GENESEO FOUNDATION

2012-13 APPLICATION DEADLINES

- ☑ Friday, Sept 14, 2012 - Fall 2012 Research & Travel
- ☐ Friday, Nov 9, 2012 - Spring 2013 Research & Travel
- ☐ Friday, Feb 1, 2013 - Spring 2013 Research & Travel

STUDENT ASSOCIATION SA Funded by Mandatory Student Activity Fees

Individual Research- Biology

Student Association & Geneseo Foundation

Undergraduate Research and Travel Grant Program (Rev. 07/06/12)

As a part of its long-range allocation of student activity fees, the Geneseo Student Association has awarded $40,000 to the Undergraduate Research Grant Program. As in previous years the Student Association's allocation has been matched by the Geneseo Foundation, bringing total support for this year's program to $80,000.

The Geneseo Foundation, a nonprofit organization which accepts, administers and allocates private gifts to benefit SUNY Geneseo, will oversee the distribution of these funds by a subcommittee of the College Research Council.

The Research Grant funds are designed to aid undergraduates in the purchasing of supplies, equipment, and other expenses they might incur in their research project. The research travel grant funds cover travel to present research at professional or scholarly meetings.

The opportunity for undergraduate students to conduct research is a unique and rewarding experience for everyone involved. Geneseo currently has a strong tradition of providing such opportunities for undergraduates. The Undergraduate Research Grant Program will continue to further this tradition by providing worthy projects with funding.

ATTENDANCE AT A GRANT WRITING WORKSHOP PRESENTED BY THE OFFICE OF SPONSORED RESEARCH IS MANDATORY IN ORDER TO BE ELIGIBLE FOR FUNDING. FOR GROUP APPLICATIONS ONLY ONE REPRESENTATIVE FROM THE GROUP NEEDS TO ATTEND.

FOR GROUP APPLICATIONS, EACH APPLICANT IN THE GROUP MUST SUBMIT THEIR OWN APPLICATION FORM BUT ONLY ONE COPY OF THE PROPOSAL AND ANY OTHER ATTACHMENTS IS REQUIRED. PLEASE STAPLE ALL FORMS AND ATTACHMENTS TOGETHER.

Name [redacted] G ID # [redacted]

College Address [redacted]

Home Address [redacted]

College Phone [redacted] Graduation Date [redacted] GPA [redacted] (minimum 2.5 required in major)

Amount of Support Requested $ 197.47 E-mail [redacted].edu

Title of Project Astrephomene Growth

Are you applying to other sources? If yes, please list NO

Department Biology Faculty Sponsor Dr. Hoops

Department Chairperson's Signature George Boraga /ymm

Student Signature [redacted]

NOTICE: IF THIS APPLICATION IS FOR FUNDS TO SUPPORT RESEARCH FOR ACADEMIC CREDIT AT AN INSTITUTION OTHER THAN SUNY GENESEO, YOU MUST FILL OUT A "PRE-APPROVAL FOR TRANSFER CREDIT" FORM (AVAILABLE FROM THE DEAN'S OFFICE) BEFORE ENROLLING WITH THE OUTSIDE INSTITUTION.

BEFORE SUBMITTING YOUR PROPOSAL, PLEASE MAKE SURE YOU HAVE COMPLETED THE "CHECKLIST FOR ALL PROPOSALS" AS WELL AS THE CHECKLIST THAT APPLIES TO THE TYPE OF FUNDING (RESEARCH OR TRAVEL) YOU REQUEST.

CHECKLIST FOR ALL PROPOSALS

- ☑ Are you a student enrolled full-time this semester?
- ☐ Please circle date of proposal writing workshop you last attended:

  Sept. 8, 2009 Jan 26, 2010 Sept. 7, 2010 Jan. 25, 2011 Sept. 6, 2011 January 24, 2012
  September 4, 2012 or met with the Director of Sponsored Research 9/12/12
- ☑ Minimum 2.5 GPA in major
- ☐ Do you have your Department Chair Signature?
- ☐ The original, signed, collated copy of both proposal and faculty support letter? Faculty support letters should discuss the specific role of the student(s) in research projects or presentations.

CHECKLIST FOR RESEARCH EXPENSE PROPOSALS

- ☐ Applied for or obtained IRB approval (human subjects) or IACUC (animal subjects), if necessary? (please refer to #5 under general guidelines)
- ☑ Obtained current price quotes for equipment and added appropriate shipping & handling costs?

IF ANY PORTION OF THIS PROJECT WILL BE CONDUCTED OFF-CAMPUS, PLEASE LIST THE LOCATION(S) AND APPROXIMATE DATES THAT YOU EXPECT TO BE AT THE OFF-CAMPUS SITE(S).

_____

_____

CHECKLIST FOR PRESENTATION/PERFORMANCE TRAVEL PROPOSALS

- ☐ Included confirmation of presentation acceptance for conference? If not, include in your proposal the date you expect to be notified.
- ☐ Does your travel budget adhere to stated allowances for auto, lodging and meals?

DATE OF MEETING _____ LOCATION _____

NAME OF MEETING/CONFERENCE _____

GENERAL GUIDELINES

1. A **maximum of $600** will be awarded to each undergraduate recipient per semester.
2. Groups of 3 or more students applying together for the same project or presentation will be limited to a **total of $1500.**
3. Students must be enrolled on a **full-time** basis.
4. Research projects must be **supervised by a faculty mentor** or sponsor.
5. URG funds may not be granted to fund stipends.
6. Research must conform to standards set by the Institutional Review Board for the Protection of Human Participants and Institutional Animal Care and Use Committee. Students using human or animal subjects for data collection need to include evidence that IRB or IACUC approval has been obtained or is being sought. Evidence of IRB or IACUC approval is required for those seeking support for travel.
7. A final report must be submitted to the Geneseo Foundation promptly after completion of the project.
8. **Submit original signed application with faculty support letter to Erwin 205.**

RESEARCH EXPENSE GRANTS

GUIDELINES FOR GRANTS FOR SUPPLIES, EQUIPMENT, RESEARCH-RELATED TRAVEL, AND OTHER EXPENSES TO BEGIN OR CONTINUE A RESEARCH OR CREATIVE PROJECT:

1. **Awards are competitive and decisions for funding will be based on the quality of your grant application.** Having a paper accepted, personal or career goals, and graduate school admission alone are not sufficient justification for funding. You must respond to all questions in #2 and #3 below and it should be 3-5 pages in length to provide the review committee with adequate information.
2. Please include a **detailed rationale** to support your proposal which includes the following information:
   a. What is the purpose of your project? *(hypothesis, thesis, objective)*
   b. How are you doing the project research? *(methodology, procedures, research strategies, etc.)*
   c. Indicate the specific role of each student in the project (e.g. what specific experiments or activities will the student(s) be responsible for?)
   d. What is your timetable?
   e. What are the expected conclusions or results of your project? (What do you hope to find out and/or accomplish?)
   f. Why should you receive Student Association/Geneseo Foundation funds for this project?

   Your rationale must be written so that a student or faculty member outside of your major may understand.
3. Include supporting documentation as it applies to your proposal:
   a. Examples of research "tools," if applicable *(Include, when appropriate, questionnaires, surveys, interview questions, lists of collections or archives you intend to utilize, etc. and explain how these address the purpose of your research)*
   b. Verification of your ability to do the research *(appointments for interviews, availability of needed equipment, contact with archivists to discuss accessibility of collections, etc.)*
   c. Equipment - ***(current price quote including S & H,*** *explanation of equipment, what it is used for, and appropriate shipping and handling costs. Demonstrate that equipment is not otherwise available, integral to the research, too inaccessible to borrow and would enhance student academic pursuits beyond your project)*
   d. References – (*cite works used in developing your proposal*)
4. All applications must be accompanied by a letter from an appropriate faculty sponsor specifically endorsing the merit and plausibility of the proposal and outlining both student and faculty sponsor roles.
5. Please include a detailed project budget with explanations to justify your budget requests. ***Budget allowance for duplicating is $0.05 per copy with $100 maximum.***
6. Travel expenses for trips to conduct research (e.g. to travel to an archive or library or to conduct field research) are allowed under the Research Grant category. Please follow the limitations for travel expenses noted on Page 3 (Presentation or Performance Travel Grants) as follows: auto $0.22/mile; for lodging use the lesser of the actual per-night student cost or $70/night; meals $31/day (broken out at $7 breakfast, $9 lunch, and $15 dinner, as appropriate).

Item	Explanation	Description	Total
EL-USB-1 USB Temperature Data Logger	A data logger that will measure temperature at time intervals to record actual temperature's in culture chambers during experiments.	A data logger that can store temperature data points and load onto a computer via USB.	$ 197.47
			$
			$
			$
			$
	TOTAL		$ 197.47

Please direct any questions to: Anne Baldwin, Director of Sponsored Research, 245-5547, Erwin 205, baldwinA@geneseo.edu

Determination of ideal conditions for robust growth of *Astrephomene gubernaculifera*

Background

Prior experiments have shown that the colonial green alga *Astrephomene gubernaculifera* has a chemoattraction to acetate (Hoops et al. 2002). Unfortunately, the original strain that was used in these experiments was lost and is no longer available. *A. gubernaculifera* is a rare alga and there are few isolates available. Further, these experiments must be done in bacteria-free cultures and most of the few available cultures are co-cultured with bacteria. The Hoops lab has obtained two new strains new strains of *A. gubernaclifera* from Japan. However, these do not exhibit as robust growth under dim light at 25° in the same media as the prior strain of *A. gubernaculifera* did.

We presume that the newer strains may not be growing under their optimal conditions. In order to determine the optimum conditions for growth of the new strains we have designed several experiments. We will test a range of different temperatures, light intensity, pH, and acetate concentrations to find the best conditions for growth. Ensuring the new strains grow robustly is important to make sure that the results of experiments using the new strains are valid.

Experimental Design

I have already developed a spectrophotometric assay for cell growth, and I will further check the cultures visually and will use the light microscope to determine their morphology and health under each condition. We have multiple culture chambers to use in these experiments, but we have observed unpredictable temperature fluctuations inside the chambers. In order to interpret the results, we need to know the actual temperatures throughout the growth periods. We propose purchasing three EL-USB-1 temperature data loggers from CAS DataLoggers.

These could be placed next to the samples and would record the temperature at 5-minute intervals through the experiments.

I am the sole student conducting these experiments and will be responsible for all aspects of them under the guidance of Dr. Hoops. I have started an experiment varying light intensity to determine the optimum light conditions for the growth of the new strains. Using Styrofoam boxes and different locations to block out a portion of light, I have set up four replicates for each of five different light intensity conditions. Every night growth in each culture will be measures using the spectophotometric assay, and visually checked to determine health and morphology. Varying light intensity is one of the easier experiments to set up, along with varying temperature.

The experiment to determine optimum temperature for growth of the new cultures will be set up as soon as data loggers are available. The results of the experiment varying temperatures cannot be trusted without knowing the actual temperatures of the culture chambers. I would like to set up this experiment as soon as possible because once the data loggers are obtained it is a simple experiment to set up and temperature is very important when culturing cells.

Similar to the light intensity experiment, testing temperature, pH, and acetate concentrations will be set up with four replicates and assayed for cell growth, health, and morphology using the same procedures. After the optimum growing conditions are determined I will test whether or not the new strains exhibit chemoattraction to acetate, as the prior strain of *A. gubernaculifera* strain did.

Chemoattraction to acetate is a very important property that the previous strain of *A. gubernaculifera* strain showed. Other students in the Hoops lab have research based on the chemoattraction of *A. gubernaculifera* to acetate. Determining the optimum growth conditions

and testing the chemoattraction to acetate is required for these other experiments because of the newly acquired strains. My research will benefit the other current students in the Hoops lab, as well as any future students who will be using the new strains of *A. gubernaculifera.*

I have all the needed materials for the experiments mentioned, and below is a timetable outlining my plans for the fall and spring semesters.

Fall 2012	Spring 2013
• Determine which light intensity is the best for growth. • Determine what temperature is the best for growth. • Determine what pH is the best for growth	• Determine what concentration of acetate is the best for growth • Determine which growth media is the best for growth • Determine if the new strains exhibit chemoattraction to acetate

Equipment and Budget

The three data loggers, each at a cost of $59.95 plus shipping would require a total of $179.85. Shipping is estimated at $17.62 bringing the final total to $197.47. This model of data logger is easy to use, holds enough data to be used for the length of the whole experiment, and has a USB interface for easy data entry. Three of these would be enough to monitor temperature fluctuations in culture chambers during the experiment designed to determine the optimum growing temperature for the two new strains. There are not enough data loggers on campus to monitor temperature fluctuations in each of the culture chambers, and these must be dedicated to

the sole purpose of monitoring the culture chambers while the planned experiments are going on.

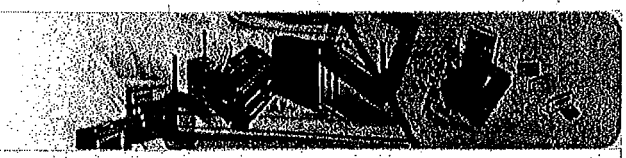
Attached is a printout with the description and total if purchased from CAS DataLoggers.

1. Hoops, Harold J., Amy E. Cocina, David S. Binder, and Armand Widjaja. 2002. Acetate is a chemoattractant for the colonial green alga Astrephomene gubernaculifera (Chlorophyceae). *Journal of Phycology* 38.6 : 1099-105.

CAS DATALOGGERS

www.DataLoggerInc.com

1-800-956-4437



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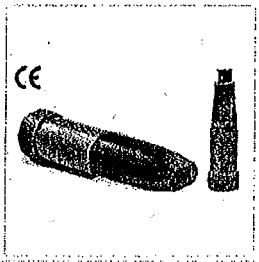
3 Items

CAS DataLogger Store

EL-USB-1 USB Temperature Data Logger

$59.95

1 Add to Cart



USB Temperature Data Logger

- -35 to +80C Temperature measurement range
- User programmable sample rate and alarm limits
- 16,000 Point storage capacity
- IP67/NEMA 4X rated
- USB interface for set-up and download
- Replaceable battery
- View More Information

Cart Items	Quantity	Item Price	Item Total
EL-USB-1 USB Temperature Data Logger	3 Remove	$59.95	$179.85
		Subtotal	$179.85
		Shipping	$17.62
		Total	$197.47

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Geneseo STATE UNIVERSITY OF NEW YORK AT GENESEO

Department of Biology

9/12/12

Letter of support **for** [redacted]
For a Student Undergraduate Research Grant
Fall 2012

Organisms sense the environment and respond to it. The best understood sense and response system is bacterial chemotaxis, the process where the bacterium senses an attractant or repellent and modifies its swimming behavior to move towards a source of the chemoattractant or away from the source of chemorepellent. After many years of study, this process is understood in exquisite detail. Every gene/protein involved has been identified and in most cases extensively characterized. Further the interactions between each of the proteins have been worked out. However, we now know that there are significant differences between the sensing and response systems of bacteria and of eukaryotic systems including humans.

In humans, a very large number of sense and respond systems are based on a signaling mechanisms that involve heterotrimeric G-proteins. Processes that work through such proteins include such sense and response systems like smell, vision and the "fight or flight" response. In fact they are so important to humans that more than half of all modern drugs (including Claritin, Prozac, Viagra etc.) are thought to work by affecting one or more steps in a G-protein mediated signaling pathway. One very common G-protein signaling pathway works through the secondary messenger cAMP.

The motile green algae are favorite experimental systems for genetics and motility. *Chlamydomonas*, a unicellular form, is perhaps one of the dozen most important eukaryotic model systems. Unlike bacteria, these green algae make use of signaling pathways involving heterotimeric G-protiens. *Chlamydomonas* shows a weak chemotactic response, but a strong response towards light (phototactic response). In contrast the colonial green alga *Astrephomene gubernaculifera* shows a very well developed chemotactic response towards acetate (3). This response necessarily involves changes in the behavior of the flagella that are used for propulsion and steering in this organism. The biochemical basis of this chemoresponse is unknown, but we suspect that it may involve a heterotrimeric signaling pathway for the following reasons. First, the closely related green alga *Chlamydomonas* has genes for proteins in the heterotrimeric G-protein pathway (5), and one would therefore expect such genes to be present in *A. gubernacilifera*. Secondly, components of the cAMP signaling are thought to influence flagellar behavior in may organisms including humans and *Chlamydomonas* (2,4,6,7). Lastly, cAMP pathways are thought to influence phototaxis (a different flagellar–based response behavior) in *Chlamydomonas* (1).

[redacted] are working out the methods for this experiment (see other grant). However the strain of *A. gubernaculifera* I used in the original experiments is no longer available and an alternate bacteria-free culture has been hard to obtain. This alga is uncommon in culture collections and when available is often co-cultured with bacteria that interfere with the chemotaxis assay. For unknown reasons, the methods I had used before to

make mixed strains of *A. gubernaculifera* bacteria-free did not work with the strains I tried. We have finally gotten an axenic strain (air shipped from Japan!)

Interestingly, this strain grows differently than the previous strain did. We are presently growing it is a different medium in which it grows better but not as rapidly as the original strain. I have had it in culture for about six months, so we are certainly able to maintain it. The previous strain showed its most well developed response when it was very rapidly growing, so we need to grow this strain under its optimal conditions before working out additional portions of the assay. [redacted] has joined my lab and is undertaking experiments to find optimal growth conditions. He will be testing the effects of temperature, light intensity, pH, acetate concentration and inoculum size on the overall growth rate and morphology. Most of these are pretty straight forward and can be done with materials already on hand. However, we need to carry out the temperature and light experiments in our lighted culture chambers. The culture chambers are notoriously finicky. For example, one chamber is set at 25° C and is usually at that temperature. However, a min/max thermometer revealed that the temperature has varied from 21° to 29°. If [redacted] is to compare growth of the strains he has to know how the temperature varied over the course of his experiments. It is impractical to check the temperature manually every half hour or so for the week of a typical experiment. [redacted] asks for several temperature "data loggers". One data logger would be placed in each culture chamber and will periodically record the temperature. These records can be downloaded into Excel and analyzed. Unexpected temperature changes would be undesirable, but at least he would know about them and could modify or repeat the experiments.

[redacted]s new to research, but has a solid record of scholarship in both classes and labs at SUNY Geneseo. He will be able to do these experiments. I therefore recommend funding his grant.

Sincerely,

Harold Hoops, Biology

1. Boonyareth, M., J. Saranak, D. Pinthong, Y. Sanvarinda & K.W. Foster. 2009. Roles of cyclic AMP in regulation of phototaxis in *Chlamydomonas reinhardtii. Biologia.* 64:1058-1065.
2. Govorunova E.G., O. O. Voytsekh & O. A. Sineshchekov. 2006. Changes in photoreceptor currents and their sensitivity to the chemoeffector tryptone during gamete mating in *Chlamydomonas reinhardtii. Planta.* 225:441-449
3. Hoops, H.J., A,E. Cocina, D.S. Binder and A. Widjaja 2002. Acetate is a chemoattractant for the colonial green alga *Astrephomene gubernaculifera* (Chlorophyceae). *J. Phycol.* 38:1009-1105.
4. Jivan, A., S. Earnest, Y.-C Juang & M.H Cobb. 2009. Radial spoke protein 3 is a mammalian protein kinase A-anchoring protein that binds ERK1/2. *J. Biol. Chem.* 284: 29437-29445.
5. Sabeeha S. Merchant, et al. 2007. The *Chlamydomonas* Genome Reveals the Evolution of Key Animal and Plant Functions. *Science* 318, 245-251.
6. Smith, E.F. 2002. Regulation of flagellar dynein by the axonemal central apparatus. *Cell Motility and the Cytoskeleton.* 52: 33-42
7. Yang, C. & P. Yang. 2006. The flagellar motility of *Chlamydomonas* pf25 mutant lacking an AKAP-binding protein is overtly sensitive to medium conditions. *Mol. Biol. Cell* 17: 227-238.