DEAN'S ADVISORY COMMITTEE
STUDENT VENTURE GRANT APPLICATION

Please read all instructions and regulations on the reverse side of this sheet prior to the completion of this form. The 8 copies of your proposal are due in the Dean's Office on the 2nd Friday of the Block by 1:00 p.m. If you have questions, please contact Rita Zook at x6686 or email rzook@coloradocollege.edu.

DATE SUBMITTED 9/17/10

NAME ______________________ CLASS __ WORNER BOX __ EXT. __

ID # ______________________ HOMETOWN (Not Address) ______________________

NAME ______________________ CLASS __ WORNER BOX __ EXT. __

ID # ______________________ HOMETOWN (Not Address) ______________________

STUDENT RESEARCH X  LIFE OF THE MIND ______ CONFERENCE ______

PROJECT TITLE

Yeast 2- hybrid screen and genetic C. elegans genetic cross

BRIEF DESCRIPTION OF INTENDED USE OF FUNDS

Laboratory supplies and reagents

PROPOSED DATE/BLOCK OF USE 2010/ Block 1

NAME OF FACULTY SPONSOR Nancy Huang

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

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

TOTAL AMOUNT OF VENTURE FUNDS NOW REQUESTED $1,000

ARE YOU SEEKING OTHER FUNDING FOR THIS PROPOSAL? Yes _ No _

IF YES, WHAT IS THE SOURCE? ____________________________

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 9/17/10
Caenorhabditis elegans or C. elegans is a round worm that inhabits soil. As full grown adults, these worms only measure 1.5mm in length. C. elegans has been used for over 40 years as a model organism in the field of developmental biology. These tiny worms are extremely useful due to their ease of cultivation in the laboratory, short life cycle of 2-3 weeks, and, most importantly, similarity to human development and structure. C. elegans is comprised of muscle, a nervous system and epithelial tissue. They reproduce sexually as well as by self-fertilization and exhibit distinct stages of development. Developmental biology aims to answer questions pertaining to exactly how cell differentiation and proliferation leads to the complete animal system that responds to taste, smell and touch, exhibits behavior and ages.

During early embryogenesis in C. elegans, the embryo utilizes maternally provided mRNAs to expedite development. Pal-1 is a gene responsible for muscle development and would be expressed in all cells if the regulator protein, MEX-3, were not suppressing the gene in the two anterior cells at the 4-cell stage. MEX-3 protein is present in all cells at the 2-cell stage but becomes restricted to the two anterior cells at the 4-cell stage. It was found that another regulator protein, SPN-4, causes MEX-3 to be degraded in the two posterior cells. The subject of my research would be to identify proteins that interact with SPN-4 in order to regulate MEX-3 degradation or elucidate any other functions of SPN-4. This will be done using a yeast 2 hybrid screen. In this assay, yeast cells are transformed with plasmids coding for a library, or mix, of proteins. Yeast cells that are able to take up a plasmid that results in the synthesis of a protein that interacts with SPN-4, will be able to survive on media lacking an essential amino acid.
Colonies that survive will have the plasmid, and thereby the protein it synthesized, identified by PCR. The proteins that interact with SPN-4 will aid in furthering our knowledge of the role SPN-4 plays in development.

In addition to this project, I will also be performing a genetic cross of *C. elegans* wild type strain with a mutant strain that expresses green fluorescent protein (GFP). This mutant strain was engineered to glow green while simultaneously expressing the MEX-3 protein. In order to eliminate mutations that might have occurred in other parts of the genome while introducing the GFP gene, worms need to be crossed with the wild type strain and progeny of the appropriate genetic construction must be isolated for future studies. Following the cross, PCR will be done on the few worms to confirm that the desired purified strain was obtained.

I am currently a senior biochemistry major pursuing a career in the biomedical research field. I will be applying for graduate studies in Biochemistry and Molecular Biology in the coming months. In order to be a competitive applicant, a range of previous research experiences in different fields is required. I have previously conducted research that utilized methods such as DNA sequencing and Western blotting, but I have never been exposed to developmental biology research. The opportunity to assist Nancy Huang is her research is invaluable in gaining practical laboratory problem solving skills. The skills I acquire now will be essential in the coming years when I will be conducting research more independently.

In addition to the advancements of my personal goals, this research will benefit the Colorado College community. Future students will be able to further the project working with the mutant *C. elegans* strain. Also, if any novel protein interactions are found during the yeast 2-hybrid assay, the findings may contribute to a publication in a scientific journal, thereby
increasing the scientific prestige of the college. This would then help future Colorado College students by possibly leading to increased outside funding of research projects.

**Proposed Budget**

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While conducting formal research, it is required that people working in the lab keep an official laboratory notebook for verifying the grant money from outside sources was spent and later use by future lab students. Since all the worms and yeast must be plated on media, petri plates are needed. Agarose will be used for running DNA gels. We will be sequencing genes from *C. elegans* at the end of the 2 hybrid screen. Glass beads are necessary for spreading the transformed yeast onto petri plates in a sterile manner. The orange cap bottle, pipette tips and 50mL polypropylene tubes are necessary to facilitate accurate and sterile measuring and storage of reagents being used. While I will not be using all the supplies requested, I will be using
additional laboratory reagents not listed from Professor Huang’s personal inventory. The additional supplies will be used by future students who have the opportunity to assist in Professor Huang’s research.

Although Venture Grants should be completed during the block prior to the block of research, I hope the committee will make an exception for first block. I spoke with Professor Huang last spring about assisting in her research during first block of the following year. She assured me that there would be a project, however the final project was not decided on until the end of the summer, when the results from her summer research students were available.