This newsletter focuses on “dialogue”, the third of the themes characterizing SFU’s fortieth anniversary – the other two themes are “diversity” and “discovery”. Dialogue is fundamental to graduate studies. Students are encouraged to learn through intensive interactions with their peers in seminars, laboratories and group projects. They are encouraged to engage in dialogue within their disciplines by participating as equals in academic conferences, and they contribute to dialogues within the wider community through their roles as experts, researchers and communicators.

One of the defining features of graduate work is the relationship between the student and the academic supervisor. As stories in this newsletter demonstrate, an active and engaging dialogue between a student and a professor can create new research directions. Given the increasing demands on professors’ time, it is often students who are responsible for researching an idea developed during such a dialogue and doing a lot of the hard work necessary to turn the idea into a publication or a patent. Graduate students are indeed important in helping the University to fulfill its mandate to create and disseminate new knowledge.

The role of graduate students in research is explicitly recognized in SFU’s recently developed strategic research plan, that recognizes five priority areas where SFU will focus efforts over the next few years:

- Communication, Computation and Technology
- Culture, Society and Human Behaviour
- Economic Organization, Public Policy, and the Global Community
- Environment
- Health

Other stories in this edition demonstrate another feature of dialogue -- communication between academic disciplines. Although most graduate students need a solid grounding in an academic discipline, their research frequently incorporates insights or methods from other fields. For example, my own students in archaeology might get involved in studies of bones that incorporate analysis of ancient DNA or stable isotopes, or might analyze ancient landscapes using modern techniques derived from Spatial Information Systems.

As the University moves into its fifth decade of graduate education, we can expect to see the development of new programs that reflect our commitment to the three pillars of SFU -- diversity, discover and dialogue. Some of those programs are featured in this newsletter, some are almost ready to launch (such as our masters programs in global health), and others are about to emerge from dialogues between professors and students in the classroom, the laboratory or the coffee shop. We intend to continue our regular updates on these developments through the medium of this newsletter, and we will continue to showcase the remarkable achievements of graduate students and their professors.

Jonathan Driver
Dean of Graduate Studies
Simon Fraser University
Dialogue at SFU

Trude Heift
Associate Dean of Graduate Studies

This issue focuses on dialogue. It features 1) graduate programs that draw upon collaboration with another institution or provide a strong outreach to the community, 2) SFU faculty that carry out interdisciplinary work, and 3) graduate students with scholarships that bridge the dialogue between the university and the government, business and private sectors. In the following, we first describe three graduate programs that exemplify the kind of dialogue that takes place between academic institutions as well as the university and the community at large. For instance, the Art and Social Sciences is a joint program with the McRae Institute of International Management at Capilano College that places students in an internship abroad. The Graduate Diploma in Advanced Professional Studies in Education and an M.A. of Education in Educational Practice are two graduate programs within the Faculty of Education with a strong outreach to the community. After a brief program description, the work of a graduate student in each of the two faculties will be highlighted to provide examples of the research projects that are being pursued in these graduate programs. We also feature two faculty members that carry out interdisciplinary work breaking down barriers between disciplines. Finally, our current Trudeau scholars and NSERC Industrial Postgraduate scholars provide a short description of their research.

Dialogue at Academic Institutions

MA in International Leadership

By Stephen Easton
Director of MA(IL) Program

Within the new School for International Studies at Simon Fraser are a number of innovative approaches to develop a student’s understanding of our international environment. One such innovation is the cohort Masters in International Leadership MA(IL) program that is currently accepting applications to its final cohort for the 2006-07 academic year. The purpose of this program is to create an informed participant who understands and appreciates a variety of aspects associated with the process of globalization, and the development of an individual’s capacity in international leadership. The cohort program is a way to discover if there is demand for a professional degree program, and on the basis of the success achieved thus far, we anticipate that in subsequent years the degree will become a permanent feature of the Simon Fraser intellectual landscape under the name of the Masters in International Policy and Practice (MIPP).

Students taking the MA(IL) are exposed to a wide range of coursework and experiences that develop their understanding of international issues in an important and pragmatic way. The degree prepares participants to work internationally in leadership positions in the private/profit, private/ non-profit and government sectors. The program’s academic content arises from a stance shared throughout the School: wherever appropriate we draw upon interdisciplinary approaches to understanding problems and issues. In course work largely developed for this program, we have been able to meet this goal. The reality is that no problem is contained solely in a single academic discipline, and the School brings together themes drawn from many fields within the humanities, arts and social sciences. Language course work adds depth to understanding different experiences.

In addition to coursework, practical experience is gained through an international internship arranged in collaboration with the McRae Institute of International Management at Capilano College. Students are placed in an internship abroad, thus far typically in Asia and Latin America. Placement is ultimately driven by student demand, and we anticipate European connections to develop as student interests expand.

Within the cohort program that is accepting applications now, students are drawn entirely from graduates and current registrants of Capilano College’s McRae Institute. Upon the permanent MIPP being approved, graduates from universities around the world will be eligible to apply. We expect to have a busy time. To receive more information about the program contact Jan Berube at 604-268-7148, email miil@sfu.ca, or visit our website at www.sfu.ca/internationalstudies.

James Nevison
MA(IL) Student

It seems somewhat auspicious to be leading off a Leadership program, taking part in the inaugural year of the Master of Arts in International Leadership Program. I entered the program with the hope and expectation that it would guide my way forward—both personally and professionally—through the global landscape. I saw the program as diagonal progression: building upon my Commerce undergraduate and business experience while incorporating political, social, as well as cultural aspects towards a holistic appreciation of the complexities that are shaping the world.

Leadership is a squishy term, but I solidly believe that it entails multifacetedness. This is mirrored in the MA(IL) program, where
our coursework has embraced economic policy, explored the underpinnings of culture, and debated concepts of sustainability. This multiplicity is also highlighted in another unique aspect of MA(IL), a multi-institutional special arrangements cohort with the McRae Institute of International Management at Capilano College. Through McRae, I will be participating in a one-year international internship that I anticipate will add a “real world” lens to my studies.

Which leaves the final project. I intend for my work to delve into effective applications of sustainable business practices, and at the end of it all hope that in my small way I will have a part in creating a better understanding of global interdependence.

Graduate Diploma in Advanced Professional Studies in Education and Master of Education in Educational Practice

By Allan MacKinnon
Director of Field Programs

The Graduate Diploma in Advanced Professional Studies in Education is designed to improve the practice of classroom teaching in the schools of British Columbia. The Faculty of Education, through its “Field Programs,” works in collaboration with school districts to build capacity for innovation and leadership in particular areas. To do this we use a self-directed, reflective practice model that encourages teachers to develop “focused inquiries” and “field studies” in their own classrooms. This program fits directly into SFU’s goal to provide the most innovative interdisciplinary and professional programs and the most creative community outreach and partnership for teaching practitioners and administrators in British Columbia.

The Graduate Diploma in Advanced Professional Studies in Education has been offered since 2000 and has been extremely well received in the educational community. School district leaders in curriculum, instruction and professional development applaud this program for its practicality and relevance for teachers as well as its high visibility in terms of increased local initiative, leadership and accountability in schools.

Various Graduate Diploma programs have been developed throughout British Columbia, organized about themes such as diversity, literacy, numeracy, technology, to name a few. Programs are generally two years in duration, with intensive instruction in the summer months and weekly cohort meetings at convenient locations within school districts throughout the school year. We have explored “blended instruction” in some cohorts, with more reliance on web-based resources and discussions.

Rosie Keating
Resource Room Teacher
Maple Ridge Secondary School
Faculty of Education

The Graduate Diploma programs consist of at least 30 credits of course work in Educational Practice. Usually, this allows school teachers to achieve the “five plus fifteen” salary increase from their school district.

This year, the Faculty of Education introduced the Master of Education in Educational Practice, which offers the Graduate Diploma students the opportunity for a third year of study that can be used to further increase their salary to “category 6” of Teacher Qualification Services. The MEd in Educational Practice builds upon the Graduate Diploma in Advanced Professional Studies in Education by focusing on the foundations and methodology of teachers’ research in their practice (i.e., “action research,” “teacher research”).

On completion of the Diploma Program I felt truly empowered and was fortunate to be able to continue my journey of self-actualization when I was accepted into the MEd Program in Educational Practice.

Dialogue between Disciplines

As an example of the kind of interdisciplinary work that takes place at SFU, Professor John Bechhoefer, who works across disciplines combining physics and genetics, and Assistant Professor Dongya Yang, who conducts research in archaeology and genetics, briefly describe their research and that of their graduate student(s).
Now how does DNA replicate? In simple organisms, such as bacteria, there is a single location along the DNA that is the “origin of replication” -- the place where the DNA starts to replicate. DNA replication then proceeds to spread out from the origin at some velocity. When all the DNA has replicated, the process stops. In higher organisms, such as ourselves, there is about 1000 times more DNA to replicate, and the rate at which the DNA is copied is 100 times slower, in order to give various “proofreading” mechanisms time to check whether the copying went without mistakes. (For bacteria, mutations can help; for us, they’re usually bad.) Faced with so much more DNA to replicate at such a slow rate, nature needs to copy the DNA in many places at once. Thus, when our cells replicate their DNA, there are hundreds of thousands of origins of DNA, with many active at the same time.

What does all this have to do with water freezing? I started my scientific career by studying freezing. A few years ago, I was chatting with a biologist friend at a Parisian pub (yes, there are pubs in Paris!), and he mentioned an experiment he was doing on DNA replication. When he explained how it worked, I had a sudden idea that the processes that go on in DNA replication had a formal similarity to those in freezing: (1) replication starts at many places, just as ice crystals nucleate at many places; (2) domains of DNA grow out, just as ice crystals grow out; and (3) when two replicated regions of DNA meet, the replication stops, just as ice crystals stop growing when they hit each other. This similarity meant that well-developed mathematical models to describe freezing could also be adapted to describe DNA replication!

This idea became the germ of a thesis project for a talented SFU student, Suckjoon Jun. Pursuing it led to the first ways of extracting data such as the initiation rate for origins and other quantities from DNA. Understanding how normal replication proceeds is a first step in understanding what happens when replication goes wrong – notably in cancer cells. Suckjoon’s work was highly successful, winning the Dean of Graduate Studies convocation medal in 2005. His thesis was also runner-up (among the top four) for that year’s NSERC Doctoral award. Suckjoon subsequently won an NSERC PDF fellowship and is now at a research institute in Amsterdam (AMOLF).

Suckjoon’s work was continued by a MSc student, Haiyang Zhang, now at the Univ. of Oxford. And this summer, Brandon Marshall, a summer student (NSERC USRA), will continue on, exploring the regularity of DNA replication – why different cells take nearly the same time to replicate.

All the while, it still amazes me that such an offbeat analogy can be so useful. Finding oneself at an unexpected juncture between two disciplines is both an exciting and rewarding experience.

Dongya Yang
Department of Archaeology

A t the Archaeology Department’s Ancient DNA lab, Dr. Dongya Yang and his graduate students use an interdisciplinary approach to tackle important archaeological questions. Using ancient DNA analysis, their research focuses on illuminating hunting and fishing practices of the past, as well as ancient environments and ecosystems.

One of the major hurdles in archaeology involves the identification of animal bones, which are often burnt, butchered or fragmented, making it difficult to identify the species of animal. Using a principle that is similar to modern forensic DNA fingerprinting, genetic information recovered from archaeological bones can be used to obtain unambiguous species identifications with unprecedented precision and accuracy, enabling archaeologists to test hypotheses in a more effective way. For example, collaboration between Yang’s lab and other archaeologists at McMaster University and SFU have led to more detailed studies of pre-historic salmon fisheries in the Pacific Northwest. Until a few years ago, archaeological studies into prehistoric salmon fishing were hampered by the difficulty in distinguishing the five species of Pacific salmon from one another based on visual analysis alone. At the SFU lab, DNA has been extracted from ancient salmon bones excavated from the archaeological site of Namu on the central coast of BC, with some of the bones dating as far back as 7000 years ago. Using these DNA-based species identification techniques, genetic information in combination with archaeological data have allowed theories about the seasonal occupation of Namu to become much more refined. A similar project has been undertaken to study ancient whale remains from the west coast of Vancouver Island to illuminate ancient Nuu-chah-nulth whale hunting practices as far back as 3500 years ago. The genetic material extracted from the ancient bones can answer questions about which whale species were hunted, potentially how many whales were caught, and how whale meat was shared within a community. In addition to work on the marine resources on the Northwest Coast, Yang and his graduate students also bring genetic insight...
to other archaeological investigations such as animal domestication, social complexity and seasonal migrations.

The obtained genetic information of the remains can be beneficial to more than just archaeology; for example, ancient DNA analysis of salmon bones from Northwest Coast and Plateau archaeological sites not only can characterize ancient salmon fishing practices, but also can address issues of stock continuity and environmental changes in the past. By comparing the ancient DNA data to those of current populations, long-term changes in the genetic diversity and behavioural ecology of salmon species can be assessed. This genetic information may be invaluable in helping biologists and conservation ecologists understand temporal changes in genetic diversity of the species, which can be extremely useful for developing sustainable salmon fishery policies.

PhD students, Camilla Speller and Ursula Arndt are working in Dr. Yang’s Ancient DNA Laboratory. The coverall suits are worn to avoid contamination.

Dialogue between University and National Leaders

The following SFU graduate students are currently holding a Trudeau Foundation Doctoral Scholarship or an NSERC Industrial Postgraduate Scholarship. The work carried out under these highly prestigious awards bridges the dialogue between research and national leaders from the government, industry and private sectors and various community groups.

In the following, the two Trudeau scholars, Amy Mundorff and Robert Huish, as well as four NSERC scholars, Katherine Wieckowski, Darcy Pickard, Brendan Connors and Carolyn Huston provide a brief description of their research. Congratulations again to the six scholarship recipients!

Trudeau Foundation Doctoral Scholarship

Amy Z. Mundorff
PhD Student
Department of Archaeology

Human Identification in the World Trade Center Disaster: Assessing Identification Processes of Highly Fragmented and Commingled Human Remains

Little is known about severe human fragmentation and subsequent personal identifications from mass fatality incidents. The World Trade Center attack involved various disaster scenarios, often seen individually, but rarely together. These included airline crashes, explosions, building collapses, prolonged fires with subsequent watering, and decomposition resulting from prolonged excavation time. Each of these factors existed simultaneously at the World Trade Center site, and each influenced the recovery and identification process.

The academic literature is largely silent about issues surrounding mass fatality incidents involving severe human fragmentation. Especially lacking is an understanding of how various taphonomic processes interact to degrade or preserve the human body. Fragmented human remains are difficult to assign to a particular victim and complicate and prolong the identification process. Understanding the mechanisms of human fragmentation and subsequent degradation processes will allow scientists to improve the techniques and protocols used in individual victim identification.

My research will involve analyzing the data of nearly 20,000 pieces of human remains recovered after the World Trade Center Disaster. In this study, I hope to answer crucial questions related to the fragmentation of human remains, preservation of DNA and variations in skeletal element survivability. My research questions will concentrate on: the processes involved in human fragmentation, identifying the durability variations between different body-parts/skeletal elements, and determining which body-parts/skeletal elements are likely to yield viable DNA samples for individual victim identification. I will also review the geographical distribution of human remains as mapped and recovered from the World Trade Center site in order to ascertain whether any inherent spatial and temporal patterns may be distinguished.

Amy Mundorff, PhD Student

This research will provide insight into human fragmentation and personal identification following mass fatality incidents and is critical to present day concerns of policymakers preparing for future mass fatality events. In addition, this research will advance our theoretical knowledge on human taphonomy.

Robert Huish
PhD Student
Department of Geography

The Latin American School of Medicine: Popular Health Provision from the Classroom to the Community
Throughout the Americas, from Tierra del Fuego to Nunavut, many young doctors are either unable or unwilling to practice in rural, and under serviced communities. This growing trend has left marginalized communities, in the richest and poorest nations alike, hurting from too much inequality and too little understanding. The endemic lack of health care services and human resources for health is critical throughout Latin America, and similar trends exist, as a result of centralization of services and neo-liberal economic restructuring, in Canada and the United States. While politicians and policy makers proclaim that our challenges can be overcome with illusory notions of a second-tier system or increasing volunteerism, can we really say that we have sufficient dialogue about the determinants of providing health care to the remote and the removed? Especially considering that Cuba, a poor country that copes with an anaemic supply of material resources, has been able to provide excellent health care service throughout the country and across the hemisphere?

“My research will help to find out how these students will fare upon return to their home communities. I’m seeking out the challenges that arise between the tests of the school and realities of the field in Ecuador. It is about measuring the transferability of skills, but it also concerns discovering the capabilities, imagination, and potential of empowering individuals to impact communities. From this I hope that we can have a better understanding of this unique project and also broaden our own dialogue to go beyond broad theoretical and bureaucratic solutions to include the remedies that lie in human capability.”

The predominant theory currently used in fleet dynamic models to explain the relationship between resource and effort distribution is the ideal free distribution (IFD) from behavioural ecology. However, the IFD is based on several unrealistic assumptions which could undermine its ability to accurately predict fishing effort that is driven by factors other than density dependent habitat selection. An alternative approach for modelling fleet dynamics is to use neural networks (NN) which allow for the interaction of an ecological model and a fishing fleet’s decision making process as determined by learning, memory, and a perception of resource distribution.

The groundfish fishery of British Columbia is the largest commercial fishery on the west coast of Canada in terms of total landings (tonnes) and value. In 2003, the fishery harvested 126,100 tonnes of groundfish (rockfish, cod, sablefish, and sole), with a landed value of 135.6 million dollars (CND) (1). The large size and socioeconomic importance of BC’s groundfish fishery necessitates robust control systems that minimize the possibility of a stock collapse. Furthermore, as management of the groundfish fishery moves away from simple regulatory regimes to individual vessel quotas and spatial closures, an understanding of how fishing effort in a fishery spatially distributes itself is proving to be critical.

The objective of my research is to evaluate which of the two methods, an IFD or a NN, is a better predictor of fishing behaviour and effort distribution. Using simulation modelling I am able to investigate the effect that different regulations, such as spatial closures and gear restrictions, will have on the distribution of fishing effort. These findings will help to equip fisheries managers with methods for the development of robust management strategies that are most effective for achieving a sustainable...
groundfish management plan.

Works cited:


Darcy Pickard
MSc Student
Statistics & Actuarial Science

Working with ESSA Technologies Ltd.

Evaluating the effectiveness of rehabilitation actions in creating fish habitat in the Trinity River

I received an industrial NSERC scholarship in support of my Masters of Science in Statistics degree. My industrial NSERC sponsor company is ESSA Technologies Ltd. ESSA is an independent Canadian company originally incorporated in 1979. They focus on environmental and natural resource problems. They have four major domains of expertise: fisheries, forestry, environmental assessment and international development.

I have been working with the Fisheries and Aquatic Sciences Team at ESSA. For my thesis project I’ve been looking at experimental designs to evaluate the effectiveness of rehabilitation actions in creating fish habitat in the Trinity River in northern California. The number, timing and location of rehabilitation actions are limited by the potential for habitat rehabilitation as well as logistics such as obtaining permits, cost and construction time. These restrictions make it difficult to properly randomize the treatments. I am using simulation to compare different designs in terms of cost and effectiveness. I’ve created a simple model of the habitat creation process which accounts for variable flow volumes, channel morphology differences and dependence on upstream conditions. I’m now looking at testing the success of different experimental designs under different conditions. This method fits in well with the adaptive management protocol of the client, as the model can be updated and improved as new information is gathered.

The industrial NSERC scholarship provided me with an excellent opportunity to apply my learning to a real and current problem. Additionally, it has led to a full-time position with ESSA Technologies Ltd. to begin upon completion of my thesis work.

Carolyn Huston
PhD Student
Statistics & Actuarial Science

Working with Vancouver Aquarium Marine Science Centre

Working for the Aquarium: More than just pretty fish?

As a tourist, one of my favourite places to visit in the city was the Vancouver Aquarium. A year later, I still enjoy going to the Vancouver Aquarium, only now as my job! Through the generosity of an NSERC industrial post-graduate scholarship I get to spend 20% of my time working at the Vancouver Aquarium.

I have these locations made into conservation areas to help ensure the continued existence of these fascinating fish.

Brendan Connors
MSc Student
Behavioural Ecology Research Group
Department of Biological Sciences

Working with Watershed Watch Salmon Society

Do sea lice alter salinity preferences in Pacific salmon?

My research focuses on the influence of parasites on fish behaviour. Most species of fish have parasites associated with them, and parasites have been shown to affect almost every aspect of fish behaviour. In most instances, however, there is a paucity of knowledge regarding the underlying mechanisms of parasite altered behaviours and even less of an understanding of their ecological consequences.

A parasite of considerable economic importance and growing ecological significance is the salmonid specific sea louse, Lepeoptheirus salmonis. Recent research suggests that open net pen salmon aquaculture can be a significant source of sea louse infection on adjacent juvenile salmonids.
and salmon farming has been implicated in the collapse of wild salmon stocks in both Europe and Canada.

Sea lice have been shown to influence the salinity preferences of European sea trout. Though similar observations have been made in wild juvenile Pacific salmon, to date no one has investigated sea louse altered salinity preferences in Pacific salmonids. This is despite the fact that perturbations to salinity preferences may have a number of ecological ramifications for the migration patterns, foraging success and habitat preference of Pacific salmon.

Using observational and manipulative field based experiments combined with controlled laboratory experiments my research aims to (1) investigate the role sea louse infection plays in altering salinity preferences in juvenile pink and chum salmon, (2) provide insight into the mechanisms behind sea louse altered salinity preferences, and (3) investigate the ecological consequences of altered salinity preferences in Pacific salmon.

This research will serve as a model for understanding parasite altered behaviours in Pacific salmonids while contributing to the fields of behavioural ecology, parasitology and salmonid ecology. In addition, this study has applied importance in addressing the myriad of questions surrounding the impacts of salmon aquaculture on wild salmon populations in coastal British Columbia.

**NSERC Doctoral Prize**

The Doctoral Prizes honour four of the best students completing doctoral degrees in science and engineering at Canadian universities. Two prizes are awarded in the engineering and computer sciences and two in the natural sciences each year. The Prize consists of a silver medal, a cash award of $10,000 and a framed certificate. These are highly competitive prizes. For example, in the 2006 competition (most recent), there were 43 nominations in total -- 19 in the category of engineering and computer science & 24 in the category of natural sciences. The following lists the SFU students (including their thesis topic and senior supervisor) who have been successful in this competition over the past years. Congratulations to the award recipients!

1992


1998

Li, Yingfu (CHEM). Catalytic DNA Molecules for Porphyrin Metallation. Dipankar Sen (senior supervisor).

2001


2002

Monks, Ashley (PSYCH). Regulated N-Cadherin Expression is Associated with Steroid-induced Neural Plasticity in the Adult Rat Nervous System. Neil Watson (senior supervisor).

2003


2006


**Graduate Student Support**

SFU graduate students are supported by generous donors who contribute to endowment funds in many programs. If you would like to make a contribution to help students in a particular field, or if you would like further information about any aspects of making a donation, please contact Wanda Dekleva at (604) 291-3093 or at wdekleva@sfu.ca. Many options are available for giving, including one-time donations, regular contributions, or planned giving. Many different payment options can also be arranged. Between now and 2008 the Burnaby Mountain Endowment Fund will match any gifts to scholarship endowments of $50,000+, creating a wonderful opportunity for student support.

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