density from CM for the control and treatment group is 20.0+ 2.8 and 9.1 + 2.6, respectively (P<0.01). Our data showed that inhibition of caspase 1 enzyme in IL10 mice reduced epithelial cell extrusion to the background 129Sv/Ev level, confirming pyroptosis as the cause for epithelial cell extrusion.





Project Title: American Sign Language –Phonological Awareness Test (ASL-PAT): A Sign of Things to Come! Full Name: Suzanne Spady Faculty: Arts (Research done in Education) Department: Linguistics and Psychology (research done in Education Psychology) Degree and Year of Study: Bachelor of Arts, 4<sup>th</sup> year Supervisor Name: Lynn McQuarrie and Marilyn Abbott

American Sign Language (ASL) is the conversational language for many Deaf children yet, assessments designed to measure these children's sign language skills are lacking. There is a current need for valid and reliable test instruments in order to monitor Deaf children's sign language acquisition. This study reports on the development of a computer-delivered test designed to measure American Sign Language phonological awareness (ASL-PA) in young children (ages 4-7). Findings from research on Deaf signers' phonological awareness were synthesized to create a framework of the most salient ASL phonological features [i.e., Handshape (H), Location/place of articulation (L), and Movement (M)]. McQuarrie's (2005) receptive-based phonological similarity judgment task (picture matching-to-sample), which was developed for children aged 8 to adult, was used as the prototype to develop a downward extension of the test that would be suitable for 4-7 year old children. The test measures the ability to identify similarity relations in signs under three comparison conditions [i.e., signs with three shared parameters (H + M + L); signs with 2 shared parameters (H + M; L + M; and H + L); and signs that share a single parameter (H, M or L)]. We outline the test development procedures, and document the implementation of the first three phases of a seven phase test development process. Specific issues associated with designing test items and materials are described.

82.

Project Title: Modal Identification of Ultrasonic Guided Waves Propagating in Cervine Tibia Full Name: Tho N.H.T. Tran Faculty: Medicine & Dentistry Department: Radiology & Diagnostic Imaging Degree and Year of Study: Bachelor in Biomedical Engineering – 4<sup>th</sup> year (internship) Supervisor Name: Lawrence H. Le

Osteoporosis is currently a most common metabolic bone disease which causes brittle bones, leading to high fracture risks. Osteoporosis is caused by the loss of bone mass, deterioration of microstructures, and cortical thinning. Quantitative guided-wave ultrasonography is promising for its potential to assess osteoporosis. The generation of guided waves is sensitive to the cortical thickness.

The aim of this study is to identify the propagating guided wave modes in cervine tibia. Axial transmission technique was used with two 1-MHz-30° transducer-wedge systems. The signals were acquired at various source-to-receiver distances for a fixed transmitting transducer position. Two-dimensional Fourier transform was applied to transform the data from time-





distance (x-t) space to frequency-wavenumber (f-k) space to extract dispersion information. Dispersion curves were obtained by further mapping the f-k curves to phase velocity-frequency (c-f) domain using linear interpolation. Theoretical dispersion curves were simulated using a water-filled cylindrical model with an inner radius of 6.25 mm and 4.4 mm cortical thickness. The compressional wave velocity, shear wave velocity, and density of cortical bone are 4000 m/s, 2000 m/s, and 1930 kg/m<sup>3</sup> respectively; for water, no shear wave is assumed and the other parameters are 1500 m/s and 1000 kg/m<sup>3</sup> respectively.

The experimental dispersion curves correlate strongly with the simulation results for the five guided wave modes: F(1,1), F(1,5), F(1,8), L(0,6), L(0,7). The study has demonstrated that the guided waves in cervine tibia can be identified. The findings have showed that guided-wave ultrasonography has a great potential to study long bones in-vivo.

83.

Project Title: Cardiomyocyte-specific ATGL over-expression prevents doxorubicin-induced cardiac dysfunction in mice Full Name: Tae Yeob (Ty) Kim Faculty: Science Department: Biological Sciences Degree and Year of Study: BSc Honors Physiology [2<sup>nd</sup> Year] Supervisor Name: Jason Dyck

Anthracyclines such as, doxorubicin (DOX) are an effective class of antineoplastic agents. Despite its efficacy in the treatment of a variety of cancers including breast cancer, the clinical use of DOX is limited by cardiac side effects. While it has been shown that DOX induced cardiotoxicity is an outcome of enhanced cardiomyocyte oxidative stress and cellular death, it remains unclear if myocardial triacylglycerol (TG) metabolism contributes to DOX-induced cardiotoxicity. Wild type (WT) mice and mice with cardiomyocyte-specific ATGL overexpression (MHC-ATGL) received a weekly intraperitoneal injection of saline or DOX (8mg/kg) for four weeks. Heart rate, heart weight to tibia length ratio and DOX-induced body weight loss were comparable between genotypes. As expected, myocardial TG content was significantly reduced in MHC-ATGL mice compared to the WT following DOX treatment. Echocardiographic analysis, also revealed a significant reduction of systolic heart function in DOX-treated WT mice, an effect that was not observed in DOX-treated MHC-ATGL mice. The wet to dry lung weight ratio was increased in DOX-treated WT, but not MHC- ATGL mice, suggesting a protection from pulmonary signs of heart failure. Surprisingly, the preservation of cardiac function in MHC-ATGL mice following DOX treatment was associated with decreased protein expression of PPARa. Oxpat, CD36, and FATP1, markers of fatty acid metabolism, when compared to DOX-treated WT mice, indicating a reduction of fatty acid uptake and subsequent utilization in the cardiomyocyte. Taken together, our data suggest that chronic reduction in myocardial TG content by cardiomyocyte-specific ATGL over-expression is able to prevent DOX-induced cardiac dysfunction.





Project Title: A Scalable Platform for Text Analytics Full Name: Tyler Sliwkanich, Douglas Schneider, Mitchell Home Faculty: Science Department: Computing Science Degree and Year of Study: BSc. Specialization 4th-year (Tyler), BSc. Honours 3rd-year (Doug) BSc. Specialization 2nd-year (Mitchell) Supervisor Name: Denilson Barbosa

Tyler: We present a custom built solution using off-the-shelf, open-source technologies to provide a scalable platform for users to search and analyze large text corpora. The back-end is built with the high performance, NoSQL database CouchDB, as well as Apache Lucene. CouchDB is a good choice for our work-flow as we perform offline batch insertions with extremely minimal updates once that data is in place. Furthermore, because we do not need to perform ad-hoc queries, we can forgo the flexibility that traditional SQL solutions provide and construct preconceived indices which can then be used to quickly query large amounts of denormalized data using the MapReduce paradigm. Additionally, Apache Lucene is used to index the data in CouchDB and provide us with the ability to perform full-text searches. This includes keyword searches, partial matches, and ranked results to name a few elements. The front-end is a web interface that anyone can access where they can perform both generic and faceted queries on any of of the available corpora, similar to searching on Google.

Doug: My work looked at developing visualizations for social and other interactive networks. I created a visual graph that would allow a user to explore networks of entities and relationships. The entities and relationships were gathered from web blogs, websites, and other sources with a Natural Language Processing (NLP) program that some of the PhD students were working on. The data is then loaded into a database to be served to the graph visualization. I am currently working with two databases in an attempt to find which one results in the greatest scalability. The first database, CouchDB, is designed to be much quicker at serving information to the user on the fly, however, it requires a large upfront cost to initially load data. On the other hand Relational Databases are designed to be quick to load data into, however, they are not as fast at serving data to the user when the user makes complicated queries.

Mitchell: My work involved using various scripts and tools to prepare data to be processed by the Natural Language Processing (NLP) program a PhD student had prepared. I worked with the Stanford Named Entity Recognition (NER) and Orlando, a collection of historical literary documents. My main task was to train a model by machine learning using the hand-annotated documents as examples of how I wanted the algorithm to annotate new data. This data was then processed with NLP techniques before being fed into the database. In addition, I was responsible for manipulating a large body of archived blog posts and comparing them with dumps from Freebase and Wikipedia.





Project Title: A study of symptom and quality of life outcomes following treatment in a tertiary care urogynecology clinic Full Name: Rebecca Visscher Faculty: Arts Department: Psychology Degree and Year of Study: Bachelor of Arts; Major in Psychology/Minor in Sociology/ Fourth Year Supervisor Name: Cathy Flood and Jane Schulz

Pelvic floor dysfunction is very prevalent in women. 50% of women over the age of 50 will experience pelvic floor dysfunction. There are multiple treatment modalities available. However, outcome data and impact of treatment on quality of life is not well studied. Our two year prospective cohort study aims to identify which of the treatment options used in a tertiary urogynecology clinic are effective in reducing pelvic floor symptoms, and the impact of these treatments on patients' quality of life.

## Methods:

Consecutive new patients in a tertiary care urogynecology clinic population were asked to complete a three-day bladder diary and four validated questionnaires in the summer of 2009. These questionnaires were: the SF-12 Health Survey, Vaizey Incontinence Score, and short forms of the Pelvic Floor Impact Questionnaire (PFIQ-S7) and the Pelvic Floor Distress Inventory (PFDI-S20). These questionnaires determine the extent of pelvic floor symptoms as well as urinary and anal incontinence concerns based on the impact to quality of life. In the summer months of 2010 and 2011, the same patients were asked to complete the three-day bladder diary and questionnaires again. Their pre-treatment and post-treatment results were compared to determine whether treatment had improved the scores on their questionnaires.

## Results:

At the time of the abstract deadline our results were still in review.

## Discussion:

The results of our study would have clinical implications regarding effectiveness of treatment options and the impact on quality of life. Outcomes from this study may impact regional pelvic floor management algorithms and resources.

Project Title: Acetyl coenzyme A carboxylase 2 knockout mice have an altered cardiac metabolism in ischemia-reperfusion





Full Name: Julia Jing-ou Tan Faculty: Science Department: Neuroscience (student), Pharmacology and Pediatrics (supervisor) Degree and Year of Study: Second Year Honors Neuroscience Supervisor Name: Gary D. Lopaschuk

Introduction: Ischemic heart disease (IHD) is the leading cause of death in North America. Defined as the restriction of blood and oxygen supply to the heart, myocardial ischemia induces heart failure. After ischemia, the heart's metabolic profile shifts to increased fatty acid oxidation (FAO) and decreased glucose oxidation. This change is detrimental. Therefore, optimizing cardiac metabolism is a possible treatment for IHD. One strategy is targeting acetyl coenzyme A carboxylase (ACC2), an enzyme that produces malonyl CoA, a FAO inhibitor. This project investigated the effects of knocking-out ACC2 on cardiac function and metabolism during ischemia-reperfusion.

Methods: 12-week old male ACC2KO mice were compared to wild-types (WT). Hearts were isolated and aerobically perfused (30 min) followed by global no-flow ischemia (18 min) and reperfusion (40 min). Oxidative metabolism was quantified with radioisotopes and functional parameters were measured during perfusion. Hearts were then biochemically analyzed.

Results: During the aerobic period, FAO was significantly increased in ACC2KO than WT, while glucose oxidation was decreased. Despite these changes, ACC2KO sustained less injury following ischemia. Malonyl CoA levels in ACC2KO and WT also remained similar whereas acetyl CoA increased in ACC2KO.

Discussion/Conclusion: The data suggest a compensatory mechanism, through converting acetyl CoA back to malonyl CoA by ACC isoform ACC1, may be responsible for the observed metabolic/functional profile. Further studies will investigate this potential compensation.

87.

Project Title: Oncostatin M receptor deficiency is associated with less mortality and attenuated multi-organ dysfunction in sepsis Full Name: Barbara Pedrycz Faculty: Science Department: N/A Degree and Year of Study: Biological Sciences Major, 4th year student Supervisor Name: Thomas Mueller

Patients with acute kidney injury, especially when associated with multi-organ dysfunction (MOD), have a high mortality rate, basically unchanged over the last 50 years. Inflammation is a key process in kidney injury and MOD. Previously, we have shown the crucial role of the II6-family cytokine Oncostatin M (Osm) and its receptor (Osmr) in the renal inflammatory response. Furthermore, our findings indicate that Osmr- deficient (-/-) mice are protected against distant organ injury. To further understand the role of Osmr in mediating inflammation and injury we induced sepsis in wild type (WT) and Osmr-/- mice by cecal ligation and puncture (CLP) as the





prototypic model of systemic inflammation and MOD. Kidneys, livers, hearts, lungs and blood were harvested 24 hours after CLP. Organ injury and function was assessed at the molecular level by real-time RT-PCR, at the tissue level by histopathology, and in circulating blood by immunoassays. Altogether 34 mice were studied with at least 5 mice per condition. The intensity of sepsis, as induced by increasing size of cecal puncture holes, was reflected by increased transcript levels of organ injury markers and Osmr in WT mice. CLP performed with 18 G needles resulted in a 40% mortality rate in the WT vs. 0% in Osmr-/- mice. WT compared to Osmr-/- mice had a worse kidney function (BUN of 150 vs. 41 mg/dl in WT vs Osmr-/-, p <0.0001), exhibited higher systemic II6 concentrations (101,700 vs. 22,000 pg/ml in WT vs. Osmr -/-), and showed higher tissue transcript levels of inflammation and injury as measured by II6 and Ngal (II6 of 28.3 vs. 5.5 % Hprt and Ngal of 3,115 vs. 1,416 % Hprt resp. in WT vs. Osmr-/-). Overall, our results indicate that Osmr is not only a novel biomarker of organ injury but also a potential therapeutic target to protect against MOD and improve outcomes in syndromes with systemic inflammation.

88.

Project Title: Novel effect of cellular retinoic acid binding proteins on proliferation in human malignant glioma Full Name: Shuai (Stone) Li Faculty: Faculty of Medicine and Dentistry Department: Department of Oncology Degree and Year of Study: Bachelor of Sciences General, Double Major in Biology and Chemistry, Third year Supervisor Name: Roseline Godbout

High grade astrocytomas (a.k.a malignant gliomas, MG) are the most common CNS malignancy. Despite aggressive treatment involving surgical resection, radiation therapy and chemotherapy, its highly invasive characteristics allow them to recur distal to the primary tumour site, giving patients with MG a very poor prognosis. Therefore, finding alternative therapeutic targets may prove beneficial for the treatment of these tumours.

Interestingly, retinoid treatment has shown promise in the treatment of promyelocytic leukemia. Upon further investigation, the major intracellular regulators of retinoic acid are cellular retinoic acid binding proteins 1 and 2 (CRABP1 and 2). CRABP1 sequesters retinoic acid (RA) in the cytoplasm while CRABP2 transports RA to the nucleus where it then interacts with nuclear hormone receptors and affects transcription of certain genes resulting in decreased proliferation of cells. From previous studies involving various tumour cells, it is hypothesized that CRABP1 sequesters RA in the cytoplasm of MG cells while CRABP2 at high concentrations of RA moves to the nucleus and facilitates activation of nuclear hormone receptors resulting in decreased proliferation.

Our results show that contrary to previous findings, CRABP1 and 2 may have novel functions in MG. CRABP1 appears to move into the cytoplasm in the presence of RA and cause decreased proliferation while CRABP2 sequesters the RA in the cytoplasm and opposes the effects of




CRABP1. Further understanding of the role of these proteins in malignant glioma (MG) may provide a foundation for novel approaches to the treatment of these cancers.

89.

Project Title: Histone deacetylase inhibition improves glucose regulation in prediabetic mice Full Name: Sarah Aziz Faculty: Science Department: Biological Sciences Degree and Year of Study: Bachelor of Science, Second year Supervisor Name: Jason Dyck

Diabetes is often associated with poor insulin signalling. Histone deacetylases (HDACs) affect signalling pathways in cells by removing acetyl groups from other proteins. HDAC inhibitors are currently under investigation as therapeutic agents for cancer, rheumatoid arthritis and cardiovascular and metabolic diseases.

This study investigates the potential of trichostatin A (TSA), an HDAC inhibitor, to improve insulin signalling and glucose regulation in a high-fat fed mouse model of obesity and insulin resistance. Mice were on high-fat diet (60% Kcal from fat) for 8 weeks before having either control or TSA injections (1mg/kg/day) for 10 days. These mice then underwent glucose or insulin tolerance tests. The extent of insulin sensitivity in these animals was also examined.

TSA treatment increased insulin and decreased glucose levels in mice fed with high-fat diet. Accordingly, TSA-treated mice had better glucose and insulin tolerance than control mice. Immunoblotting of liver homogenates showed that insulin signalling proteins such as IRS-1, Akt and GSK-3 $\beta$  were more phosphorylated in TSA-treated mice. Also, TSA-treated mouse liver samples had elevated Sirt3, a deacetylase with a role in insulin signalling.

We have shown that TSA ameliorates the metabolic abnormalities caused by a high-fat diet in mice, likely through improving insulin signalling in the liver. These data suggest that histone deacetylase inhibitors could cause a compensatory Sirt3 increase that enhances insulin sensitivity in obese mice. Overall, our data suggest that inhibiting HDACs may be useful in treating insulin resistance in prediabetes and lessening the metabolic complications of obesity.

90.

Project Title: An Agricultural awareness based video produced as part of the requirement of an introductory Animal Science class (video) Full Names: Andy Jaikaran, Natalie May, Jeff Douglas, Marie Eriksson, Cara Noble Faculty: Agriculture Department: Various Departments in Ales Degree and Year of Study: 3 and 4 Supervisor Name: Frank Robinson

This video was created as a project in our Animal Science 200 class in the Faculty of Agriculture in 2010. This class covers issues in Animal Agriculture and focuses on inquiry and





communication. Our video serves to demonstrate and educate why the sexing of poultry semen would be beneficial to the poultry industry and why it cannot be done. If the sex of a fertilized chicken egg could be determined before incubation the resulting energy savings by hatcheries could be reduced by fifty percent as only females lay eggs. Also, the reduced inputs of feed, water, energy and space would also constitute a large monetary savings because males would not hatch. Our video compares current chromosomal sexing methods in mammals with chickens and describes the problems with applying the same procedure in chickens. The heterozygous chromosomes of the hen and the homozygous chromosomes of the rooster are problematic in semen sexing. We cannot predetermine the sex of the chick by manipulating which chromosome the rooster contributes during fertilization. Through interviews with reproductive specialists, literature review, and speaking with industry leaders we have determined that although the benefit of sexing poultry semen would be significant it cannot be accomplished due to lack of technology in this field and prohibitive cost. We chose this format to communicate our findings as we hoped it would be understood easily by everyone and be useful in the classroom.

This is the link to our video on you tube. It is also available in DVD format.

http://www.youtube.com/watch?v=Llgu9mbFecl

91.

Project Title: Analysis of shifts in glacial soil microbes Full Name: Sina Kazemi Faculty: Science Department: Microbiology Degree and Year of Study: BSc. Biological Sciences, Yr5 Supervisor Name: Brian Lanoil

The Canadian arctic has experienced increasing temperatures in the twentieth century leading to a heightened rate of glacial retreat. Microbes are critical for the soil development and nutrient dynamics in glacial systems, as they are the primary colonizers of these soils and play a role in geochemical weathering and nutrient cycling beneath the glacier. These activities have strong implications for vegetation colonization, development, and succession. We hypothesized that the initial subglacial conditions will have no effect on the final composition of the microbial community; thus, we predict that there will be a convergence of microbial communities to a single community over increasing distance from a glacial terminus. To test this hypothesis, we have focused on two glacial valleys in the Yukon Ice Field Ranges. Sampling of glacial foreland soils was carried out in May and July 2011. Samples were collected at 0.5 km intervals, 50 m from the center of the valley, from the Duke Glacier terminus to the visually observable grassland, spanning a total distance of 3.3km. A similar set of samples covering ~2.2 km of glacial foreland were collected from the Trapridge Glacier. We are utilizing culture-independent molecular techniques to determine the composition of microbial communities along the glacial foreland. We will use UniFrac to compute differences between microbial communities based on phylogenetic information; if our hypothesis holds, UniFrac distances will decrease with





increasing distance from each glacier terminus. I will report on my progress with this ongoing project.

92.

Project Title: Screening candidate genes for the pathogenesis of idiopathic hypercalciuria in a pediatric cohort. Full Name: Emma Heydari Faculty: Medicine Degree and Year of Study: MD Class of 2013 Supervisor Name: Todd Alexander and Catherine Morgan Department: Pediatric Nephrology

Idiopathic hypercalciuria (IH) is defined as an increase in urinary calcium (Ca<sup>2+</sup>) excretion without a known cause. Clinical consequences include hematuria, kidney stones, and osteoporosis. These are common problems with significant morbidity and economic impact. Approximately 50% of affected individuals have a first-degree relative with hypercalciuria, indicating a strong genetic component of the disease. The proximal tubule of the kidney has been implicated in the pathogenesis of this disease. Claudins are a family of tight junction proteins that regulate the flow of water and ions across various epithelia in the body. Claudin-2 and claudin-12 are expressed in the proximal tubule of the kidney, are preferentially cation permeable, and are necessary for intestinal Ca<sup>2+</sup> absorption. Moreover, claudin-2 knockout mice have hypercalciuria. We propose that claudin-2 and claudin-12 are dysfunctional in individuals with idiopathic hypercalciuria. A cohort of 20 children with idiopathic hypercalciuria (Ca:Cr ratio >0.56) was collected. The M:F ratio was about 2:1, the median age of onset was 4±4 years, and the median urine Ca:Cr ratio was 0.94±1.02. The most common presenting complaint was hematuria and 77% of children had a family history of nephrolithiasis. 1,25-dihydroxy vitamin  $D_3$ which was significantly elevated in 57% of children in whom activated vitamin  $D_3$  was measured, despite the fact that less than 22% were ever on any supplementation. Other hormones involved in calcium homeostasis were not altered. Thus far, sequence analysis of 8 children has not identified an alteration in the genes for CLDN2 or CLDN12. We will use this cohort to continue to explore potential causes of idiopathic hypercalciuria.

93.

Project Title: Effect of Luminal Factors from Intestinal Inflammation on Colonic Epithelial Cells Full Name: Joanna Couch Faculty: Science Department: Biology Degree and Year of Study: 4 Supervisor Name: Eytan Wine

Introduction: The intestinal luminal environment impacts homeostasis and imbalances may play a role in inflammatory bowel disease (IBD). We hypothesized that luminal factors from inflamed mouse intestinal samples would induce various inflammatory responses.





Methods: lleum, cecum, and distal colon samples from control and inflamed mouse intestines were homogenized and centrifuged to extract supernatants. Colonic epithelial cells were incubated with the supernatants. Cell resistance was measured to determine the supernatant's effects on permeability. Proinflammatory cytokine expression was quantitatively measured by mRNA expression levels. A protein ( $I\kappa B\alpha$ ) in the signalling pathway of inflammation was also quantitatively measured.

Results: No change in cell resistance was observed when human colonic cells were incubated with distal colon samples. Colonic cells incubated with  $25\mu$ g ileum supernatant showed a significant decrease in the mRNA expression of proinflammatory cytokines interleukin (IL)-8 and tumor necrosis factor (TNF)- $\alpha$ , but no decrease was found for IL-6. No effect was found on IL-8 or TNF- $\alpha$  expression at higher concentrations of ileum supernatant or at various concentrations of distal colon and cecum samples. Protein expression indicates no significant change in IkB $\alpha$  in human colonic cells incubated with the distal colon supernatants.

Conclusions: Cell resistance, mRNA cytokine expression and protein expression suggest no significant change in inflammatory response in colonic epithelial cells incubated with luminal factors from inflamed mouse intestinal supernatants. This suggests that the luminal factors do not induce inflammation responses. The observed decrease in IL-8 and TNF- $\alpha$  expression with 25µg of ileum supernatant requires additional time trials and concentrations to be tested.

94.

Project Title: A Bite into the Media's Image of Nursing in an Apocalyptic World Full Name: Sherrylynn Kerr Faculty: Faculty of Nursing Degree and Year of Study: After Degree in Nursing. Year 2/2. (First degree: BA, major in psychology) Supervisor Name: None

The aim of this exploratory paper is to describe the image and role of the nurse as portrayed in popular media. The public portrayal of the nurse is compared and contrasted with that found in professional publications. The image and role of the nurse is described based on the film Dawn of the Dead. Critical thinking skills, ethics and values in the profession of nursing according to the Canadian Nurses Association (CNA), the autonomous role of nursing, and the image of nursing within specific contexts are investigated. Challenges facing the nursing profession within popular media exist, though a trend towards increasing positive images of the nurse continues to evolve.





Project Title: The effect of fungal infection and drought on pine defense against fungi vectored by Mountain Pine Beetle Full Name: Charles Copeland Faculty: Science Department: Biological sciences Degree and Year of Study: B.Sc Honours – Plant biology; 5<sup>th</sup> year Supervisor Name: Janice Cooke

Dendroctonus ponderosae, or mountain pine beetle (MPB), has caused severe damage to lodgepole pine (Pinus contorta) forests in British Columbia, and has recently been reported in jack pine ((P. banksiana) in Alberta. As the beetles burrow into the bark of the trees, they inoculate them with symbiotic fungi. In response, pine trees produce defensive compounds such as terpenoids. However, periods of drought may disrupt photosynthesis and reduce carbon available for synthesis of these compounds. The goal of this project is to determine whether water deficit affects the defense capacity of lodgepole and jack pine differently when the trees are confronted with Grosmannia clavigera, a fungal species carried by MPB. Seedlings and mature trees of both species were inoculated with G. clavigera, and their photosynthetic ability was measured at later time points. Water deficit conditions reduced the photosynthetic rate of the seedlings, especially jack pine, while photosynthesis of the mature trees was not affected by water deficit or fungal treatments. As well, the lesions caused by fungal growth in the stem were measured to determine the extent of fungal colonization in the tree. Water deficit resulted in shorter lesions. Finally, tissue samples were collected and gRT-PCR was used to examine the transcript abundance of defense-related genes. There was a trend towards higher expression of β-farnesene synthase under water deficit conditions. Therefore, decreased water availability may cause trees to utilize different defense mechanisms than under well watered conditions.

96.

Project Title: Multi-Component Reactions Catalyzed by Iodine and Water for the Synthesis of Quinoline Derivatives Full Name: Xi Wang Faculty: Science Department: Chemistry Degree and Year of Study: undergraduate-fourth year Supervisor Name: Jeff. M. Stryker

Wang et al, developed an improvement to the Kozlov reaction with iodine as a catalyst under anhydrous condition for the synthesis of benzo[f]quinoline molecules. However the method failed when we tried to used 2-aminoanthracene and 2-amino naphthalene as starting amines. Based on the fact that imine formation requires acid catalysis, our initial thought was to add adequate amount of acid into the reaction system to maximize the amount of imine formed in the first step and at best not to suppress the subsequent cyclo-condensation. To our delight, the reaction works well when small amount of water was added into the system.





Project Title: AP2δ induces axonal genesis through transcriptional regulation of ST8Sia2 and ST8Sia5 Full Name: Amit Rahul Lutchme Persad Faculty: Science Department: Oncology Degree and Year of Study: BSc Honours (Biochemistry), Second Year Supervisor Name: Roseline Godbout

AP2δ was misexpressed in developing chick retina by in ovo electroporation of retroviral expression constructs. Formation of bundles of axons characterized by expression of polysialylated neural cell adhesion molecule (PSA-NCAM) was induced upon AP2δ misexpression. To test the hypothesis that members of the ST8Sia family of sialyltransferases are involved in sialylation of AP2δ-induced ectopic axonal bundles, we examined the temporal expression of all six sialyltransferases by RT-PCR and Western immunoblotting. The subcellular localization of sialyltransferases was examined by in situ hybridization and immunofluorescence. Two sialyltransferases were selected for further study based on correlation with PSA-NCAM expression. Our results suggest that ST8Sia2 and ST8Sia5 play an important role in the production of highly polysialylated NCAM. We propose a model whereby induction of ST8Sia2 and ST8Sia5 by AP2δ induces the production of PSA resulting in highly polysialylated NCAM, which promotes axonal outgrowth and migration. Furthermore, the PLCγ and PI-3K growth pathways were induced upon AP2δ misexpression, likely due to PSA-induced FGFR activity.

98.

Project Title: Photosynthetic efficiency as quantified by the photochemical reflectance index Full Name: Tiffany Riddle Faculty: Science Department: Earth and Atmospheric Science Degree and Year of Study: Bachelor of Science, in 4th year Supervisor Name: Arturo Sanchez-Azofeifa

The photochemical reflectance index (PRI) as presented by Gamon (1992) was examined as a narrow-band indicator during May of 2005 in Fort Sherman and the Metropolitan Natural Park in Panama. This index reveals the epoxidation of xanthophyll cycle leaf pigments at 531 nm, which indicates declining photosynthesis light use efficiency in exchange for radiation protection. This study observed 22 species representing two structural groups: trees and lianas; measuring reflectance with a handheld reflectometer in the field.

Average PRI (Figure 1) for liana species was -0.00139  $\pm$  0.00723; whereas mean PRI for tree species was -0.000324  $\pm$  0.00457. There was no significant difference between these values (F77=0.595, p=0.443). The maximum average  $\Delta$ PRI (Figure 2) for lianas was -0.348 and was -0.0288 for tree species; which were found to be significantly different (F77=15.24, p=0.000203). The inverse relationship between photosynthetic efficiency and leaf protection is displayed in a negative exponential nature. Differing photosynthetic rates can be seen clearly between and within the species of lianas and trees, indicating the degree of protection individual species (and different structural groups) must invest in. Species with a small  $\Delta$ PRI do not invest as much





energy in protection as species with a large  $\Delta PRI$ , and therefore must be more resilient to damage under excessive radiation exposure.

99.

Project Title: New technologies for peripheral intravenous cannulation in children and adults: Systematic review and meta-analysis of controlled trials Full Name: Zachary John Fritze Faculty: Science Department: Biological Sciences Degree and Year of Study: Bachelor of Science, currently in second year of study Supervisor Name: Sarah Curtis

INTRODUCTION: Peripheral intravenous placement (PIVP) is one of the most frequently performed medical procedures. It can be technically difficult for health care workers and painful for patients. Our objective was to identify and evaluate novel technology for improving PIVP.

METHODS: We searched for published and unpublished studies using five medical online databases, ClinicalTrials.gov, and Google.ca. Two blinded reviewers included studies for metaanalysis if they had a randomized or quasi- randomized design, evaluated a method or device designed to improve PIVP, and reported on one of four primary outcome measures: success or failure of PIVP, number of attempts to successful placement, time from study enrollment or IV order to successful placement, and procedure time. Relevant articles that did not meet the eligibility criteria for meta-analysis were included for qualitative synthesis. Two blinded reviewers applied a data extraction form to the included studies. We assessed study quality using the Jadad scale and the Cochrane Risk of Bias Tool. Data were combined with mean differences or relative risk ratios with 95% confidence intervals.

RESULTS & CONCLUSIONS: 17 studies were included for meta-analysis and 249 were included for qualitative description. Seven of the studies included for meta-analysis had a high risk of bias, six had a low risk of bias, and four had an unclear risk of bias. Twelve technologies were identified. Trials of the use of a bedside-ultrasound, a transilluminator, a local warming mitt and a pressure-sensing device look promising. More high quality trials are needed before any recommendations can be made.

100.

Project Title: The Putative Regulation of β-catenin O-GlcNAcylation by the Wnt and Pl3K Pathways Full Name: Yu Hao (Danny) Huang Faculty: Science Department: Pediatrics Degree and Year of Study: Bachelor of Science: Biological Sciences General— 1st Year Supervisor Name: Jacqueline Ha

When a cell is unable to control protein production, there is rapid unrestricted cell division which can ultimately lead to cancer. Cell growth is largely regulated by DNA, the instructions for protein production. Beta-catenin ( $\beta$ -cat) is a protein that binds to DNA and signals DNA to produce protein.  $\beta$ -cat levels are found to be high in many adult and pediatrics cancers. We





have discovered that sugar molecules,  $\beta$ -N-acetyl-glucosamine (O-GlcNAc) attach to  $\beta$ -cat and prevented  $\beta$ -cat from adhering to DNA. Likewise, we have also reported that in some cancer cells, minimal sugar molecules are attached to  $\beta$ - cat. The ability of  $\beta$ -cat to link to DNA is dependent on a signal given to the cells by a protein called Wnt. In addition, a molecule called PI3K can also provide the same signal. However, how these two signals are involved in the attachment of O-GlcNAc on  $\beta$ -cat is presently unknown. We propose that these signals interact together to regulate this sugar modification on  $\beta$ -cat and ultimately affect the position of  $\beta$ -cat relative to DNA.

101.

Project Title: Physiological and Psychological Measures of Fatigue in Varsity Swimmers Full Name: William Lampe Faculty: Physical Education and Recreation Department: N/A Degree and Year of Study: MSc, Exercise Physiology and Biochemistry; 1<sup>st</sup> year Supervisor Name: Michael Kennedy

Fatigue measures sensitive to training volume change are crucial in preventing chronic fatigue and overtraining syndrome.

PURPOSE: Determine physiological and psychological markers of fatigue sensitive to changes in training volume during a varsity swim season. We hypothesized that measures of fatigue would improve with reduced training volume.

METHODS: Weekly evaluation (10 female, 19 male varsity swimmers) included an orthostatic tolerance test (OTT; 5 min lying, 3 min standing to measure heart rate response (HR)), self-reported form, feeling, energy level (EL), and 3 night sleep average. Training volume was determined for 3 intensive (Build 1,2,3) and 2 reduced (Taper 1,2) training periods. OTT measures were: SUPINE (4-5 min lying heart rate (HR)), HR15 (HR at 15 sec after standing), HRPEAK (peak HR during first 30 seconds of standing), STAND (HR from 6:30 – 7 min), DP (HRPEAK – STAND) and DP15 (HR15 – STAND).

RESULTS: There was a main effect (p < 0.05) for all measures of OTT except DP. Highest training volume (Build 2 and 3) corresponded with lowest STAND, PEAK, and DP15. SUPINE was lowest during Build 2. Form, feeling, EL, and sleep were greatest during taper phases (p < 0.05). Post hoc analysis revealed positive correlations between EL and both form and feeling.

IMPLICATIONS: Findings suggest that measures are useful markers of fatigue in swimmers and thus modification of training volume is reasonable. However coaches and sport scientists may want to focus on physiological changes during periods of high volume and psychological measures during taper phases to modify training volume.





Project Title: PAX3 Expression and Regulation in Melanoma Full Name: Zachary Tan Faculty: Medicine and Dentistry Department: Medicine Degree and Year of Study: Doctor of Medicine, Third Year Supervisor Name: Alan Underhill

The transcription factor PAX3 is critical for development of neural crest lineages including melanocytes. In addition, PAX3 is expressed throughout melanoma progression, from benign nevi to metastatic disease. Nevertheless, little is known about how PAX3 carries out these diverse roles. PAX3 is reported to be phosphorylated by Glycogen Synthase Kinase 38  $(GSK3\beta)$ . In the present study, the potential role of this kinase in modulating PAX3 activity in B16F10 melanoma cells was examined using chemical inhibitors. Fluorescence Activated Cell Sorting (FACS) was used to assess cell cycle distribution and PAX3 levels were monitored by immunoblotting. Treatment of cells with the GSK3ß inhibitors lithium chloride (LiCl) and BIO caused decreased cell proliferation (P<0.05) and G2/M accumulation (P<0.05), and was associated with increased PAX3 expression (P≤0.05). In contrast, knockdown of PAX3 using siRNA resulted in G1 accumulation (P≤0.001). Immunofluorescence techniques for exogenous Bromodeoxyuridine (BrdU) incorporation and endogenous Phosphoserine 10 Histone 3 (PS10H3) allowed for direct microscopic visualization and quantification of cells in S and G2/M phase respectively. Upon PAX3 knockdown, there was significantly less BrdU incorporation and PS10H3 staining (P≤0.05). Lastly, cell motility assays were conducted using live-cell Differential Interference Contrast (DIC) microscopy and analyzed using T-Scratch software. Interestingly, inhibition of GSK3β as well as PAX3 knockdown was associated with markedly decreased cellular motility and proliferation. These investigations identify GSK3β and as an important modulator of PAX3 levels in melanoma cells, and also suggest broader roles for PAX3 in regulating the G1 to S-phase transition in melanoma.

103.

Project Title: Manipulating Instructions Strategically Affects Reliance on the Ventral-Lexical Reading Stream Full Name: Anwer Zohaib Siddiqi Faculty: Rehabilitation Medicine Department: Speech and Language Pathology Degree and Year of Study: Honors Neuroscience 3<sup>rd</sup> Year Supervisor Name: Jacqueline Cummine

Much research has provided evidence for a dual-stream model of speech processing. The ventral stream has been shown to be sensitive to familiar words (e.g., cat, more) whereas the dorsal stream is particularly active for unfamiliar words (e.g., wat, nore). To date, no study has shown whether reading instructions can modulate use of the ventral-lexical stream. Using lists of words comprised of regular words (REGs, e.g., gave), exception words (EXCs, e.g., have) and nonwords (e.g., tave), we instructed participants (N=20) to name all of the letter strings or





name only the words. The blood-oxygenation-level dependent response and online reaction times (RTs) were analyzed. Results showed that there was more activation in participants' ventral streams in the name only words condition, relative to the name all condition. This work supports the notion that the ventral stream is involved in lexically-based reading (whole word processing) and provides a clear demonstration that the contribution of this system can be modulated given task demands.

104.

Project Title: Evanescent Field Scattering as a New Sensitive Detection Method for Atomic Force Microscopy Full Name: Bradley Hauer Faculty: Science Department: Physics Degree and Year of Study: Honors Physics – Year 4 Supervisor Name: John Davis

This experiment focuses on developing a new sensitive method to detect the displacements of micro/nano-mechanical devices, which are of particular interest in applications such as atomic resolution mass sensing, prion protein detection, nanomechanical electrometers and single spin detection. For this method, a micro/nanomechanical device is brought close to a tapered fiber (~1 $\mu$ m away) to interact with its evanescent field. Due to the motion of the device, some of this field will be scattered by the high index material of the device. By observing variations in transmission through the fiber due to this effect, it is possible to detect the motion of the device. Detection sensitivity can also be enhanced by first coupling into a whispering gallery mode (WGM) optical microresonator. The final goal of this experiment is to combine these two phenomena, to produce a new method for sensitive atomic force microscopy (AFM).

105.

Project Title: Effect of Naphthenic Acids on the Microbial Community Full Name: Bennett Lambert Faculty: Engineering Department: Civil Degree and Year of Study: Bsc Civil and Environmental Engineering Supervisor Name: Ania Ulrich

Naphthenic acids are one of many toxic compounds present in oil sands tailings pond water. They are extremely toxic to aquatic organisms and remain in the liquid phase. Naphthenic acids are degraded aerobically, but so far the bacterial species responsible has not been identified. In order to isolate the effect of naphthenic acids on the diversity of the microbial community, samples of oil sands process-affected water were taken fromSuncor's south tailings pond. The samples were subjected to selective enrichment using naphthenic acids as the sole carbon source. Denatured gel gradient electrophoresis was then performed on the samples and the effect of naphthenic acids was evaluated. Several bacterial species that are known to degrade organic pollutants were identified by sequencing rpoB gene fragments, including Ralstonia sp.,





which is known to be a very versatile microorganism that can withstand adverse conditions . During the experiment there was a large amount of biomass within the flasks containing naphthenic acids. This is very promising as it may be a starting point in the development of a bacterial treatment product for oil sands process affected water. Further research into the mechanism of degradation and effectiveness of the identified microorganisms in degrading naphthenic acids is needed.

106.

Project Title: INDICATIONS AND OUTCOMES IN CHILDREN RECEIVING RENAL REPLACEMENT THERAPY IN A CANADIAN PICU Full Name: Erin Boschee Faculty: Medicine & Dentistry Department: Medicine Degree and Year of Study: MD Program, Class of 2014 (2<sup>nd</sup> Year) Supervisor Name: Lindsay Ryerson and Dominic Cave

We performed a retrospective chart review on all patients receiving RRT between 2004 and 2008 at Stollery Children's Hospital, Edmonton, Canada. Data was collected on patient demographics, PRISM score, pRIFLE criteria, indications for initiating RRT, RRT modality, length of stay and mortality.

97 patients had RRT initiated in PICU. 40/97 were post cardiac surgery, 9/97 were admitted with sepsis, 7/97 post cardiac arrest and 5/97 post liver transplant. At the time of RRT initiation, 29/97 were on extracorporal life support and 63.9% had renal failure by pRIFLE score. The most common cause of AKI was hemodynamic instability 52.6%, followed by multi-organ dysfunction syndrome (MODS) 15.5%. The most common indication for RRT initiation was fluid overload (56.7%) with a median percent fluid overload of 12.1% (IQR 3.5-22.3%) with a median urea of 14.9mmol/L (IQR 8.3-27.7mmol/L). Median RRT duration was 6 days (IQR 3-15) and 28-day mortality was 9.3%. 75.3% of patients survived to hospital discharge. 6.2% of patients required dialysis at the time of hospital discharge.

Hemodynamic instability and MODS are the most significant causes of AKI in the PICU population. The paucity of conventional indications of acid base, electrolyte disturbance or uremia in the presence of significant renal dysfunction by pRIFLE score suggests that renal dysfunction is being recognized early and managed aggressively. In the population studied, the mortality was lower than previously reported in children and much lower than in the adult population. The use of RRT was associated with a renal recovery greater than 90%.





Project Title: Clinical Feasibility and Acceptability of Intermittent Electrical Stimulation in an Extended Care Facility. Full Name: Lisa Kawasaki Faculty: Science Department: Pharmacology Degree and Year of Study: B.Sc. 2<sup>nd</sup> year Supervisor Name: K. Ming Chan

Pressure ulcer is a serious medical issue with a \$3.5 billion health care cost in Canada annually. It affects quality of life and increases caregiver's burden. Our team introduced a novel active intervention named Smart-E-Pants, which delivers intermittent electrical stimulation every 10 minutes for 10 seconds to relieve pressure, increase tissue oxygenation, and possibly strengthen muscle. This study looks at the feasibility of implementing such a system in an extended care facility by evaluating caregiver's demands, participant feedback and skin reaction. Participants with intact cognition, BMI < 32 and reasonable skin condition were chosen but these criteria limited recruitment. Even when recruited, 4 out of the 8 participants terminated prematurely due to other coexisting medical conditions. A trained caregiver on average takes 27.6 minutes to don and doff system, which is more time-efficient than other interventions such as turning a patient every 2 hours. Ease of position and finding contractions is moderate to easy. There were 2 incidences of skin tears due to electrode edge and Micropore<sup>™</sup> tape. Mepitac® wound tape is now being used for its waterproof but breathable property. Participant feedback was generally positive, reporting no irritability, distraction, discomfort, or cumbersomeness. From these results, Smart-E-Pants in an extended care facility is feasible as long as medical issues do not interfere with donning and doffing system. Allen Gray provided a valuable learning experience. The feedbacks provided led to refinement of the system which is an important step for commercial deployment to other long-term care facilities around the world.

108.

Project Title: The Effectiveness of Team Based Learning on Learning Outcomes in Health Professions Education: A Best Evidence in Medical Education (BEME) Systematic Review Full Name: Mim S. Fatmi Faculty: Science Department: Biological Sciences Degree and Year of Study: General Sciences, 4<sup>th</sup> year Supervisor Name: Anna Oswald

Methods: A systematic review protocol was developed and prospectively registered with the international Best Evidence in Medical Education (BEME) organization after peer review. A comprehensive literature search was conducted; full text articles were screened and included studies were assessed for methodological quality. Only studies evaluating TBL with a valid comparator in a health professions setting were included. Qualitative synthesis included a description of studies by outcomes according to a modified Kirkpatrick model.





Results: Three hundred thirty titles were screened; 13 studies assessing trainees at the undergraduate level and one study at the postgraduate level were included. All studies reported knowledge as a learning outcome; 7 reported a significant increase in scores for the TBL group ( $p \le 0.05$ ), 4 reported no statistically significant difference, and 3 studies showed improvement but did not comment on significance. Seven studies also reported controlled learner reaction scores as an outcome, of which only two reported significant differences ( $p \le 0.05$ ), one favouring TBL and the other favouring the comparator.

Conclusions: This review demonstrates predominantly positive findings for the effects of TBL on knowledge outcomes in health professions education. Despite improvement in knowledge scores, learner reaction was both positive and negative. This may reflect the increased demands on learners in this student-centred teaching strategy, although further study is needed.

109.

Project Title: Isothermal Self-Replication of DNA using Destabilizing Probes Full Name: Catherine (Katie) Mitran Faculty: Science Department: Chemistry Degree and Year of Study: BSc Honors in Chemistry – 4<sup>th</sup> year Supervisor Name: Julianne Gibbs-Davis

One of the greatest challenges facing the analysis of DNA, is that the target strand must first be amplified in order to create a signal large enough for most instruments to detect. There are a number of techniques, such as PCR, that accomplish this using temperature cycling. The temperature differences are needed because once the target strand has been used as a template, the newly formed complementary strand remains bound until the temperature is increased. However, these techniques require expensive equipment and temperature stable enzymes, as the temperature in PCR often reaches 95 °C, thus making it an impossible technique for point of care diagnostics. We have developed a system of amplification that allows for turnover numbers of greater than 4000 to be obtained at a single temperature, often close to room temperature. This system incorporates an abasic site, which acts as a destabilizing group, into one of the probes that gets ligated to form the complimentary strand. This destabilizing group then causes the product to dissociate from the target, without an increase in temperature. It was also found that this system could be used to detect a single base substitution, as the enzyme would not tolerate a single base mismatch at the ligation site. However, if the single base mismatch was in the probe, at a location other than the ligation site, it could also act as a destabilizing group. Thus, combining different types of destabilizing groups, such as a mismatch in one probe and an abasic site in the other, allowed for the rate of ligation to be increased and the sensitivity of the system to be tuned.





Project Title: Etiology of Hydrocephalus as a Predictor of Shunt Revision in the Pediatric Population Full Name: Mitchell P. Wilson Faculty: Medicine and Dentistry Department: Medicine Degree and Year of Study: MD, Second Year Supervisor Name: Jeff Pugh

Hydrocephalus is responsible for 50% of admissions to pediatric neurosurgery in Edmonton with cerebrospinal shunt insertions used as the most common surgical management for this condition. However, limited research has been published on revision rates based on etiology, though multiple shunt revisions are often required. We performed a retrospective chart review of all pediatric neurosurgery patients with hydrocephalus at a tertiary care center from 1994 – 2011 to assess operative risk factors for cerebrospinal shunt failure. A total of 232 charts were reviewed with 142 (61%) requiring a shunt insertion for their management. Of these, 78 (55%) have required at least one shunt revision with 66 (46%) requiring two or more revisions. Preliminary analysis suggests germinal matrix intra-ventricular hemorrhages (pre-term) may require a greater number of shunt revisions than hemorrhages in full term children. Neoplasms appear to require less shunt insertions compared to all other frequent causes. Upon completion, this study will assess potential correlations of hydrocephalus etiology and number of revisions necessary. Results have the potential to alter and individualize first line surgical management of hydrocephalus in pediatric patients based on etiology.

111.

Project Title: Links among obesity, inflammation and fatigue in individuals with cancer Full Name: Victoria Olszak Faculty: Nursing Department: N/A Degree and Year of Study: Supervisor: Catherine Field

Background: There is evidence linking obesity and excess fat to an increased inflammatory state. Fatigue is an established consequence of inflammation. Cancer patients report high fatigue, but links between obesity, inflammation and fatigue have not been studied in this population. The purpose of this study was to explore links among obesity, inflammation, and fatigue cancer patients undergoing chemotherapy.

Research questions:

- 1. Do immune function, body mass index (BMI), body composition and fatigue change during treatment in individuals with Non-Hodgkin's Lymphoma, Lung Cancer and Colorectal Cancer?
- 2. Do immune function, BMI, body composition and fatigue vary by cancer diagnosis?





3. Do individuals with a high BMI (25.00 or greater) pre-treatment exhibit higher immune response and fatigue during therapy when compared to individuals with a normal BMI (<25.00)?

Methods: The sample was comprised of 16 individuals (n=5 Non-Hodgkin's Lymphoma, n=5 Lung Cancer, n=6 colorectal cancer) with data collected at three time points (pre/early treatment, mid-treatment, one month post treatment). Data were collected using questionnaires, blood samples, and dual energy x-ray scans. Data were analyzed using descriptively and using non-parametric tests, given the small sample size.

Conclusions: Immune function declined over time (p<0.05). Weight and BMI declined in men (p<0.01) but not in women, and fatigue increased from mid-treatment to post-treatment (p<0.05). Changes in immune function, BMI, body composition, and fatigue were independent of diagnosis. Individuals with a high BMI pre-treatment had higher immune response and fatigue during treatment than did individuals with a normal BMI (p<0.05).

112.

Project Title: Geochemical Study of the Duck Creek Formation (Western Australia): Implications for Mesoproterozoic marine evolution (cannot attend poster competition) Full Name: Megan Paranich Faculty: Science Department: Earth and Atmospheric Sciences Degree and Year of Study: Honors Geology, Second Year Supervisor Name: Kurt Konhauser, Ernesto Pecoits, Natalie Aubet

One of the most dramatic changes in Earth's history is the shift from a reducing to an oxidizing atmosphere. Geochemical evidence indicate that during the early Precambrian (>2,300 Myrago) oceans were largely anoxic, with abundant Fe<sup>2+</sup>, and that deep oceans were not oxidized until 1,800 Myr. At that time, the oxygenation of the deep oceans is in turn thought to have led to the oxidation of dissolved iron, thus ending the deposition of laterally extensive Fe-rich deposits (banded iron formations or 'BIF'). An alternative interpretation suggests that the increasing atmospheric oxygen levels enhanced sulfide weathering on land and the flux of sulfate to the oceans resulting in Fe<sup>2+</sup> removal in the form of pyrite (iron sulfide) tying up the iron and ceasing BIF deposition. Although both scenarios provide a possible explanation for the cessation of BIF deposits, they may have differently influenced the availability of biologically important trace metals as a result of large differences in the solubility of metal-complexes under ferruginous and sulfidic conditions. Here we investigate the ca. 1,800 Myr Duck Creek Formation, Western Australia, which preserves 1000m of carbonates and BIF deposited during the final stages of the main global period of BIF. Crucially, the biosphere at that time is also recorded in these rocks by the occurrence of stromatolites and cyanobacterial communities. Therefore, this assemblage of rocks provides an unparalleled opportunity to examine the conditions surrounding the disappearance of BIF and the availability of bioessential trace elements during a critical window for the evolution of life.





Project Title: Development of a database to analyze sugar intake in pregnant women Full Name: Stephanie Babwik Faculty: Agriculture life and environmental sciences Department: Nutrition and food science Degree and Year of Study: Nutrition and food science – 4<sup>th</sup> year Supervisor Name: Rhonda Bell

The Sweet Moms Study is designed to learn how sugar intake during pregnancy may affect the health of moms and their babies. The purpose of this project was to create a database that included total sugar and mono- and disaccharide content of foods and to document the process of creating this database so that it can be kept updated for this and future studies.

Foods selected for this database were those that are found in the diet history questionnaire developed for pregnant women. For each food, the amount of total sugar (g) was determined from one of 3 different databases (CNF, USDA, NCIS). For foods that appeared in more than one of these databases, an average value was calculated to get a more representative value of the amount of sugar present. For foods of mixed composition (ex. muffins) that were not found in any of the databases, recipes were developed and analyzed to calculate the amount of sugar present.

Typically the databases accessed provided information about total sugar, free fructose (FR), glucose and galactose but did not provide information about total FR, glucose or galactose (i.e. free FR or glucose does not include that bound in sucrose or other disaccharides). Total FR was calculated as  $0.5 \times \text{sucrose}(\text{g})$  and was added to free FR. Total glucose was calculated as  $(0.5 \times \text{sucrose}(\text{g})) + (0.5 \times \text{lactose}(\text{g})) + (1.0 \times \text{maltose}(\text{g})) + \text{free glucose}$ . Total galactose was calculated as  $0.5 \times \text{sucrose}(\text{g}) + \text{free galactose}$ .

Foods that had the highest content of added FR and glucose (per 100 g) were: chocolate, chocolate bars, and cookies. Fruit is a source of naturally occurring FR and glucose. Those with the highest FR content (per 100 g) were raisins, prunes, and mango; those with lowest FR content were blackberries, raspberries, and strawberries.

Dietary analysis with our updated database will allow us to assess the sugar intake of the pregnant women in the Sweet Moms study.





Project Title: A 2.15 Hour Orbital Period for the Low Mass X-Ray Binary XB 1832-330 in the Globular Cluster NGC 6652 Full Name: Megan C. Engel Faculty: Science Department: Physics Degree and Year of Study: Honours Astrophysics, 5<sup>th</sup> year Supervisor Name: Craig Heinke

We present a candidate orbital period for the low mass X-ray binary XB 1832-330 in the globular cluster NGC 6652 using a 6.5 hour Gemini South observation of the optical counterpart of the system. Light curves in g' and r' for two LMXBs in the cluster, sources A and B in previous literature, were extracted and analyzed for periodicity using the ISIS image subtraction package. A clear sinusoidal modulation is evident in both of A's curves, of amplitude ~0.11 magnitudes in g' and ~0.065 magnitudes in r', while B's curves exhibit rapid flickering, of amplitude ~1 magnitude in g' and ~0.5 magnitudes in r'. A Lomb-Scargle test revealed a 2.15 hour periodic variation in the magnitude of A with a false alarm probability less than 10<sup>-11</sup> and no significant periodicity in the light curve for B. Though it is possible saturated stars in the vicinity of our sources partially contaminated our signal, the identification of A's binary period is nonetheless robust.

115.

Project Title: IN VITRO TRANSCRIPTIONAL ANALYSIS OF VACCINIA VIRUS REPLICATION PROTEINS Full Name: Sydney Patricia Rudko Faculty: Science Department: Biological Sciences Degree and Year of Study: Honors Microbiology, 3<sup>rd</sup> year. Supervisor Name: David Evans

Despite having been studied for almost 30 years, the concerted mechanism behind DNA replication in vaccinia virus is currently unknown. While the proteins involved in the replication complex are known, the order in which they come together and act to carry out replication is unknown, and all we can assume is based on the general characterizations of these proteins. A20 binds D4, a uracil glycosylase, to form a processivity factor for the E9 DNA polymerase. As well as D5, an ATPase and putative helicase, and H5, a scaffold protein for the replication complex. However, these proteins do not express in traditional systems (E.coli, yeast), and therefore it is difficult to study their precise function and interactions. Using the The proteins were expressed in vitro from a pF3 WG (BYDV) Flexi® Plasmid Vector in a To verify expression, we used FluoroTectTM GreenLys, a charged lysine TRNA labelled with a BODIPY®-FL fluorophore which was incorporated into the proteins during translation. The labelled proteins were visualized with a fluorescence imager. We then utilized a uracil DNA glycosylase assay and showed that D4 was functionally active. In future work, we will assay for





the known functions of A20, D5, and H5. Furthermore, to further understand the precise mechanism behind Vaccinia replication, we will probe for new interactions between these proteins. These studies will ultimately be useful in the development of vaccines against vaccinia and other poxviruses.

116.

Project Title: Computation of Tail Probability Distributions via Extrapolation Methods Full Name: Philippe Gaudreau Faculty: Campus Saint-Jean Department: N/A Degree and Year of Study: Bachelor of Science General: 5<sup>th</sup> year Supervisor Name: Hassan Safouhi

In the present contribution, we used new formulae for higher order derivatives to develop an algorithm for an extrapolation method to approximate tail probability distributions, namely the normal, the gamma, the student's t, the inverse Gaussian and the F distributions. Previous to this contribution, the evaluation of these tail probabilities using this method required symbolic computation of large determinants. Our algorithm makes use of recursion making such calculations relatively easy to perform and produces explicit approximations to any desired degree of accuracy.

117.

Project Title: Examining the role of two key amino acids within the enzyme Fumarate Reductase Full Name: Scott Robert Meyer Faculty: Science Department: Chemistry Degree and Year of Study: Chemistry, set to Graduate Nov 2011. Supervisor Name: Joel Weiner

Fumarate reductase (Frd) is an enzyme present in microorganisms such as Escherichia coli. Its presence allows bacteria to thrive under conditions of zero oxygen. Frd will chemically convert the substrates fumarate and menaquinol into succinate and menaquinone, respectively. It facilitates these by providing an electron conduit and a reaction scaffold. Frd is similar to another enzyme, succinate dehydrogenase (Sdh), which catalyzes the opposite reaction of Frd. The mammalian form of Sdh (Complex II) is part of a pathway that converts the food we eat into molecules that cells can use for energy. When Complex II is defective, tumors such as pheochromocytomas and paragangliomas can develop. Since Complex II in mammals is difficult to analyze, we looked at the Frd protein in E. coli to determine how these enzymes function and how disease states arise.

Based on high-resolution X-ray pictures of Frd and Sdh we determined that there are two tryptophan amino acids residues (the building blocks of proteins) that may assist in the functioning of these enzymes. We examined the functionality of the two tryptophans in Frd by replacing them with different amino acids, and then monitoring the resultant behavior of the altered enzymes.





From our experiments, we determined that one tryptophan serves to maintain the integrity of the enzyme; when it is absent the enzyme either fails to assemble correctly or falls apart easily. The second tryptophan residue was found to assist in positioning the menaquinol in a way that it could be converted to menaquinone.

118.

Project Title: Marta 'Cartoonized:'Depictions of First Lady Marta Sahagún in Mexican Political Cartoons Full Name: Erendira Cervantes-Altamirano Faculty: Arts

Department: Political Science & Religious Studies Degree and Year of Study: 4

Supervisor Name: Linda Trimble (Political Science)

This paper offers content and discourse analyses of Marta Sahagún's portrayals in political cartoons between January 2004, when Sahagún first expressed interest in the Presidential candidacy, and July 2004, when she had to renounce her ambitions. Political cartoons were chosen because they reflect cultural assumptions on the First Ladyship while providing particular opinions on the events that took place. The goal of this study is to determine how Marta Sahagún was portrayed in political cartoons particularly to dissect the gender discourses surrounding her depictions. Similar studies have observed that political cartoons tend to reflect particular gender assumptions in relation to the Presidency and the First Ladyship. This study is important because without a proper understanding of the roles that the First Ladyship fulfills in relation to the Presidency, and how these are reflected in the media and popular opinion, the Mexican First Ladyship will continue to perpetuate traditional gender roles and will be unlikely to acquire official status or to be redefined in the near future.

119.

Project Title: DOWN THE RABBIT HOLE: WHERE KNOCKDOWN OF HOST VACCINIA RELATED KINASE-2 LEADS TO INCREASED MYXOMA POXVIRUS GROWTH Full Name: Kristopher Wayne Dodd Faculty: Medicine and Dentistry (was Science at the time) Department: Undergraduate Medical Education (was Biological Sciences at the time working in Medical Microbiology and Immunology at Faculty of Medicine and Dentistry) Degree and Year of Study: Medicine, 1<sup>st</sup> year Supervisor Name: David H. Evans

Myxoma (Myx) virus, a zoonotic Leporipoxvirus, is a potential oncolytic virus because of its strict specificity to infect and lyse only certain human cancer cells. This tropism has previously been attributed to two factors: phosphorylation levels of the host AKT protein and a disregulated MAPK/ERK pathway which normally leads to IRF-3 activation and subsequent type 1 interferon production. To search for other novel host factors involved in Myx replication in cancer cells, our lab conducted a series of RNAi screens in breast cancer cells and identified vaccinia related kinase 1 (VRK-1) and VRK-2 as hits. Both host proteins are homologs of proteins found in vaccinia (B1R) and Myx (M142R). VRK-2 is poorly understood but has been implicated in MAPK





cell signaling. Through repetition of screen assays and evaluation of viral titres, VRK-2 knockdown was proven to consistently increase Myx growth. To determine the mechanism of action we examined the effects of EGF and IL-1 $\beta$  treatment, as well as transcription factor over-expression, in conjunction with VRK-2 knockdown on viral growth. VRK-2 acts on both the MAPK/ERK and MAPK/JNK pathways as a negative regulator with respect to both stimuli. However, neither treatment with IL-1 $\beta$  and EGF, or over-expression of the relevant transcription factors, resulted in a significant increase in Myx replication when coupled with VRK-2 knockdown. This indicates that there may be a direct interaction between host VRK-2 and viral proteins, or involvement in the regulation of an unidentified host pathway that is beneficial to viral replication in human cancer cells.

120.

Project Title: "I Am not An Animal, I Can Write! A Terror Management Exploration of Language and Human Creatureliness." Full Name: Jordan Lee Clemens Faculty: Arts Department: Psychology Degree and Year of Study: Honours Psychology, Senior Year Supervisor Name: Jeff Schimel

The present research utilized terror management theory (TMT) to investigate the existential functions of language, and its effects in shielding us from the awareness of our animal nature.

TMT posits that human beings are existentially motivated to maintain a buffer between what is distinctly human, and what is merely animal to allay concerns about death and meaninglessness. We reasoned that if body hair serves as reminder of our animal nature, then when reminded of death, participants should view a hairy man as less intelligent, and a hairless man as more intelligent. Our study showed that when reminded of their own death, participants rated a hairy model as less likely, and a hairless model as more likely, to have written a good essay relative to the control. Thus, the existential buffer between humans as unique (possessing language) and animals as inconsequential (no language) was maintained. Implications and future directions will be discussed.

121.

Project Title: Proposed Improvements for Intraspinal Microstimulation Array Fabrication and Insertion Full Name: Kian Parseyan Faculty: Science Department: Centre for Neuroscience Supervisor Name: Vivian K. Mushahwar

Spinal cord injury, stroke and multiple sclerosis can result in disruptions in the connections between upper and lower motor neurons, and diminish voluntary control of movements. A novel intervention to replace lost function involves electrically stimulating pools of motor neurons in the spinal cord to produce synergistic muscle contractions using implanted microwires:





intraspinal microstimulation (ISMS). In animal models, ISMS was successful in producing functional standing and walking in the hind legs. The current fabrication process for ISMS arrays is prone to inconsistencies and the implantation procedure requires highly trained manual skills; thus, making the translation of this approach to other laboratories or the clinic challenging. This project reviewed the fabrication and implantation procedures for ISMS arrays and proposed methods that would improve surgical outcomes. Three processes were selected for improvement: electrode de-insulation, sharpening and insertion. To expose a stimulation site on 30µm platinum/iridium wires, ablation of polyimide insulation with a laser can be used. Electrode tip-shape was investigated and a beveled tip was chosen. To produce a beveled tip, microwires can be inserted through a tapered glass capillary tube. Using a microelectrode beveller, the microwire tips can be beveled simultaneously with the capillary tube. Implantation of an ISMS electrode is currently executed by hand, under a surgical microscope. Judging straightness of the fine wire is challenging, and can lead to poor positioning within the cord. Therefore, a microwire insertion guide was developed that includes a targeting slit, a forceps-fitting region and an attachment for a micromanipulator. The slit adjusts the wire in the medial-lateral angle while the terminal end, in combination with the forceps-fitting region, accounts for the rostralcaudal angle for a straight insertion. These improvements will enhance the utility of ISMS and pave the way for its clinical implementation as an effective intervention for individuals with mobility impairments.

122.

Project Title: Influence of Swimming Duration and Intensity on Airway Hyper-responsiveness in Varsity Swimmers. Full Name: Jessie Gill Faculty: Physical Education and Recreation Department: N/A Degree and Year of Study: Bachelor or Physical Education; 4<sup>th</sup> year Supervisor Name: Michael Kennedy

Airway hyper-responsiveness (AHR) may occur in swimmers due to high ventilation and prolonged exposure to the pool environment. Diagnosing AHR requires bronchial provocation tests that are performed at rest and after exercise. However, AHR may be more prevalent after a competitive race compared to non-competitive exercise conditions in swimmers. PURPOSE: To determine the prevalence and magnitude of AHR after a race compared to an 8 min field swim challenge and a typical swim practice. It was hypothesized that AHR would be most prevalent and demonstrate the greatest magnitude following the race. METHODS: Eight female and 17 male swimmers completed three conditions (sanctioned race of different distances, 8 min field swim challenge and swim practice). Forced vital capacity (FVC), forced expired volume in 1 second (FEV<sub>1</sub>) and forced expiratory flow (FEF<sub>25-75</sub>) were measured rest and after each exercise condition. AHR was defined as a decrease in FEV<sub>1.0</sub> of  $\geq$  10% from rest to 6 minutes





after exercise. RESULTS: A significant increase in FEV<sub>1</sub> (3.6%) and FEF<sub>25-75</sub> (14.8%) was observed from rest to after the race. However, there was a mean decrease in FVC after the race (-1.2%; prevalence = 19 swimmers). AHR was diagnosed in only one swimmer after a 1500m race. CONCLUSION: AHR was not prevalent in swimmers after exercise regardless of the exercise condition. As well, race distance did not influence magnitude of the change in FEV<sub>1.0</sub>. FUTURE DIRECTIONS: More sophisticated bronchial provocation tests may be required to better assess AHR in swimmers.

123.

Project Title: Students' Views on Problem-Based Learning (PBL) Full Name: Marguerite Tiangco Faculty: Faculty of Medicine and Dentistry Department: Department of Dentistry Degree and Year of Study: Bachelors of Science with Dental Hygiene Specialization (4<sup>th</sup> year) Supervisor Name: Steve Patterson

Objectives: Problem-based learning (PBL) is a pedagogical tool used in health science education that emphasizes small group learning. Though the literature suggests PBL is increasingly adopted in more medical schools, the extent of PBL in dental education remains largely unknown. This study explored the views of dental students about PBL and how to improve PBL in dental education.

Methods: Students were from the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> year classes at the U of A dental school. Data were collected from focus groups and an online survey. Post-transcription, the data analysis was divided into cognitive and social components.

Results: 12, 14 and 8 students participated in focus groups from the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> year classes, respectively. 67 students across all years completed the online survey. There was general agreement that PBL encourages active learning and material reinforcement. Each year varied on PBL implementation. 1<sup>st</sup> years (dental-only PBL groups) felt PBL should remain dental-only groups. The 2<sup>nd</sup> years, (medical-dental PBL groups in 1<sup>st</sup> year and dental-only groups in 2<sup>nd</sup> year) had some students expressing feelings of intimidation while others had feelings of camaraderie about being with medical students. Some favored the dental-only group system. The 3<sup>rd</sup> years, (medical-dental PBL groups for two years) felt segregated. This exclusion led to a decrease in participation and interest in PBL. Suggestions for improving PBL include: dentally-relevant cases, objectives and preceptors.

Outcomes: This research will aid in curriculum planning for dental programs. Additional research includes the benefits of PBL for life-long learning of dental professionals.





Project Title: *Women As Sinew in Communities (WASi Communities)* Full Name: Jenna A. Weber Faculty: Education Department: Elementary Degree and Year of Study: Bachelor Degree of Elementary Education Supervisor Name: Phyllis Steeves

"A people is not conquered until the hearts of its women are on the ground." (adapted)

Theme: Women as Healers: The Sinew of Community

The theme of this research is Aboriginal women as healers in their own communities. Our longterm objective is the establishment of an Aboriginal women's healing network throughout northern Alberta; our short term objective is to begin and carry out in-depth dialogue and sharing with a group of Aboriginal women in four gatherings in a retreat and/or workshop settings.

During the gatherings, we will engage in healing strategies and learn about ways to heal ourselves through theoretical teachings and practical applications. We will discuss and use the healing techniques of music and traditional singing and drumming as part of Aboriginal women's healing and wellness.

We will come together in ceremony that binds us together as women committed to support the wellness of each other, and of each of our different communities, as a sinew that supports each of our hearts and spirits, holding our body together to encircle and protect the constant flow of energy and strength that we send forth to our families and communities

These gatherings have been carried out and this proposal is to present a poster on one of the gatherings to demonstrate the wisdom, knowledge and power of the healing energies that were held and carried forward into community action by the Aboriginal women of the different regions comprising the network.