

DEAN'S ADVISORY COMMITTEE
STUDENT VENTURE GRANT APPLICATION

Fund

Please read all instructions and regulations on the reverse side of this sheet prior to the completion of this form. The original plus 6 copies of your proposal are due in the Dean's Office on the 2nd Friday of the Block by 1:00 p.m.

DATE SUBMITTED October 13, 2006

NAME CLASS 2008 WORNER BOX

EXT.

ID # HOMETOWN (Not Address)

BRIEF DESCRIPTION OF INTENDED USE OF FUNDS PROPOSED DATE/BLOCK OF USE

I intend to use the awarded grant to attend the 2007 International Hypoxia Symposium, February 27—March 4, 2007 in Lake Louise, Canada.

NAME OF FACULTY SPONSOR Mark Wilson

HAVE YOU BEEN THE RECIPIENT OF A PREVIOUS VENTURE GRANT Yes No

IF SO, WHAT AMOUNT? _____ WHEN? _____ REPORT SUBMITTED? _____

TOTAL AMOUNT OF VENTURE FUNDS NOW REQUESTED \$850 (maximum grant) ^{\$1000}

ARE YOU SEEKING OTHER FUNDING FOR THIS PROPOSAL? Yes No

IF YES, WHAT IS THE SOURCE?
unknown, most likely biology/sport science department

→ pending funding from venture grant.

If this proposal is approved, I understand that it is my responsibility to notify the Dean's Office immediately if I do not pursue my project as proposed to the Dean's Advisory Committee. I further understand that all funds are to be used according to the proposal as submitted and approved by the Dean's Advisory Committee. Any changes to an approved project must be submitted to the Chair of the Committee for approval. Please note: the IRS requires that we report Venture Funds as taxable income.

SIGNATURE _____ DATE 10/12/06

Venture Grant Application

2007 International Hypoxia Symposium:
Château Fairmont Lake Louise, Lake Louise, Alberta, Canada.
February 27th—March 4th, 2007

OCTOBER 13, 2000

“Hypoxia is a constant threat to the human body and its vital organs throughout life. There are many situations in which the threat is heightened in health and disease, but mechanisms have evolved to lessen its detrimental effects. The International Hypoxia Symposia was founded to enable scientists, clinicians, mountaineers and other interested individuals to share their experiences of the situations associated with oxygen ^{deprivation} ~~lack~~ and the adaptations that allow us to survive.”

(www.hypoxia.net)

The inspiration

It seems logical that after three years of intensive class and lab time, five hour exams and exhaustive memorization, I would no longer be a biology major. Unfortunately, I have a strange affinity to the natural sciences, especially those subjects related to human physiology, and continue to enroll in biology and chemistry classes. The final decision to follow the pre-medical track at Colorado College has increased this commitment and dedication—provoked by the understanding that knowledge gleaned during undergraduate schooling is necessary when embarking down the road to become a medical professional. However, my thoughts often wander from my cadaver to the outdoors and mountains where I spend my extracurricular time biking, climbing, leading ORC sponsored trips or skiing. After struggling to balance this addiction to the outdoors, human physiological sciences and my passion for medicine, I have finally discovered an occupational field that incorporates these diverse characteristics. Initiated through a Wilderness First Responder course, I became interested in alpine/high altitude medicine and elucidation of the cellular and systemic processes inducing these illnesses. In addition to gaining *clinical* experience in this field through medical internships, I wish to address the physiological implications of altitude through thesis research.

The thesis

Andrew Subudhi, Ph.D. - a CC alumnus ('92) and professor of biology and medicine at the University of Colorado in Colorado Springs (UCCS) and Denver Health Science Center (UCDHSC) - has provided the crucial link between my "wishes" and the actualization of this research. Dr. Subudhi is in the process of publishing several papers (funded by the National Institutes of Health) regarding the theory that changes in cerebral hemodynamics are responsible for headaches associated with Acute Mountain Sickness (AMS). One of the papers describes an innovative method of assessing cerebral

hemodynamics which needs to be validated against a more classical method. Working alongside Dr. Subudhi, I plan to collect data using the classical technique, analyze the results, and compare the findings to his innovative method. This missing piece will hopefully provide the information needed to publish a methodological paper which will support a series of other papers describing associations between changes in cerebral hemodynamics and headache.

Cerebral auto regulation (hemodynamics) is the mechanism by which equilibrium is maintained in the brain. According to Poiseuille's law, when vessel diameter is held constant, pressure is directly proportional to blood velocity (flow). Auto-regulation minimizes deviations in cerebral blood flow by adjusting vessel dilation in response to changes in "perfusion pressure" (blood pressure) in the brain (Aaslid et al. 1989). When pressure drops, velocity may also drop (and vice versa), causing ischemia, the loss of blood flow to tissue. Acute hypoxia (lack of oxygen) and increased heart rate, common at high altitude, may contribute to the dysfunction of cerebral hemodynamics—potentially causing the symptoms associated with Acute Mountain Sickness.

The symposium

In January of 2007 I will begin working with Dr. Subudhi in analyzing data collected using the classical model to test cerebral hemodynamics at altitude. With this thesis work in mind, I am requesting monetary aid to attend the 2007 International Hypoxia Symposium held at Chateau Lake Louise in Canada, February 27th through March 4th. Dr. Subudhi has been asked to present data regarding his innovative model at the conference and necessarily needs to incorporate the preliminary results from my research into this disclosure of his work. The IHS is an annual conference held to discuss recent altitude research, mountaineering experiences, clinical findings pertaining to mountain medicine and the physiological adaptations necessary to survive hypoxia. The presentations are not limited to researchers, but include doctors and climbers exposed to situations regarding oxygen deprivation. Initiation of the symposium began with the rise in popularity of mountaineering in the early 70's; it became apparent that climbers and the doctors of the time knew little about the negative effects of altitude. In 1973, realizing the wealth of knowledge *climbers* possessed regarding altitude illness, Dr. Charles Houston invited a dozen British climbers to a meeting, assessing their experiences at altitude. The success of the meeting stimulated more interactions between climbers, doctors and research scientists—gradually increasing in sophistication as more studies exposed pertinent information—until the meeting reached a level of scientific and medical superiority. Presently, the prestigious symposium facilitates discussion between top researchers, doctors and climbers in hopes of furthering the knowledge presently available regarding altitude and hypoxia.

As suggested by Professor Subudhi, the conference would provide a diverse introduction to present altitude research, countless doctor, scientist and climber contacts for my thesis research and a deeper understanding regarding the negative repercussions of hypoxia on human physiology. Dr. Subudhi's presentation of my primary research would provide feedback from the research community and confirm the significance of my thesis

work within the larger scheme. Additionally, many of the topics discussed at the symposium delve deep into altitude science, a field in which Colorado College lacks the expertise to provide specific classes. Not only would the conference offer invaluable information for my thesis work, but also contains medical facets which speak specifically to my future plans in the field of health care. One day of the symposium focuses on mountain medicine. With my background in wilderness medical practices (Wilderness First Responder), experience in backcountry trip leadership and dreams of someday working as a doctor at a base camp or ski-clinic, the Day in Mountain Medicine will provide substantial information to update my knowledge of altitude illness, provide medical contacts for future internships and, most importantly, be of extreme interest. The WFR class I took during half-block 2005-2006 was undoubtedly the most inspiring class I have taken during college. The creativity and practicality of wilderness medicine facilitates the desired balance between the outdoors and my drive to become a doctor.

Applications of the experience

If given the opportunity to attend the 2007 International Hypoxia Symposium, I have several plans regarding community applications of the experience. First, the conference would provide the integral baseline for my thesis research. A presentation of my thesis on Biology Day would incorporate concepts explored at the conference and their relation to the research I conducted regarding cerebral auto-regulation at altitude with Andrew Subudhi. Secondly, information discussed on the Day of Mountain Medicine would be of immense interest to many students and faculty involved in the Outdoor Recreation Committee as well as personal backcountry adventures. As an active member of the ORC and one of several public relation planners for the group, I anticipate hosting a Mountain Medicine Night. I plan on inviting a professional acquaintance from the symposium or asking Dr. Subudhi to present his data. After the talk, a discussion would be facilitated for the expert to answer questions about mountain medicine and/or the effects of altitude on human physiology. With the prevalence of adventure-inclined students and faculty at CC, many of whom are trained in some level of backcountry first aid, I foresee the Mountain Medicine seminar having great success. Lastly, if my thesis research becomes published, as a co-author to Dr. Subudhi, I may have the opportunity to attend a later symposium as a presenter. Having the initial exposure to the conference would benefit preparation for this presentation and increase the likelihood of invitation to return as a researcher.

The itinerary

The conference is held from February 27th- March 4th, 2007, at the Chateau Lake Louise in Lake Louise, Alberta, Canada. Lake Louise is located within Banff National Park. I will take Delta flight 3760, departing from Salt Lake City on February 26, 2007 at 9:50 AM arriving at Calgary International Airport at 11:56 AM. Lake Louise is located 120 miles from Calgary. I will take the daily Greyhound Bus line from the airport to Lake Louise. For the duration of my stay in Lake Louise, I have decided to stay at the HI Lake Louise Alpine Centre (a hostel) to reduce cost. The hostel is located 2.5 miles from Chateau Fairmont Lake Louise—where the symposium is held. February 27th through March 4th will be spent attending the IHS presentations and discussions; featured sessions included below. I will depart Lake Louise on March 5th for the Calgary Airport. My return flight from Calgary departs at 12:26 PM and arrives at 2:24 PM in Salt Lake City.

Featured Sessions (90 minutes length each)	
Session Organizer	Title
Ben Levine	The Heart at High Altitude
Max Gassmann	The working skeletal muscle: About molecular, physiological and doping aspect
Frank Powell	Insights to hypoxic responses from recent studies on insects
Jerry Dempsey	Vascular, Metabolic, and Cognitive Effects of Intermittent Hypoxia
Ben Levine	Non hemoglobin "globins" –what are they, and what do they do for oxygen transport?
Erik R. Swenson	Hypoxia-induced vascular remodeling and hypertension: Are all organs equal?
Annalisa Cogo, Marco Maggiorini	Hypoxia induced lung fluid movement: the endothelial and the epithelial "fronts"
	Additional Sessions
	Hot Topics in Mountain Medicine
	Hot Topics in Hypoxia
	Recent Advances in Mountain Medicine
	Future Directions in Hypoxia Research
	Two Poster Sessions

The budget

Proposed Budget for International Hypoxia Symposium 2007

Figure 1: Actual cost

Transportation	
Airfare	556.9
Greyhound Bus	64.7
Lodging	
Lake Louise Alpine Centre at \$27/night	189
Food	200
Symposium Registration (discounted student rate)	350
Total \$	1360.6

Figure 2: Requested Funds

Transportation and Lodging	810.6
Minimal food expense	40
TOTAL REQUESTED FUNDS	850.6

The total cost of travel, lodging and registration for the 2007 International Hypoxia Symposium exceeds possible funding available from the Venture Grant Committee (see Fig. 1). I am therefore requesting the maximum award of \$850 to cover transportation, lodging and some food expense (Fig.2). To fund the remainder of the trip (program registration, additional food money), I plan to utilize scholarship and grant options through the biology or sport science departments.

The consideration of this application is much appreciated as the opportunity to attend the 2007 International Hypoxia Symposium would be of great benefit to my thesis research and professional aspirations.

Sources Cited

Aaslid, R., Lindegaard, K., Nornes, H., Sorteberg, W. (1989). Cerebral autoregulation dynamics in humans. *Stroke* (25): 45-52

International Hypoxia Symposium website:

www.hypoxia.net