DEPARTMENT OF BIOLOGICAL SCIENCES
College of Arts & Sciences

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: MARCH 1, 2002

The Department of Biological Sciences is pleased to offer the following research projects for the summer of 2002. Interested students are urged to contact the faculty member(s) directing the project(s) that most interest 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.

Professor Steve Rogstad
Department of Biological Sciences
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The Rogstad Laboratory is investigating population biology issues that may contribute to saving the endangered North American Chestnut, which may go extinct by the end of this century due to the introduced chestnut blight. Students will have the opportunity to learn plant DNA extraction and manipulation techniques, as well as methods used to analyze DNA genetic markers and the information they provide.

Professor Bruce Jayne
Department of Biological Sciences
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The student could become involved in projects studying how different environments affect the locomotion of animals. Ongoing projects include 3-dimensional analysis of the limb movements of lizards as they move on horizontal, uphill and downhill perches with varying diameter. Some preliminary experiments with insects and small scale artificial landscapes will determine how features of the landscape such as the size and steepness of the hills affect the paths traveled by the animals. Additional opportunities include recording and analyzing muscle activity of lizards. Good quantitative skills are required, and some experience with Microsoft Excel spreadsheets is desirable but not necessarily required.

Professor Brian Kinkle
733 Rieveschl x 6.9756 Fax: (513) 556-5299 Email: Brian.Kinkle@uc.edu

Dr. Kinkle is an environmental microbiologist with current research projects focusing on the biodegradation of pollutants in soil, the ecology of pathogenic bacteria in drinking water, and the ecological genetics of microbes growing in acidic hot springs in Yellowstone National Park. For further details see his web site http://www.biology.uc.edu/faculty/kinkle/brian.htm), or contact him by phone (556-9756) or email (kinkleb@email.uc.edu).

Professor Michael Miller
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What is the impact of tributaries and land use on the nutrient budget of the Ohio River? What is the impact of nutrient loading on the algal biomass of the Ohio River? Is the response to nutrient loading attenuated by the high dams of the navigation channel? A four university consortia including UC, NKU, Thomas More, and Marshall U will be taking a 500 mile boat trip down the Ohio River from above Cincinnati to Cairo, IL sampling water chemistry, sestonic chlorophyll, nutrients, phytoplankton, zooplankton, zebra mussel veliger density, coliform bacteria, and antibiotic resistant bacteria. Completing the transect begun last summer with River Run 2001, we will sample the Ohio River water every 5 miles and in each tributary mouth. Join the first of its kind transect of the Ohio River under steady state summer moderate to low flow, to help us understand nutrient dynamics in large rivers. Participant will have ability to setup an independent parameter of choice s Caffeine, PAH's by Elisa, Gasoline/Oil spillage by Elisa) as well as participate in all of the adventure.

Professor Charlotte Paquin
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My research focuses on understanding gene amplification, the mutation from one copy of a gene per genome to two or more copies of a gene per genome in the yeast, *Saccharomyces cerevisiae*. Gene amplifications allow the evolution of new genes because when two copies of a gene are present one copy can maintain the normal function of the gene while an extra copy can evolve a new function. In addition, gene amplification is very rare in normal cells but quite frequent in cancer cells and it is one mechanism of over-expression of oncogenes. Current research projects in the lab involve molecular characterization of gene amplifications, identification of mutations that increase amplification rates and experimental evolution experiments using yeast strains with increased amplification rates or extrachromosomal amplifications.

Professor Ken Petren
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Research in the Petren lab addresses various issues related to the ecology of vertebrates. Changes in population density can often be traced to biological interactions such as competition and predation. These processes can be mechanistically related to behavioral interactions among individuals. Pacific island lizard communities serve as a model system to address these questions because these communities have recently undergone invasions and displacements. Invading species often have a direct negative impact on native species, thus understanding invasions is a priority for conservation and management. Molecular techniques are also used extensively to reconstruct the movements of individuals among populations and the evolutionary history of species. Microsatellite genetic fingerprinting is being used to study island populations of gecko lizards, as well as the diversification of Darwin's finches of the Galápagos Islands.

Professor Jodi Shann
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Potential Research Area 1: The revegetation and ecological restoration of contaminated sites has not been well investigated. We are currently monitoring plant succession and phytoremediation on a 5 acre site that is contaminated with petroleum hydrocarbons and metals. The majority of the plant data is collected between May and October. The soil samples are collected at the beginning of the summer, but are processed throughout the year.

A summer student could work with me and with the PhD student conducting the project to:1) collect and analyze field data. To do this well, she would need to learn to identify species, take representative samples, and use a diversity of sampling techniques (including GPS and digital imaging).2) examine under controlled conditions (lab or greenhouse) some aspect of remediation and/or succession that directly relates to the field study. My WISE student last summer (Cecilia Henessey) determined the mobility of metals in soil collected from the site, and the influence that plants or plant compost had on this. She is currently repeating critical experiments so that the work can be submitted for publication.

Potential Research Area 2: Our lab has demonstrated that the root exudates of a model plant species (corn), when applied to unplanted soil, increase degradation of polycyclic aromatic hydrocarbons (PAHs) by microbial communities. PAHs are common contaminants that can be both hazardous and recalcitrant in the environment. A summer student could conduct an independent project to screen different plant species for their production of root exudates (total carbon). She would then test the effectiveness of these exudates for increasing degradation of PAHs in soil. The student would learn how to control variables within an experiment, and how to collect, handle, and process samples. In addition, the student would learn to run state-of-the-art analytical instruments such as ICP, HPLC, GC, and GC-MS.