

## Student Research Opportunity, Summer 2009:

### The C-fern™ protocol: Fern Gametophytes, *in vitro* Cultivation, Fertilization and Genetics

**Sponsoring:**

Post Katrina Bossier Shreveport SCINET Initiative and Student Research Grant

Part of a "Psilotum Project"

**Supervisor:**

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**Time frame:** June and July  
**Workload:** 8 hrs/week, 10 weeks  
**Payment:** \$500.00 total  
**Research credit:** possible by appointment (e.g., BIOS 491)

**Application:** Friday May 8, Dr. Amy Erickson, in print! (not e-mail).  
**Form:** Shreveport/Bossier Sci-Net Summer Research Opportunity

**Pre-Requirements:**

- Endurance and reliability, independent operation and accountability.
- Interest in organismic biology, cell biology, or genomics, genetics, or gene expression studies.
- Familiarity with land plants and life cycles of organisms.
- Experience with ms-Office, Excel, PowerPoint, internet searches.
- Experience with reading primary literature.

**Recommended either of**

- BIOS 224 & 224L, Principles of Botany
- BIOS 320 & 320L: General Microbiology
- BIOS 330 & 330L: Cell Biology
- Laboratory practice

**Accomplishments:**

- Reproduction and adjustment of the provider's C-fern™ protocol
- Application of this protocol to a eusporangiate fern with green gametophytes (species of Equisetales or Marratiales).
- Presentation consisting of poster and oral presentation (PowerPoint), putatively in April 2010.

## Outline

**C-fern™** is a protocol for gametophyte cultivation and plant genetics specially designed for teaching purpose. We want this protocol to pilot the cultivation of other gametophytes, and class exercises.

***Ceratopteris*** is an established model organism for plant genetics and molecular biology, and it is an aquarium ornamental.

**This is** a great opportunity to acquire skills in tissue culture and lab techniques.

### **1) The purpose of the project is the cultivation of fern gametophytes under controlled conditions.**

First we will establish a protocol for the growth and fertilization of photoautotrophic gametophytes of the model fern *Ceratopteris* (Filicales) using a commercial protocol. Second, we will attempt to grow heterotrophous gametophytes of eusporangiate ferns, namely *Equisetum hyemale* and *Psilotum nudum*. Benefits on short terms are education, and mid term research. In education, *Ceratopteris* serves as model organism (genetics and botany), since it has a very short generation time. In environmental research, cultivatable gametophytes allow to study establishment and life expectancy of fern population under diverse conditions; as haploid generation, gametophytes provide quasi homozygous genotypes (only one set of alleles), and better resolution of population genetics. In developmental research, embryo development of pteridophytes requires access to gametophytes at predictable stages; early embryo development bears information on the evolution of the distinction of root and stem, and the primary polarity of embryos in all

**2) The goal is a student to establishing and completes the protocol for C-Fern® Project,** provided by Carolina Biological Supply Company, developed by Department of Botany, University of Tennessee, Knoxville (Carolina cat#15-6702, more references below).

**3) Envisioned time frame: June and July 2009** (two month project)

**4) College students with completed introductory botany (BIOS 224) are preferred;** high school students with special interests in botany/developmental biology, and able to execute maintenance tasks, may be considered after an interview.

### **Additional information & references:**

- <http://amerfernsoc.org/growfrnc.html>
- [http://www.botany.org/bsa/announce/fast\\_pl.html](http://www.botany.org/bsa/announce/fast_pl.html)
- <http://www.biologie.uni-hamburg.de/b-online/library/cfern/cfern.bio.utk.edu/resource/whycera.html>