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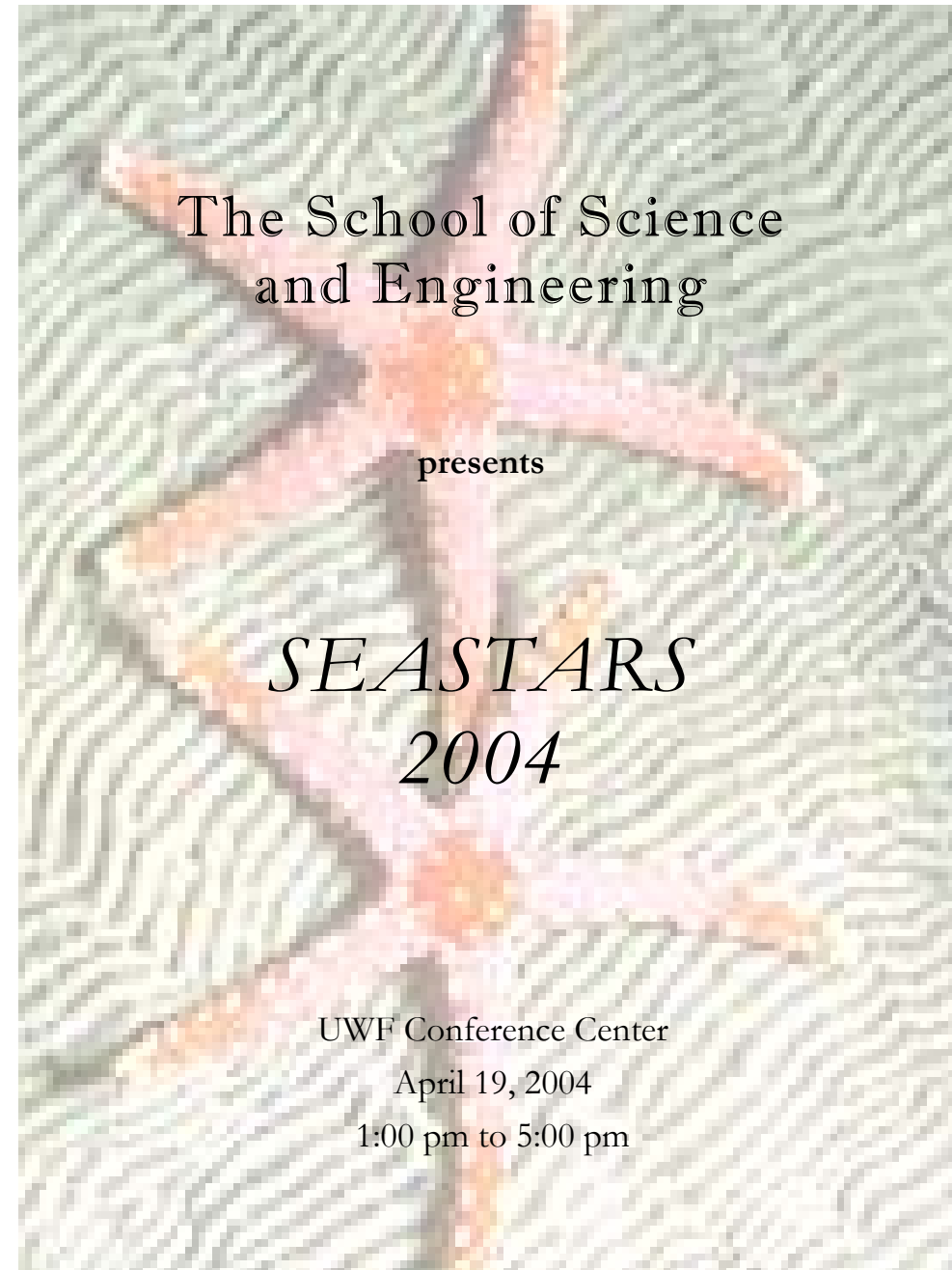
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Univariate and Multivariate Control Procedures for the Process Means and Variances

Dr. Raid Amin and Mr. Oliver Bengel

Department of Mathematics and Statistics



Howell (1949) introduced a Shewhart-type control chart for the smallest and largest observations. He showed that the proposed chart was useful for monitoring the process mean and process variability, and that it was meaningful to place specification limits on the chart. In this article, we propose an exponentially weighted moving average (EWMA) control chart, based on the smallest and largest observations in each sample. When there is a change in the process, the proposed MaxMin EWMA control chart (and its modification) shows which parameters have increased or decreased. The MaxMin EWMA may also be viewed as smoothed tolerance limits. It is a control procedure that offers useful graphical guidance for monitoring processes and for trouble shooting in applications. A two-dimensional Markov-chain to approximate the Average Run Length (ARL) for the proposed control chart is developed. A design procedure for the MaxMin EWMA is given. Numerical results show that the MaxMin EWMA chart has good ARL properties for simultaneous changes in the mean and standard deviation. A comparison with the combined use of \bar{X} and $\ln(S^2)$ -EWMA charts is provided. The MaxMin EWMA chart has already been successfully field-tested and subsequently implemented with 100 multi-stream processes. We are also introducing multivariate extensions to the MaxMin Chart and multivariate tolerance limits. The proposed procedures may provide simple to understand, but powerful ways to simultaneously monitor multivariate means and variances and also obtain (as a bonus) multivariate tolerance intervals.

Trialing the Ciliate *Strombidium* sp. as a Key Prey Item for First Feeding Red Snapper (*Lutjanus campechanus*) Larvae

Ms. Suzanne Gibson, Ms. Manuela Aristizabal,

Dr. Richard Snyder and Dr. William Patterson

Department of Biology



Red Snapper (*Lutjanus campechanus*) is an economically important fish in the Gulf States. While Western Gulf of Mexico populations are rebounding from recent stock near-collapses, Eastern Gulf stocks have yet to achieve the same success. Over the past two decades, studies have been conducted to evaluate their suitability for mariculture stock enhancement programs. High larval mortality, especially during the first feeding stage has inhibited progress. We hypothesize that the significant mortality during the first feeding stage is due to inadequate/ low nutritional prey items. Food items available to larvae in nature include planktonic ciliates, but these organisms have not been adequately tested in mariculture systems for their food value. Ciliates may be ideal prey items for first feeding larvae due to their low motility, ease of digestion and prevalence in the larval snapper's natural pelagic environment. We propose to test our hypothesis by raising larvae in 1 and 2 L beakers at a stocking density of 20 fish L⁻¹. The non-loricate ciliate, *Strombidium* sp. will be introduced to the fish on day 1, post hatch at three different densities. Larval mortality will be observed to determine condition. These protocols will be employed to determine and compare mortality of snappers raised on *Strombidium*, copepod nauplii, and wild zooplankton cultures. We will also evaluate the presence of consumed *Strombidium* with immunochemical and microsphere techniques. Results of this work will directly support efforts to culture red snapper.

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Agricultural BMPs, TMDLs and Water Quality

Ms. Lockett Kiely, Mr. Matthew Wagner, Mr. Jeffrey Allison,
and Ms. Ariel Launder

Department of Biology

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Agricultural runoff may have substantial nutrient loading impact on local water segments as well as on rivers, bayous, and bays within the affected watershed. To promote agricultural best management practices (BMPs) that consider both the legal and environmental ramifications of runoff impacts to surface and ground water, this project integrates scientific validation of selected BMPs with education and extension activities. BMPs consist of a vegetated filter strip (VFS) for aquaculture pond effluent and the use of biosolids for pastureland fertilizer. This project evaluates the effect of BMPs on water quality of agricultural runoff. We established that the catfish aquaculture VFS BMP is effective in attenuating NH₄⁺, total suspended solids, and improving dissolved oxygen in aquaculture runoff and characterized its function, mechanism and operational parameters. We found that biosolids released nutrients over a longer time period than did inorganic fertilizers but supported lower productivity for the same nutrient load in pastureland. Data generated by this project on BMP performance is supporting public education and agricultural extension activities on water quality issues associated with agricultural runoff and to promote BMP use.

Tetrahymena Phosphatidylinositol Synthase

Ms. Tanya Lansley, Ms. Brandy Moye, Mr. Edmond Chan,
Phillip Ryals,

and Dr.

Department of Biology

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Properties of phosphatidylinositol synthase (PtdIns-synthase) from the ciliate *Tetrahymena* were investigated using microsomal fractions enriched for the enzyme. Optimum conditions for maximum PtdIns-synthase activity as assayed in a Triton X-100/CDP-DAG mixed micelle system with [³H]*myo*-Ins as co-substrate were a pH of approximately 8.0 using 50 mM Tris-HCl buffer and a reaction temperature of 30 °C. Incubation of PtdIns-synthase at pre-selected temperatures prior to assay at 30 °C showed that the enzyme was stable for at least 20 min at 40 °C. A sharp decline in activity was seen after incubation at 50 °C for 20 min. Activity was stimulated by 2 mM Mg²⁺ ion in the reaction buffer, and stimulated to a slightly lesser degree by 1 mM Mn²⁺ ion. Other metal cations (Ca, Co, Cu, Fe, Mo, Zn, and Li) at a concentration of 2 mM had no appreciable effect on activity. Under optimum conditions *Tetrahymena* PtdIns-synthase activity was linear over at least 20 min and was linear with increasing concentrations of the enzyme. The enzyme was capable of utilizing both [³H]*scyllo*- and [³H](1D)*chiro*-Ins as substrate to form phosphatidyl-[³H]*scyllo*- and phosphatidyl-[³H](1D)*chiro*-inositol, respectively, with (1D)*chiro*-Ins being the least preferred substrate. Supported by National Institutes of Health grant 1 R15 GM62126-01A1 to P.E.R.

Temporal Dynamics of Estuarine Microbial Biofilm C

Mr. Joseph Moss, Dr. Andreas Nocker-Einsiedler, Dr. Joe Lepo,

and Dr. Richard Snyder

Department of Biology



Microfouling in the form of a biofilm occurs on all solid materials exposed to aquatic environments. A growing central theme of biofilm research focuses on the biogeochemical importance of estuarine biofouling communities. As part of a larger research project investigating the use of biofilms as indicators of ecosystem “health”, the approach of this study was to determine significant temporal variations in estuarine bacterial biofouling communities. Slotted acrylic samplers (periphytometers), holding glass coverslips were deployed monthly (Nov/02-Dec/03) for 7 days during peak tidal periods at a fixed study site (30° 20' 19"N, 87° 09' 21"S) located in East Sabine Bay, Gulf Breeze, Florida. Biofouling communities were fingerprinted using 16S rDNA and terminal restriction length polymorphism (T-RFLP) methodologies using Cfo, Msp, and Rsa digestions. T-RFLP fingerprints exhibited pronounced increases in total dominant signature peaks in warmer sampling periods as well as distinct patterning amongst peaks in winter (Jan, Feb, March) and summer (June, July, Aug) sampling periods. Trends in T-RFLP patterns appear to be associated with increases in recorded ambient water temperature and nutrient levels. Amplified ribosomal DNA restriction analyses (ARDRA) are underway to compliment T-RFLP patterns so that dominant peaks can be phylogenetically assigned.

An Algorithm and Code for Computing Exact Critical Values for the Kruskal-Wallis Nonparametric One-Way ANOVA

Dr. Sikha Bagui

Department of Computer Science

Dr. Subhash Bagui

Department of Mathematics and Statistics



In this article, we provide an algorithm and code to compute exact critical values (or percentiles) for Kruskal-Wallis test on k independent treatment populations with equal or unequal sample sizes using Visual Basic (VB.NET). This program has the ability to calculate critical values for any k, sample sizes, and significance level alpha. We developed an exact critical value table for k=4. This table will be useful to practitioners since it is not available in standard nonparametric statistics texts. The program can also be used to compute any other critical values.

An Initial Examination of Gene-Ontology

Cluster Assessment

Dr. Jacalyn Huband, Dr. James Bezdek, Dr. James Keller and Dr. Nikhil Pal

Department of Computer Science



One of the most important objects in bio-informatics is a gene product (a protein or a messenger RNA). However, the functions or structures of many gene products are unknown. To classify the functionality of unknown gene products, researchers have generated similarity (or dissimilarity) measures to compare the closeness of an unknown gene to a known gene. The similarity measure provides data for cluster analysis, which leads us to knowledge discovery for the gene products.

An important first step in cluster analysis is to determine if clusters exist in the data. A tool that helps to answer this question is the Visual Assessment of (Cluster) Tendency (VAT), developed by James Bezdek (University of West Florida) and Richard Hathaway (Georgia Southern University). VAT presents the pairwise dissimilarity information of n objects as a square digital image with n^2 pixels (after the objects are suitably reordered so that the image is better able to highlight potential cluster structure).

We have applied the VAT tool to gene product dissimilarity data, generated by Mihail Popescu, James M. Keller, and Joyce Mitchell (University of Missouri – Columbia). In this poster, we present the VAT images and resulting discoveries.

Supramolecular Chemistry of Crown Ether Based Ditopic Receptors

Mr. Jason Kimbrell

Department of Biology

Dr. Michael Huggins

Department of Chemistry



Hydrogen bonding is defined as a weak interaction between a hydrogen atom bonded to an electronegative atom and an electron lone pair on another electronegative atom. Ditopic binding is the simultaneous complexation of cationic and anionic species to multi-site receptor. The primary focus and overall goal of our research focuses on the design and preparation of an effective crown ether based ditopic receptor. Anion binding is typically achieved via hydrogen bonding interactions. The target molecule is composed of a crown ether moiety for cation binding, and a pyrrole group for anion binding. Preparation of the target molecule will be accomplished through standard synthetic procedures. Characterization of the binding events will be done primarily through NMR spectroscopy. The preliminary results of the research will be presented.

Studies in Weak Hydrogen Bonding

Dr. Michael Huggins

Department of Chemistry



Hydrogen bonding plays a vital role in a vast array of molecular and biological systems. A “weak” hydrogen bond typically involves a non-traditional hydrogen bond donor or acceptor group. Recently, “weak” hydrogen bonds involving a C-H moiety have found prominence in the chemical literature and are in the midst of a heated debate about their role in protein folding and substrate binding to enzymes. Unfortunately, this interaction is difficult to study experimentally due to its inherent weak strength. We have begun an attempt to prepare a series of model compounds to study this inherently weak interaction. The target compounds were designed to allow for specific control of a self-association process using differing numbers and types of hydrogen bonding interactions, normal and “weak” hydrogen bonds. By studying this process, we will attempt to determine the strength of “weak” hydrogen bond. The results of these studies will be presented.

Chicken Dance as Food for Red Snapper Larvae

Ms. Manuela Aristizabal, Dr. Richard Snyder and Ms. Suzanne Gibson

Department of Biology



This study is designed to define the culture characteristics of planktonic ciliates protozoa, with the goal of using these organisms for critical “first foods” for fish larvae. These protozoa have a characteristic swimming behavior that may stimulate larva fish feeding response. The movement appears to be like the “chicken Dance”. Two approaches have been taken to provide planktonic protists for larvae food: enrichments natural microzooplankton and isolation of specific species. Microzooplankton was collected from Big Lagoon State park in Pensacola FL. Five different loricated and nonloricated were isolated and tested for survivorship. Strombidium has the highest survivorship, when feed a diet of Isochrysis ($n = 64\text{ml}^{-1}$) and Tetra ($n = 14\text{ml}^{-1}$). Strombidium growth was also tested in four different salinities (25,28,30 and 34 ppt). And found to be greatest in 28ppt $n=2150\text{ml}^{-1}$. These data suggest that Strombidium can be mass cultured with Isochrysis at 28 salinity and may be suitable prey for first feeding Red Snapper larvae.

Class D Switching Power Amplifiers: Theory, Design

Dr. Dale Harrell, Mr. Mark Bloechl, and Dr. Mohannad Bataineh

Department of Electrical and Computer Engineering



Switching, or class D, amplifiers represent a source of untapped potential for efficient, high power amplification. They are mostly suited for mobile and portable applications. In an effort to better understand these amplifiers, this project examines the theory, design, and performance of these circuits. As a result, it was determined that Class D amplifiers are not as difficult to design and build as commonly believed. The output sound quality of a well-designed class D audio amplifier is comparable to many high fidelity conventional sound systems. D class amps typically have 90-95% efficiency at rated power compared to conventional audio amps, which have 65-70% efficiency ratings. Most importantly, these benefits are available in a smaller, more cost-effective package due to the switching amplifier's high efficiency and capability for integration.

Structural and Electrical Characterization of CVD

Dr. Mohannad M. Bataineh

Department of Electrical and Computer Engineering



Integrated micro-systems with intelligent sensors that are capable of sensing and evaluating their surroundings will have a profound impact on peoples' lives for generations to come. The Integrated micro-systems dimension will also revolutionize the semiconductor and computer industries. Integration of mechanical structures and multifunctional materials alongside microcircuits on one and the same chip is a new challenge for the semiconductor industry. Fabricating integrated micro-systems requires new structures, new processes, and more importantly, new materials which have excellent electronic as well as mechanical and thermal properties for Micro Electro-Mechanical Systems-Integrated Circuits (MEMS-IC) process flow. Polycrystalline diamond films are uniquely qualified for applications in MEMS, optics, electronic packaging, and other micro components. Real progress in the area of electronic characterization and modeling of materials should lead rapidly to the realization of the potential of such materials for several micro-systems' applications. I am proposing an integrated material and electronic properties investigation of electrical charge transport in CVD Diamond films over a range from DC to 15 MHz AC signals. The results will be analyzed and in light of the potential use of this material in fabricating miniature mechanical and electronic components used in nanotechnology applications.

Sample size calculation for finding unseen species

Dr. Hongmei Zhang

Department of Mathematics and Statistics

Dr. Hal Stern

*Department of Statistics
(University of California at Irvine)*



Estimation of the number of species extant in a geographic region has been discussed in the statistical literature for more than sixty years. The focus of this work is on the design of future data collection efforts in this context. Two population situations are considered, i.e. infinite population size, and finite population size. Specific models are set up for each situation in order to obtain a posterior distribution on the number of species and characteristics of their distribution in the region. Then a Monte Carlo method is used to determine how large an additional sample is needed to guarantee that a specified proportion of the total number of species is collected with a given confidence level.

Discovering Crime patterns in a State Database

Dr. Sikha Bagui

Department of Computer Science



This article presents a knowledge discovery effort to retrieve meaningful information about crime from a State database obtained from <http://www.unl.edu/SPPQ/datasets.html>, a US State Politics & Policy Quarterly Data Resource website. The raw data was preprocessed, and data cubes were created using Structured Query Language (SQL). The data cubes were then used in deriving quantitative generalizations for the data in the form of $t_weights$ and $d_weights$. An entropy based attribute relevance study was done to determine the relevant attributes. Finally, a machine learning software called WEKA was used for mining association rules, developing a decision tree and clustering.

Effects of Rapid Decompression on Striped Burrfish

Mr. Michael Hodgdon, Ms. Abby Holcomb, Ms. Brittany Miller,
and Ms. Meaghan Roche
Department of Biology

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Catastrophic Decompression Syndrome (CDS) in fish is caused by a rapid decrease in pressure resulting in swimbladder expansion, with concomitant loss of internal anatomical integrity. Striped burrfish, have evolved the ability and anatomy necessary to increase their body volume by up to three times. The ability to inflate is primarily a defense mechanism in these fishes, but may also have other advantages. For example, burrfish are known to inhabit depths from 0 to 30 m and a flexible body compartment may prove useful when coping with changes in pressure and potential CDS. Burrfish in our experiments were exposed to pressures of 1, 4, and 7 atm, which mimics depths the fish naturally encounters. Necropsies of treated burrfish did not reveal haematoma, volvulus, eversion or prolapse of the major organs, all classic injuries associated with CDS in teleosts. Resistance to CDS injuries in burrfish may result from the unique anatomical features associated with inflation including an extensive peritoneal cavity, absence of pleural ribs and pectoral girdle, and a thick-walled extensible stomach. Negative effects of pressure change resulting in CDS are devastating to other fish species, whereas the novel adaptations of striped burrfish may allow them to move between depths with impunity.

Post-relocation Home Range Estimation of the Tortoises (*Gopherus polyphemus*) at Islands National Seashore

Gopher
Gulf

Mrs. Bianca Klein
Department of Biology

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Twenty-two tortoises in the Naval Live Oaks Area of Gulf Islands National Seashore were relocated from an area slated for construction. They were moved to a 2.43 hectare silt-fenced area with habitat deemed suitable by park personnel for site adoption by those tortoises. A prescribed burn immediately followed their release from the fenced area to increase site suitability for tortoises following their spring emergence from winter burrows. Fifteen tortoises of varying size class were outfitted with radio transmitters and were tracked for an average of 31.7 days. Immediate post-relocation response was examined using radiotelemetry and the ArcView GIS program Animal Movement 2.0, utilizing the minimum convex polygon method to determine home range. Three tortoises met minimum requirements of the method, and were determined to have home ranges ranging from 0.05 - 0.34 hectares.

The home ranges of the three tortoises were similar to those home ranges found in other studies. This may indicate habitat suitability due to the recent burn event, although site fidelity may be related to their penning experience. Successful reproduction was recorded, and growth was documented for most tortoises since the relocation event. Continued existence of the only remaining population of tortoises at Gulf Islands National Seashore is dependent on the proper management, including prescribed burning, of the Naval Live Oaks Area.

Optimizing Media Conditions for the Tissue Culture of *Melaleuca alternifolia*

Ms. Rebecca Paschen and Dr. Tara Sirvent
Department of Chemistry

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Melaleuca alternifolia, also known as tea tree, is a member of the Myrtaceae family of plants that is native to a small area in northern New South Wales, but it is cultivated for commercial production in many areas of Australia and New Zealand. Centuries ago Australian aborigines used the leaves from the plant to treat skin infections. In the 1700's, explorers brewed the leaves into a tea for drinking. Today the tea tree is harvested and steam-distilled to extract the aromatic oil which is pale yellow or almost colorless and has a potent scent similar to eucalyptus. The oil has many medicinal properties and has an extensive array of bioactivity including anti-fungal, anti-septic, anti-infectious, anti-inflammatory, antiviral, and bactericidal properties. The active ingredients are terpineol, cineol, pinene, terpinenes, and an assortment of alcohols. These components, varying in concentrations, are what make this an attractive medicinal plant in the herbal industry.

Currently there are issues of herbal product safety and supply within the industry. To better control both quality and to increase supply, we are developing a tissue culture method whereby the active phytochemicals can be extracted in large quantities. Tissue culture is a method of propagating plants that allows plants to grow in defined media under sterile conditions.

Finding a Match: The Gale-Shapley Algorithm

Ms. Hadley Weber
Department of Mathematics and Statistics

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The idea of a stable marriage or matching can be explained in the following setting. In a certain community consisting of n men and n women each person ranks those of the opposite sex in accordance with his or her preferences for a marriage partner. A stable marriage is a one-to-one pairing of men with women so that in the set of marriages, no two people prefer each other over their marriage partners.

Despite this seemingly whimsical inspiration, the idea of stable marriage has many applications. Stable matchings can be applied when pairing is required between groups with mutual preferences. One application is matching medical students to internships through the National Resident Matching Program. Another is in business—finding a stable employee-to-job allocation, leading to higher productivity.

At first, it is not evident that a stable marriage will even exist. Gale and Shapley [GS] described an algorithm to construct a certain stable marriage known as the men optimal marriage. Since then, the understanding of the structure of stable marriages has increased. My project will focus on the fundamental concepts, algorithms, and applications of stable marriage.

[GS] D.Gale, L.Shapley, College admissions and the stability of marriage, *Amer. Math. Monthly*, 69 (1962).

Importance of microalgal production on the northern Gulf of Mexico nearshore sand bottom

Mr. Jeffrey Allison

Department of Biology



The proposed project would characterize previously undocumented microalgal productivity on the sand bottom, nearshore shelf (SBNS) of the northeastern Gulf of Mexico. My objectives would be to quantify the spatial development and magnitude of SBNS algal production and the biogeochemical processes associated with sand bottom productivity (water column/sediment nutrient fluxes, sediment production/respiration ratios). The project will focus on the sand bottom habitat offshore of Santa Rosa Island, FL and examine: 1) benthic chlorophyll concentrations, 2) near bottom chlorophyll and nutrient concentrations, 3) benthic primary production, 4) benthic nutrient fluxes, 5) sediment oxygen consumption. Sampling will be conducted by SCUBA divers and measurements will be made in situ where possible to enhance precision in the sampling methods. The results of this study would be directly applicable to management of Northwest Florida's offshore resources.

Oligopyrroles and their Affinities for Hydrogen Bonding

Mr. Dustin Dixon and Dr. Michael Huggins

Department of Chemistry



Oligopyrroles and their affinities for hydrogen bonding have been the focus of our current research. The three molecules specified (1-3) have been the synthetic targets for further titration studies with anions (molecules 1&2) and neutral molecules (3) acting as a guest. Creating an amide bond between a pyrrole-acid and amine is the key step in the synthesis of these bis-pyrroles. Studies have shown anions may hydrogen bond via each N-H group, thus, four of these groups should create a satisfactory location for binding. Target molecules 1 and 2 (host) have a geometry that will allow atoms to fit into the concave portion of the molecule as a guest. Molecule three has a similar geometry but a much larger concave surface; therefore, larger neutral molecules with carbonyl groups such as an anhydride are likely to bind. Computer modeling representations and simple calculations show that these molecules have the correct geometry to allow the desirable binding.

Nitrate Impacts on Florida Apple Snail (*Pomacea paludosa*)

Survival and Growth

Ms. Norah Myers Corrao, Dr. Philip Darby & Dr. Christopher Pomory

Department of Biology



Nitrate pollution in Florida first magnitude springs has been indicated as being a possible reason for declining Florida apple snail (*Pomacea paludosa*) populations. Based on other nitrate toxicity studies, we hypothesized that survival and growth would not be affected at nitrate concentrations typically seen in springs (0–25 ppm nitrate). Field data was used to determine if there was a correlation between spring snail density and spring nitrate concentration. Adult and juvenile LC₅₀s could not be determined based on the low mortality rates. Juvenile EC₅₀ values were determined to be 587.35 and 617.65 ppm nitrate, for trials 1 and 2, respectively. A correlation between spring snail density and spring nitrate concentration was not supported by the data. Elevated nitrate concentrations do not seem to play a role in affecting apple snail populations. We suggest that many other factors, including habitat structure and invasion of exotic plants, contribute to Florida apple snail distributions.

Interleukin-10 functions as an autocrine growth factor in

AIDS associated B-cell lines

Mr. Yi-Chun Huang and Dr. Venkat Sharma

Laboratory of Cytokine Research, Department of Biology



Interleukin-10 (IL-10), first described as a Th2 cytokine, is produced by a variety of immune cells. The principal function of IL-10 appears to be as an anti-inflammatory and immunosuppressive cytokine as it inhibits HIV-1 replication. IL-10 exerts its biological effects by binding to IL-10 receptors (IL-10R). IL-10R is composed of two subunits IL-10R1 and IL-10R2 and both subunits belong to the class II cytokine receptor family.

Using reverse transcriptase-polymerase chain reaction (RT-PCR) method, the mRNA expression of IL-10 and IL-10R in 13 tumor derived human B-cell lines was studied. These cells included AIDS-associated B cell lines (AABCL) and non-AABCL which were further separated based on their Epstein Barr Virus (EBV) status. We observed that IL-10 is expressed in most human B-cell lines (10/13), whereas the IL-10R was expressed ubiquitously (13/13). Furthermore, most of the EBV positive AABCL secrete functional IL-10 protein. Currently, we are analyzing IL-10 gene promoter polymorphisms to study the changes in the IL-10 gene expression between AABCL and non-AABCL. These results suggest that IL-10 functions as an autocrine growth factor in AIDS associated B-cell lines.

Interleukin-15 and Interleukin-15 Receptor expression in Tumor derived B-cell lines

Ms. Kana Tsukamoto and Dr. Venkat Sharma

Laboratory of Cytokine Research, Department of Biology

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Interleukin-15 (IL-15) induces proliferation and promotes cell survival of human T and B lymphocyte, natural killer cells, and neutrophils. IL-15 and the T-cell growth factor, IL-2, exhibit a similar spectrum of immune effects and share the IL-2 receptor (IL-2R) subunits IL-2R β and IL-2R γ for signaling in hematopoietic cells. Each cytokine has a private α receptor namely, IL-2R α for IL-2, and IL-15 α for IL-15 for ligand binding. Since IL-2 has not been identified in human B-cells we wish to explore if IL-15 is the counterpart of IL-2 in human B-cells.

In this study, we examined IL-15 for its ability to stimulate B-cells and characterized the expression of IL-15 and IL-15 receptor (IL-15R) mRNA in tumor-derived B-cell lines taken from EBV positive and negative AIDS-associated B-cell lymphomas and Non-AIDS-associated B-cell lymphoma. Total RNA was isolated from cultured cells and analyzed by reverse transcriptase-polymerase chain reaction (RT-PCR) method to semi-quantify IL-15 and IL-15R mRNA transcripts.

Our results confirmed that IL-15 expression is predominantly induced in all B-cells infected with Epstein - Barr virus (EBV). However, IL-15R expression is induced ubiquitously with or without EBV infection. We further confirmed that in all Tumor-derived B-cell lines 2 molecular forms of the IL-15 R gene transcripts were generated by alternative splicing pattern. Our results further suggest that IL-15 augmentation may be a contributing mechanism in the proliferation of AIDS-related B-cell lymphoma cells.

Lottery Scheduling: Adaptive Feedback Response

Mr. Daniel Pittman

Department of Computer Science

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We describe changes to lottery scheduling, a randomized process management system. Lottery scheduling allows for fair, flexible, and adaptive control over the relative execution rates of processes in a system, and prevents starvation.

Similar to an adaptive feedback queue, the lottery scheduler we propose allows for runtime feedback response and adaptation to allow I/O bound processes the higher priorities proven to be effective in existing algorithms. Unlike adaptive feedback queuing, however, the lottery scheduler eliminates the chance of starvation through the inherent design of the system. Every process is given a set amount of tickets, whose number varies depending on runtime performance. Even though the amount of tickets and consequentially statistical probability of selection for execution can be decreased during runtime, the probability of being chosen is never allowed to be zero. Turnaround time in the lottery scheduler is shown to be less than is possible in both round robin and adaptive feedback queuing algorithms, with only a moderate increase in overhead and decrease in execution efficiency.