



Abstracts and Program

HCLAS Natural Science Research Symposium

October 27th, 2006



9:30 AM – Gathering and Welcome

SESSION I

10:00

NAME: Peter Daniel

DEPARTMENT: Biology

PRESENTATION TITLE: Antennular Waving in Lobsters and the Detection of Odorants: A 3D Kinematic Analysis

ABSTRACT:

How do animals extract information from the complex spatial and temporal structure of odorant plumes? In lobsters antennules can move independently of general body movements through antennular waving. We tested whether antennular waving increases in response to chemosensory stimuli by stereoscopic filming and 3D kinematic analysis. Antennular waving and body movement increased upon addition of squid extract. However there was a strong correlation between antennular waving and body movement independent of stimulus. Left and right antennule movements, while not synchronized, are both tightly coupled to body movement. This results in increased spatial sampling due to body movement and antennular waving.

10:20

NAME: Dilruba Ozmen-Ertekin (with Kaan Ozbay and Jose Holguin-Veras)

DEPARTMENT: (Civil) Engineering

PRESENTATION TITLE: Role of Transportation Accessibility in Attracting New Businesses to New Jersey

ABSTRACT:

A general research methodology, which was developed to analyze the factors affecting companies' relocation decisions, is described, and its practicality is tested through an application on a study region that includes 21 counties in New Jersey representing the 'destinations' for the new businesses, and New York City and Philadelphia representing the 'origins'. A gravity based business relocation model is developed and calibrated using an iterative approach. The modeling process also involves multi-attribute decision analysis to evaluate the determinants of business relocation process as precisely as possible.

10:40 AM – Coffee break

SESSION II

11:00

NAME: Charles Merguerian

DEPARTMENT: Geology

PRESENTATION TITLE: New Geologic Discoveries in Southern Manhattan

ABSTRACT:

Drill core examined from over two dozen separate locations south of Canal Street in Manhattan over the past three years have been fruitful in extending surface mapping from areas of natural exposures north of 59th Street. In this area of no surface exposure, drill core and other forms of

subsurface information indicate that the region is underlain by internally sheared units of the Walloomsac, Manhattan, and Hartland formations together with sheared slivers of serpentinite and foliated granitoid rock. A newly discovered belt of schistose and calcareous rocks appears south of Canal Street in NYC in two separate along strike areas near the World Trade Center site and also reappears across town near the Brooklyn Bridge. Exposed as a result of new construction efforts, the duplication of hitherto unrecognized Walloomsac rocks on either side of southern Manhattan suggests repetition by folding or faulting.

11:20

NAME: Dennis Radcliffe

DEPARTMENT: Geology

PRESENTATION TITLE: Trace elements in natural rutile: testing Pauling's rules.

ABSTRACT:

Natural rutile (TiO₂) nearly always crystallizes in the presence of iron which commonly substitutes (1-2%) for titanium. The octahedral ionic radius of Ti is 75 nm and that of Fe is 65 nm (Fe³⁺) and 75 nm (Fe²⁺), thereby supporting Pauling's first rule. Because the ionic charge of iron is less than that of titanium, a charge imbalance occurs in violation of Pauling's second rule. This could be offset by the substitution of other cations, preferably high field strength which have a high charge

X-ray spectrographic analysis of rutile reveal that 7 trace elements commonly substitute in the rutile structure – Cr, Nb, Sb, Sn, Ta, V, W. The range of octahedral ionic radii of these elements is 68 – 83 nm, all within 15% of the ionic radius of Ti. Further the most abundant trace elements (Nb, Sb, Sn, V, W) have ionic charges of 4+, 5+ and 6+.

11:40

NAME: Alex Zaharakas, Christian Hillaire, Steven J. Evans, and Harold Hastings

DEPARTMENT: Physics

PRESENTATION TITLE: Universal behavior in a model of fluctuation driven ventricular fibrillation.

ABSTRACT:

12:00

NAME: NANETTE WACHTER

DEPARTMENT: Chemistry

PRESENTATION TITLE: Probing Nitric Oxide Release by Furoxans

ABSTRACT:

The synthesis of symmetrically substituted 1,2,5-oxadiazole-2-oxides (furoxans) and evaluation of electronic factors that effect nitric oxide release will be discussed. Nitric oxide (NO) is an important intercellular signaling molecule and plays a role in a variety of biological processes . NO regulates blood vessel dilation, serves as a neurotransmitter, and is involved in the immune response and the regulation of cell death (apoptosis) . Recently, furoxans have been shown to release NO in the presence of thiol cofactors . The reaction of thiols, such as cysteine or glutathione, with furoxans is believed to involve the formation of S-nitrosothiols . Furoxan derivatives, therefore, may serve therapeutically as NO-generators in vivo.

12:20

NAME: Robert Seagull

DEPARTMENT: Biology

PRESENTATION TITLE: Improving the Economic Value of Cotton Crops

ABSTRACT:

To maintain a competitive advantage in the world market, US cotton production must continue to increase crop yield and improve textile quality. As the cotton fiber is the end product of a specific developmental sequence of ovule epidermal cells, changes in these developmental processes provides an excellent mechanism by which to improve cotton. Alterations in the functioning of specific cytoskeletal elements results in changes in the production and subsequent development of fiber that translates into an improved economic value of the cotton. The long term impact of these findings will be discussed.

12:40 AM – Lunch break

SESSION III

1:30

NAME: Paul Doherty and Julie Heath

DEPARTMENT: Biology

PRESENTATION TITLE: Why do Piping Plover eggs fail to hatch?

ABSTRACT:

Piping plovers are small shorebirds that breed on Long Island beaches. This species is listed as endangered or threatened by federal and state authorities. Excluding nest predation, plover population declines may be the result of poor nesting success because of chronic human and/or predator disturbance. Disturbance can affect adult behavior, physiology, or both and consequently alter nest attendance. Changes in nest attendance may result in nest abandonment and partial clutch failure. We investigated the relationships among nest disturbance, adult behavior, egg viability, and nesting success. Results will aid wildlife managers in making decisions about how best to protect this species.

1:50

NAME: Bret Bennington

DEPARTMENT: Geology

PRESENTATION TITLE: Testing for Ecological Stability in the Fossil Record: Promises and Problems with a Guild Level Approach

ABSTRACT:

Assemblages of marine fossils appear to recur through some intervals of geologic time, suggesting that ecological structure is conserved across episodes of habitat disruption and loss. However, quantitative analyses of this apparent recurrence reveal that, in most cases, individual fossil assemblages vary significantly in their species abundance distributions, arguing against the conservation of ecological structure. One possibility is that some species are ecologically redundant, so that ecological structure is being conserved in spite of changes in species dominance. Pooling species into ecological 'megaguilds' has the potential to reveal patterns of ecological structure hidden by changes in redundant species, but also introduces a statistical bias that must be addressed.

2:10

NAME: Anthony Agnone

DEPARTMENT: Engineering

PRESENTATION TITLE: R.E.S.C.U.E. 911 (Padre Pio)

ABSTRACT:

An evaluation of rescue/evacuation system currently in use and proposed for high rise buildings is presented. The systems are classified according to passive or active. Evaluation criteria are

presented to assess their relative feasibility and effectiveness. Two novel rescue systems will be presented. Advanced systems based on electromagnetic principles will also be discussed for future exploration.

2:30

NAME: E. Christa Farmer, Woo Sol Choi, Mehreen Quadri

DEPARTMENT: Geology

PRESENTATION TITLE: Tropical Climate Change: Linkages to High Latitudes

ABSTRACT:

Several times during the last 40,000 years, something has dropped large pebbles-- too large to have been moved by ocean currents-- into North Atlantic sediments. It is hypothesized that these pebbles are dropped by melting sea ice, although the mechanisms controlling these events are not well understood. We have identified some changes in sea surface temperatures in the subtropical South Atlantic that seem to be associated with these events. The significance is that changes in deep ocean circulation seem to be involved, and similar changes have been forecast as one side effect of global changes in atmospheric carbon dioxide composition.

2:50 PM – Coffee and dessert reception

POSTER PRESENTATIONS

NAME: Qiong Zhou

DEPARTMENT: Biology

PRESENTATION TITLE: Finding the Imna gene in non-model organisms

ABSTRACT:

Molecular protocols were designed and adapted to collect the nucleotide sequences of Imna from the mammals whose Imna sequence information is unavailable from existing databases. Direct genomic selection was modified in an attempt to enable rapid, efficient, and targeted sequencing of Imna from a wide variety of mammals. The mammalian whole genomic DNA was digested and known oligonucleotides were ligated to the restriction fragments. Mouse Imna DNA was subcloned from a large DNA fragment. After isolation of the Imna containing fragments from the digested restriction fragments, the selected sequences could be amplified with the polymerase chain reaction and sequenced.

NAME: Matthew Testa, Charles Frago, David Miller, Alex Zaharakis, Sabrina G. Sobel (Chemistry), and Harold M. Hastings

DEPARTMENT: Physics

PRESENTATION TITLE: Density driven pattern formation in a shallow petri dish.

ABSTRACT: