Department of Biological Sciences
McMICKEN COLLEGE OF ARTS AND SCIENCES

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 1, 2014

The Department of Biological Sciences is pleased to offer the following research project for the summer of 2014. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.

GENETIC EXCHANGE IN THERMO-ACIDOPHILES

Professor Dennis Grogan
Department of Biological Sciences
1408 Crosley
Cincinnati, OH 45221-0006
Tel: (513) 556-9748
Fax: (513) 556-5299
Email: grogandw@ucmail.uc.edu

Project Description

Certain prokaryotic micro-organisms (primarily archaea) colonize acidic hot springs, and the Grogan lab studies their genetic processes. The projects available to a 2014 WISE participant apply basic techniques of molecular genetics to thermoacidophilic archaea in order to better understand how they exchange and recombine DNA sequences.

Sulfolobus acidocaldarius cells normally transmit chromosomal DNA to each other in a process of conjugation that can produce genetic recombinants. It is not clear whether the DNA transfer has a defined direction, however. Attempts to answer this question will document the pattern of markers in a large number of recombinant chromosomes by molecular genotyping, or force one "parental" strain to serve as the DNA donor by killing it with gamma radiation. Other experiments may document properties of the recombination process that occurs after DNA transfer. Does recombination require certain enzymes or configurations of markers, for example? Does it generate mismatches in regions of sequence divergence, and if so, how efficiently are these mismatches repaired? Ultimately, all these studies address whether thermoacidophilic archaea employ unusual molecular mechanisms to carry out basic genetic processes under extreme environmental conditions.