

Undergraduate Research Seminar
Wednesday, March 12th 5:30 p.m.
Leigh 309

Samantha Baraoidan

"How vegetative structure and composition affect small mammal biodiversity in lowveld savannahs of southern Africa"

As herbivores, seed predators, and prey species, small mammals fill important roles in ecosystems. Grass is the primary driver of the food web in the tropical savannah ecosystems of Southern Africa, and has significant effects on small mammal abundance and diversity. "Shrub encroachment" is a trend affecting savannah ecosystems around the world, in which woody plant species begin to replace grasses due to changes in historical disturbance regimes, biological communities, or anthropogenic influences. Over time, changes in other components of vegetative structure and composition may occur as well. Combining vegetative measurements with the abundance and biodiversity of small mammals is the first step toward understanding the relationship among these components.

This study investigates changes in small mammal communities in relation to changes in vegetation in the lowveld savannah of Swaziland, Africa. Research was conducted at Mbuluzi Game Reserve and Mlawula Nature Preserve in Swaziland. Small mammals were trapped using Sherman live traps on six grids over the course of three months, for a total of 2,304 trap nights. Vegetative surveys were conducted on the same grids during the same time period. Vegetative surveys included measurements of groundcover, shrub cover, canopy cover, tree density, and horizontal visual obstruction. Preliminary results indicate that horizontal visual obstruction can explain much of the variation in species richness and the abundance of certain common species.

Sadra Hamedzadeh

"Dimerization/Cyclization Pathway in the Synthesis of C₂ Symmetric Cyclic Tetrapeptides"

Cyclo-tetrapeptides are useful intermediates in drug design. This could be attributed to the specific characteristics of *cyclo*-tetrapeptides such as their low molecular weight, and favorable pharmacokinetic properties, as well as their ability to support a wide range of substituents and functional groups. Even though, *cyclo*-tetrapeptides could potentially be useful for various pharmaceutical and industrial applications, their applications are currently limited because of their difficult synthesis. The main problem for their synthesis is the difficulty in bringing the two termini in a linear tetrapeptide sufficiently close to each other for the cyclization to occur, which would lead to ineffective cyclization. Such steric and conformational hindrance issues are due to

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peptide bonds in more favorable *trans* conformation, and the tendency of linear peptides to exist in more extended configuration

Utilizing a Pd-catalyzed tandem-deprotection-cyclization reaction, we have developed a novel methodology to synthesize symmetrical and unsymmetrical cyclic tetrapeptides, from open-chain *N*-cbz-dipeptidobenzotriazolides. The *cyclo*-oligomerization reactions were successfully carried out with dipeptidobenzotriazoles as the starting materials, yielding *cyclo*-tetrapeptides. The *cyclo*-tetrapeptides cannot be prepared efficiently by previously reported synthesis methods. This novel methodology would provide a convenient tool for synthesis of a wide variety of *cyclo*-tetrapeptides that could potentially have applications in the pharmaceutical industry, catalysis, and material sciences.

Chris Louviere

“An Ongoing Exploration of the Effects of Metabolic Therapy Against Tumor Cell Proliferation”

Since President Richard Nixon declared war on cancer by signing the National Cancer Act of 1971, each decade has revealed progress including advances in surgical and imaging techniques, radiation- and chemotherapies, and supportive and palliative care. Despite these improvements, the overall cancer death rate has failed to be reduced significantly. Cancer mortality fell only 5% from 1950 to 2005, and is on the path of becoming the number one killer disease in the United States, with approximately 1.5 million new cancer cases each year and 600,000 associated deaths in the U.S. alone. Cancer is a complex disease resulting from the deregulation of multiple pathways driving tumor initiation, growth, and resistance to treatments. The focus of this research is to develop an alternative therapy against tumor cell proliferation through targeting the metabolic properties of cancer cells, specifically those of glioblastoma multiforme (GBM).