

Dr. Ron Nellerhoe's Research

(RN)

This summer research project will involve field work at two different locations. The first portion will be spent exploring the beautiful but rugged Hell Creek formation northwest of Jordan, Montana. This is classic late Cretaceous exposure and it has great potential for interesting dinosaur material. The second portion will be spent in Wyoming on the west side of the Big Horn Mountains. We will spend several days around the Shell, Wyoming, area visiting other professional groups, old historical sites and getting familiar with the rock units and structure of this Jurassic age region. From here we will travel south to Tensleep, Wyoming, to continue excavation on a site started last season. This site appears to be that of an immature *Apatosaurus*. You will experience all aspects of field paleontology during this project. There will be 3 weeks of camping, hiking and field work along with pre and post laboratory work. The total summer research period will be 8 weeks.



Dr. Gerald Van Amburg's Research

(GVA)

A POPULATION SURVEY OF MUSSELS IN NORTH DAKOTA RIVERS

Mussels are one of the most threatened groups of animals in North America, with over 71% being listed as endangered, threatened or of special concern. Studies of mussel populations have shown a relationship between loss of mussel species richness and agricultural land use. Since North Dakota is largely an agricultural state, the need exists to document the current status of North Dakota mussel populations. A two-year study has been funded by the North Dakota Game and Fish Department. The first-year will be an assessment to determine the mussel species distributions in North Dakota. Thus the two main purposes of the first-year survey is to provide species lists within a sampling site and determine species distribution throughout the state. We anticipate sampling approximately 100 sites this first summer. The entire project team will consist of four students, two biology faculty (Concordia and Valley City State University) and one technician. Students applying as research assistants should feel comfortable working in water and be able to swim. The project requires travel throughout North Dakota, staying overnight in motels and/or camping. Travel expenses will be paid by the project grant. The summer portion of the project will run at least 10 weeks. Research assistants may also have the opportunity to work on this project during the academic year. During this time selected shells will be thin-sectioned for age determination. Age information will provide some valuable demographic data on mussel populations.

Principle Investigators: Dr. Gerald Van Amburg, Concordia Biology Dept.
Dr. Andre DeLorme, Valley City State Univ. Biology Dept.



Dr. Jennifer Bath's Research

(JB)

Helminth Vaccine Trial

This research project is a continuation of a project started this spring. It involves the design and construction of a dual-epitope DNA vaccine targeting both CD4+ and CD8+ T cells as well as a primary vaccination study in mice. We will be looking for evidence of activation of specific cell types by examining expression of proinflammatory, anti-inflammatory, and regulatory cytokines as well as analyzing the humoral responses from outbred mice.

Dr. Krystle Strand's Research (KS)

Systemic Lupus Erythematosus (SLE) is a systemic autoimmune disease of unknown etiology that often results in severe damage to joint, kidney, heart, lung and brain tissue in humans. Initial symptoms and early progression of the disease are variable. It has been reported elsewhere, for example, that neuropsychiatric, or CNS-lupus, develops in approximately 20% of cases. The complex molecular interactions involved in lupus, as well as associated changes in gene expression and protein synthesis are poorly understood. Current treatment regimens such as prednisone and other anti-inflammatory drugs are non-specific and over time often lead to adverse effects in people with lupus. Increasing our understanding of the genes involved in the development of lupus in its various forms, as well as the pathways and biological processes into which these genes are organized, may provide the information necessary for developing more narrowly-targeted therapeutic strategies in the future.

This project is collaborative, interdisciplinary research with Dr. Susan Larson in the Psychology Department. Students working on this project will measure and analyze global gene expression in brain tissue of lupus-prone and control mice after evaluation of the animals' behavior, emotionality and cognitive function. Techniques include, behavioral analyses, maintenance of mouse colonies, harvesting and dissection of mouse tissues, isolation of RNA from tissues, cDNA synthesis, microarray data analysis using various software programs, real-time PCR analysis and possibly protein expression analysis using ELISA.

Dr. Bryan Bishop's Research (BB)

New avenues for addressing ecological questions have opened up with the advent of molecular techniques. One such ecological question has to do with dispersal of organisms and mating. The mound ants *Formica obscuriventris* and *F. ulkei* both have clumped distributions with areas containing high densities of mounds separated by large distances to other areas with high densities of mounds. Literature suggests that *F. obscuriventris* primarily forms new colonies via colony budding, while *F. ulkei* forms new colonies via foundress queens. By using molecular techniques, we hope to address a number of questions both within a species' population and between species. Some questions include:

- * For a given species, how closely related are mounds within an area?
- * How related is one population to another more distant population?
- * Do the two spp show differences in how they disperse?
- * What does this tell us about the dispersal pattern exhibited by these ants?
- * What does this tell us about the effects of fragmentation as a whole on these ants?

Molecular techniques now allow us to begin addressing these and other questions by analyzing the genes of these ants to determine how closely related different mounds are to each other, how a particular gene disperses through a population, etc. In addition, GIS will allow us to visualize the distribution the dispersal of both colonies and genes within those colonies, elucidating patterns associated with vegetation and soil types. Both field and lab time will be spent on this project.

This study will probably begin the first full week of May and end near the end of June.

http://www.cord.edu/faculty/bishop/Research_interests.html

Dr. Greg Hoch's Research (GH)

I will be starting two new research projects. First, at Hamden Slough National Wildlife Refuge we will be studying the nesting ecology and habitat use of marbled godwits, a large shorebird. We will specifically address land management issues such as haying and grassland types as foraging and nesting cover for the species. Second, we will conduct a population census of burrowing owls at Glacial Ridge National Wildlife Refuge. Burrowing owls have been seen at the refuge in the last couple years. We will determine the breeding status of this species as well as determine diets and available habitat on the refuge for an expanding population. Both of these birds are listed as species of special concern by the state and Federal government.