University of Houston-Downtown

PROGRAM

10th ANNUAL
GRADUATE SCHOOL AND INTERNSHIP FAIR

Sponsored by the UHD Scholars Academy

Funded by the
Brown Foundation, National Science Foundation, U.S. Army Research Office, U.S. Department of Education, University of Houston-Downtown

Friday, October 23, 2009
UHD Special Events Center

One Main Street, 725-North; Houston TX 77002-1001
Phone: 713-222-5344; Fax: 713-222-5356; scholars@uhd.edu; www.uhd.edu/scholars

UH-Downtown

10th Annual Graduate School and Internship Fair

Welcome Address

On behalf of the UHD Scholars Academy and the College of Science & Technology, we would like to welcome you to the 2009 Scholars Academy Graduate School & Internship Fair. The UHD Scholars Academy (SA) is a competitive academic program for undergraduates majoring in science, technology, engineering and mathematics (STEM) fields. The SA strives to increase the number of academically capable students graduating with degrees in STEM fields and to increase the number of those choosing to pursue graduate study in these fields. This year, the Scholars Academy has grown to 158 students. Most of these students are in attendance today along with numerous other students majoring in the STEM fields at UHD.

We are proud to announce the inclusion of a Student Poster Presentation Session as part of the Graduate School and Internship Fair. The research work presented in these select scientific posters is the result of independent student research conducted on the UHD campus or at collaborating institutions. Our student driven research has served as a springboard for presentations at regional and national scientific conferences. All students in the SA are encouraged to participate in independent research projects during their undergraduate career and approximately 66% of the SA students do. This past summer, about 55 students participated in independent research activities on-campus, with another 27 students in off-campus summer programs and internships, such as the Boeing, Continental Airlines, Texas Medical Center, Case Western Reserve School of Medicine, Rice University, Arizona State University, and UT Medical Branch.

Last academic year, Academy students presented approximately 100 posters at local and national meetings. Within this time period, Academy students presented research posters to the regional/national conferences including ABRCMS, ACS, ASM, MAA, NCUR, RADTech, SACNAS, Sigma XI, TAS, UBM and WAESO, and additional local meetings within their disciplines, and won several awards for their work.

We hope you enjoy your time at UHD with our students and Scholars, and we all look forward to collaborating with you and your institutions in the future.

Sincerely,

Mary Jo Parker, Ed.D.
Director, UHD Scholars Academy

Rene Garcia
Program Manager, Scholars Academy

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

One Main Street, 725-North; Houston TX 77002-1001
Phone: 713-222-5344; Fax: 713-223-5356; scholars@uhd.edu; www.uhd.edu/scholars

Table of Contents

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

One Main Street, 725-North; Houston TX 77002-1001
Phone: 713-222-5344; Fax: 713-223-5356; scholars@uhd.edu; www.uhd.edu/scholars

Program Schedule
Friday, October 23, 2009

8:30 - 9:00 am	Registration and Check-in
9:00 - 10:30 am	Student Poster Session and Breakfast Mixer
10:30 - 12:15 pm	Graduate School and Internship Exhibits
12:15 - 1:15 pm	Lunch for invited guest, faculty and student poster presenters

Conference Organizers:

Dr. Mary Jo Parker, Director, Scholars Academy, UHD
Mr. Rene Garcia, Program Manager, Scholars Academy, UHD
Dr. Akif Uzman, Chairman, Department of Natural Sciences, UHD

UHD Scholars Academy Co-Directors:

Dr. Dennis Rodriguez, Chairman, Department of Computer and Mathematical Sciences
Dr. Edward Sheinberg, Chairman, Department of Engineering Technology
Dr. Akif Uzman, Chairman, Department of Natural Sciences
Dr. Richard Alo, Executive Director, Center for Computational Sciences
Dr. Larry Spears, Director, Urban Center for Student Success in STEM
Dr. George Pincus, Dean, College of Sciences and Technology

SJCN Scholars Academy:

Mr. Lamar McWaine, Director, San Jacinto College North Campus

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

One Main Street, 725-North; Houston TX 77002-1001
Phone: 713-222-5344; Fax: 713-223-5356; scholars@uhd.edu; www.uhd.edu/scholars

Graduate School and Internship Programs

Baylor College of Medicine
- **Graduate School of Biomedical Sciences**
- **Molecular and Human Genetics**
- **SMART Program: Summer Undergraduate Research Training**

City of Houston – Houston Crime Lab

Ensysce Biosciences Inc.

Gulf Coast Consortia
- **Interdisciplinary Bioscience Research and Training**

Kaplan Test Prep and Admissions – Graduate Programs

Rice University
- **Department of Biochemistry & Cell Biology**

Student Conservation Association
- **Houston Conservation Collaborative**

Texas A & M University Health Science Center
- **College of Medicine**

Texas Southern University
- **Graduate School**

University of Houston-Central
- **Admissions and Recruitment, College of Pharmacy**
- **College of Technology**
- **Department of Mathematics**
- **Rice-Houston Alliances for Graduate Education and the Professoriate (AGEP)**

University of Louisiana at Lafayette
- **Graduate School**

University of Texas – MD Anderson Cancer Center
- **Genes and Development Graduate Program**
- **Office of Academic Affairs**

University of Texas – San Antonio
- **College of Engineering, Graduate Programs**

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

One Main Street, 725-North; Houston TX 77002-1001
Phone: 713-222-5344; Fax: 713-223-5356; scholars@uhd.edu; www.uhd.edu/scholars

University of Texas Health Science Center Houston
- **Graduate School of Biomedical Sciences**
- **School of Health Information Sciences**
- **School of Nursing**
- **The Brown Foundation Institute of Molecular Medicine for the Prevention of Human Diseases**

University of Texas Health Science Center San Antonio
- **Graduate School of Biomedical Sciences**

University of Texas Medical Branch
- **Biochemistry and Molecular Biology Graduate Program**
- **School of Health Professions**
- **School of Nursing**

University of Texas School of Public Health
- **Office of Student Affairs**
- **UT Education and Research Center in Occupational Health and Safety**

The following institutions have provided materials for dissemination:

Texas A & M University
- **Department of Biochemistry and Biophysics**

Texas Woman's University
- **Institute of Health Sciences Houston**

University of Texas Southwestern Medical Center at Dallas
- **Division of Basic Sciences**

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

One Main Street, 725-North; Houston TX 77002-1001
Phone: 713-222-5344; Fax: 713-223-5356; scholars@uhd.edu; www.uhd.edu/scholars

Student Poster Abstracts:

1. **Evaluation of Xylem-Feeding Insects in Texas Vineyards: Distribution along State--Wide Environmental Gradients**

Ali Alireza Abedi, UHD Applied Mathematics undergraduate
Drs. Lisa Morano* and Jeong-Mi Yoon**, Research Mentors, *Department of Natural Sciences, **Department of Computer and Mathematical Sciences, UHD

Abstract: The goal of this project was to analyze a large collection of insect trap data accumulated by the Texas Pierce's Disease Research and Education Program. The traps were set in vineyards across Texas to monitor the abundance and distribution of xylem fluid-feeding insects which may vector Pierce's disease (PD). This study evaluated the three most abundant xylem fluid-feeding insects in Texas vineyards: the glassy-winged sharpshooter, *Homalodisca vitripennis*, a smaller green sharpshooter *Graphocephala versuta* and a spittlebug, *Clastoptera xanthocephala*. Insect abundances for each of 40 vineyards spanning 2003-2007 were analyzed against environmental gradients of ecoregion, elevation, annual precipitation and cold hardiness using the multivariate technique Canonical Correspondence Analysis (CCA). CCA showed that distribution of species along environmental gradients was significant ($p=0.001$) and that the environmental gradients explained nearly 67% of the variability in insect distributions across the state. The CCA plot also suggests niche differences between these insect species.

2. **Comparing the Gene Expression in the Lesion-Prone and Lesion-Resistant Areas of the Aorta between Atherosclerosis Susceptible**

Frances Acevedo, UHD Biology undergraduate
Dr. Ba-Bie Teng, Research Mentor, Department of Research Center for Human Genetics, University of Texas Houston Health Science Center

Abstract: Atherosclerosis is an arterial disease that occurs when plaque builds within the walls of an artery, commonly the aorta, eventually leading to a heart attack or stroke. The purpose of this study was to compare the gene expression in the lesion-prone and lesion-resistant areas of the aorta between atherosclerosis susceptible mice (LDb mice) and wild type mice. Two genes have been removed from the LDb mouse, the LDL receptor and apolipoprotein B mRNA editing enzyme; with those genes removed, the mouse becomes susceptible to the development of atherosclerosis. We first cultured the primary endothelial cells from the lesion-prone and lesion-resistant areas of the aorta from both LDb and wild-type mice and synthesized cDNA. We used Real-time PCR to quantify the gene expression of the 17 genes involved in the Calcium signaling pathway. The results show that the genes were modulated in endothelial cells during atherosclerosis development.

3. **Conducting Research on Polymer-Based Solutions**

Kethleyn Africa-Gay and Ngum Ngwa, UHD Industrial Chemistry undergraduates
Dr. Mian Jiang, Research Mentor, Department of Natural Sciences, UHD

Abstract: Commercial glass pH sensors has been used for several years. However, there are limitations that are associated with these pH sensors. The goal of this experiment was to construct a polymer-based pH sensor using polyaniline.

4. **Exploration of Different Anchoring Techniques in Making Carbon Based Detectors**

Nameera Baig and Rameswari Korrapati, UHD Chemistry undergraduates
Drs. Mian Jiang and Larry Spears, Research Mentors, Department of Natural Sciences, UHD

Abstract: Carbon based detectors and actuators have found broadest uses because of their high conductivity, wide electrochemical window, chemical inertness, and thermal/mechanical stability. Functionality and effective adhesion of various carbon material, on the other hand, have remained a major challenge in sensor chemistry. In this work, we tested three approaches to attach carbon particles - graphite and carbon-60 - to form functional composite in chemical and biochemical sensing. The approaches, the sol-gel technique, the nail polish coating, and the plant tissue mixing represent the application of inorganic, organic polymeric, and bio-incorporation for surface functionality. Tetramethoxysilane (TMOS), commercial cosmetic nail polish, and grocery produce potato were used in our study to implement the three approaches for sensor fabrication and comparison. Various chemicals and biochemicals were tested for their possible sensing on these new functional surfaces. By using voltammetry, we found thiocyanate and dopamine exhibit electrocatalytic oxidation on these sensors. Further, the enhanced voltammetric current peaks display linear dependence towards respective concentrations of these analytes. These demonstrated properties may have application in detecting cigarette-smoking related study (with high thiocyanate content in body) and clinic Neuroscience research (with dopamine and other neurotransmitter conveying).

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

5. **Successful Word Sense Disambiguation Using TreeMatch**
David Brown, UHD Computer Science undergraduate
Co-authors: Christopher Bowes and Liem Luong
Dr. Ping Chen, Research Mentor, Department of Computer and Mathematical Sciences, UHD
Abstract: Using a program called TreeMatch, developed in the UHD Artificial Intelligence lab, a variety of matching algorithms have been implemented in order to study their effectiveness at guessing the contextual meaning of a word given the sentence it is located in. After applying a scoring application to the results in order to determine the percentage of correct guesses obtained, the algorithms were modified and the cycle repeated. In addition to modifying the matching algorithms, separate data repositories were used to evaluate the effectiveness of larger repositories for this particular task. Using a dataset and answer key provided by the SemEval 2007 Task 7 Committee, we were capable of guessing the correct word sense approximately 83% of the time.

6. **Modulation of Production Methods of Copper Oxide Crystalline Arrays Created by Chemical Bath Deposition**
Melissa Chan, UHD Biology undergraduate
Co-authors: I. Bobowska and P. Wojciechowski
Drs. Mian Jiang and Larry Spears, Research Mentors, Department of Natural Sciences, UHD
Abstract: CuO-based materials are important for their electrical conductivity and high temperature superconductivity. Creating these materials in a template free fashion, in mild conditions, has proven a challenge. We have produced crystalline films on nano-crystalline CuO nucleation layers using chemical bath deposition (CBD) in $Cu(CH_3COO)_2$ and $Cu(NO_3)_2 \cdot 3H_2O$, forming layers of Cu (II) hydroxyl acetateor Cu (II) hydroxyl nitrate, respectively. This study investigates the results of changes in production methods on composition, morphology and behavior of the films using X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), electrochemistry, and Raman spectroscopy. Using these techniques, we investigated the effects of varying CuO surface area in the nucleation layer, CBD conditions, and choice of metal salt incorporated into the bath. We also observed how impregnation of the layer with titania nanosheet-(2-hydroxypropyl) cellulose (HPC) solution or plain HPC solution affected the results of calcinating the deposited layer. Preliminary results indicate that, although CuO from CBD shares some characteristics with conventional cupricoxide, including the featured Cu(I/II) redox activity, the CuO surface density of the nucleation layer affects the morphology of the copper (II) hydroxy nitrate platelets formed through CBD. Higher CuO surface densities (~0.3g/m2) created layers with carnation-shaped aggregates of plates, while lower surface densities did not. Post-CBD hybridization resulted in the formation of CuO-Ti02 crystalline composite. Other electric and sensory applications of the resultant CuO are currently under investigation.

7. **Novel Application of Homogeneous Electrocatalysis with Conventional Dyes**
Preeti Choudhary, UHD Biology undergraduate
Drs. Mian Jiang and Larry Spears, Research Mentors, Department of Natural Sciences, UHD
Abstract: The fast mass and electron transfer nature of homogeneous catalysis has made it as a powerful synthesis tool in material science. Homogeneous electrocatalysis is application oriented, but has yet received little attention in measurement science and sensing chemistry. Here we wish to report our exploratory effort to apply homogeneous electrocatalysis for detecting some important small molecules of toxicological and environmental significance. The electrocatalysts employed in this study are eurhodin based dyes and other histology stain dyes including Brilliant Cresyl Blue (BCB), Toluidine Blue (TB), Neutral Red (NR), and Methylene Blue (MB). Among these, BCB, TB, NR, and MB all exhibit well-defined, reversible voltammetric redox peaks in wide pH range with various peak potentials, which indicate their fast electron exchange features at the solution/electrode interface. Our further examination shows that these fast interfacing processes offer great potential for catalysis, which was evidenced by significantly enhanced reduction peaks of BCB, TB and NR upon adding small molecules KIO_3, $KClO_3$ $KBrO_3$, $NaClO_4$, $NaIO_4$, Na_3AsO_4, formaldehyde and benzaldehyde in acidic media. A control experiment indicated that these analytes do not produce any appreciable redoxactive transition in the potentials examined. Our mechanistic study revealed that the enhanced reduction peaks are merely from the dyes surface chemistry, yet their redox process are coupled with a homogeneous electrocatalysis. Further, these cathodic peak ~ concentration plots displayed linear response at various concentration ranges. Our preliminary study thus shed great promise for the new detection of these compounds by catalysis.

8. **Novel Sensing Approach for Hydrogen Peroxide**
Marlyn Davila, UHD Biology undergraduate
Drs. Mian Jiang and Larry Spears, Research Mentors, Department of Natural Sciences, UHD
Abstract: Hydrogen peroxide is an important substance involved in many chemical and biochemical processes. An effective determination of H_2O_2 thus holds great significance to directly or indirectly monitor respective reactions and to elucidate the relevant mechanisms. Here we present a new analytical method for H_2O_2 based on heterogeneous

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

electrocatalysis by using a coated commercial pencil lead in aqueous media. Voltammetry was introduced and the voltammograms were used to gain quantitative and mechanistic data. Our research shows hydrogen peroxide can be reduced in aqueous media, but the carbon surface reduction is sluggish and the voltammetric response is insignificant. Nevertheless, the voltammetric cathodic current of H_2O_2 is significantly boosted by introducing a thin film of gold deposited onto carbon. This has resulted in much more sensitive response for the hydrogen peroxide reduction, and this catalytic response exhibits the concentration dependence that could be used to detect hydrogen peroxide. In neutral pH condition, the electrocatalytic reduction of H_2O_2 achieves its maximal capacity with least interference. We also tested the idea of the gold film on a regular pencil that would serve as a working electrode. Our data proved that the pencil with gold film is very stable and actually enhances the hydrogen peroxide reduction. The gold based alloy, based on our tests, showed more promise in alkaline media for the H_2O_2 sensing. Our proposed protocol for hydrogen peroxide by coated pencil electrodes thus offers an alternative for easy operation, potential for macro-scale processing, less use of sophisticated equipment, and possible long term/continuous detection.

9. **Metabolic effects of 3-BrOP on Pancreatic Cancer Cells**
   Elena Espino, UHD Chemistry undergraduate
   Dr. Peng Huang, Research Mentor, UT-Houston, MD Anderson Cancer Center
   Abstract: ATP generation through mitochondrial respiration is more efficient than glycolysis. The Warburg effect is phenomenon that cancer cells glycolysis production is increased. 3-BrOP possibly is inhibitor of glycolysis via suppression of hexokinase, and used as drug in this study. Our hypothesis is 3-BrOP will inhibit glycolysis in pancreatic cancer cells (Aspc1, Capan1, Panc1) and suppress cancer cell growth. We utilized MTT, ATP, Annexin/PI Assays to test effects of 3-BrOP on energy metabolism in the cell lines. Our findings show Aspc1 had the highest reduction of cell viability, depletion of ATP but no cell death. Capan1 exhibited cell death at 100µM, depletion of ATP, reduction of cell viability while Panc1 showed lowest reduction of cell viability, no depletion of ATP or cell death. The depletion of ATP shows that targeting cancer cell energy metabolism by inhibition of glycolysis will decrease cell viability, which is correlated with the degree of energy depletion.

10. **Validation of Novel *in silico* Methodologies**
    Edgar Alan Gatica, UHD Computer Science undergraduate
    Dr. Claudio N. Cavasotto, Research Mentor, School of Health Information Sciences, University of Texas Houston Health Science Center
    Abstract: Virtual screening, the process of docking a large virtual chemical library against a biomolecular target, usually neglects protein flexibility. One strategy to account for this is to use multiple receptor conformations. Thus, the structural variations among different proteins simulate the structural changes of a flexible protein. This provides a more real scenario of protein-ligand interactions, which is helpful for structure-based drug discovery. In a different context, multiple receptor conformations are used in "inverse" docking, a method in which a single small molecule is docked against a large library of receptors. This method is useful for finding the molecular target for a biologically active molecule (potential drug, toxin, biological modulator, etc.). Although these two approaches are promising, both are relatively new, and still require extensive validation prior to widespread use.

11. **Initial Analysis of Endophytes in Wild, Susceptible (European) and Hybrid Grapevines**
    Audrey Gonzalez and Gloria Abarca, UHD Biology undergraduates
    Dr. Lisa Morano, Faculty Mentor, Department of Natural Sciences, UHD
    Abstract: Pierce's disease (PD) is caused by *Xylella fastidiosa* (Xf), a plant pathogen that infects grapevines. Recently, there has been a great interest in the role of microbial endophyte communities in disease resistance. European, hybrid and wild vines differ greatly in their resistance to PD. We hypothesize that wild and hybrid vines will have differential endophyte communities and that this may confer a PD protective mechanism. We first analyzed the endophyte communities (a wild grapevine, two hybrid and two European varieties, 5 replicates each) using culture techniques. These cultures are currently being identified. Sap from each vine has also been sent out for complete genome sequencing of all microbes within the sample (using 454 pyrosequencing). We will compare our cultured microbial collections against all microbe identified by 454.

12. **Practical Applications of the Voltammetric Determination of Alkali Metal Ions by Using Conducting Polymers**
    Abdul Jangda, UHD Chemistry undergraduate
    Dr. Mian Jiang, Research Mentor, Department of Natural Sciences, UHD
    Abstract: Polypyrrole (PPy) and polyaniline (PAn) have been much focused on in recent years because of their desirable conductive properties and ease of synthesis. Our research is designed to explore, manipulate, and expand on the desirable qualities of these polymers and use them in suitable electrochemical sensor applications; mainly, for the analysis of cations, especially the non-electroactive alkali and alkaline earth metal ions. Cyclic voltammetry (CV) was used to formulate and

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

characterize PPy and PAn films on glassy carbon substrates in pH acidic and neutral solutions respectively. Systematic comparison was performed between conventional conducting polymer and PPy/PAn with big dopants such as aromatic anions and surfactants for their responding property toward metal cations. The larger anions were introduced to make the conducting polymer more cationic selective, thus enhance the sensory effect toward cations.

13. Implementing a Chemical Reaction Based Programming Model

Jeremy Kemp, UHD Computer Science undergraduate
Dr. Hong Lin, Research Mentor, Department of Computer and Mathematical Sciences, UHD

Abstract: Gamma Calculus is an inherently parallel, high-level programming model, which allows simple programming 'molecules' to interact creating a complex system with minimum of coding. Gamma calculus based programs were written on top of IBM's TSpaces middleware, which is Java based and uses a 'Tuple Space' based model for communication, similar to Gamma. A minimal parser was written in C++ to translate the Gamma syntax. This was implemented on UHD's grid cluster (grid.uhd.edu), and in an effort to increase performance and scalability, existing Gamma programs are being transferred to Nvidia's CUDA architecture. General Purpose GPU computing is well suited to run Gamma programs, as GPU's excel at running the same operation on a large data set, and potentially offer a large speedup.

14. Designing 3D Models in Maya for Microsoft XNA 3D Games

Carlos Ramses Lacayo, UHD Computer Science undergraduate
Dr. Olin Johnson, Research Mentor, Department of Computer Sciences, University of Houston
Co-authors: Dr. Chang Yun and Mr. Jose Baez-Franchazi, Department of Computer Sciences, University of Houston

Abstract: Microsoft Corporation developed this source engine called XNA (a term that Microsoft created) to develop games for PC, Xbox 360, or Zune. XNA requires programmers to know C# and provides an online tutorial for XNA. They strongly recommend starting with 2D so that developers will understand XNA concepts. Afterwards, developers can transit to 3D. The main difference between programming 2D and 3D are the different variables and camera settings. For example, 2D only focuses on two variables (x—and y—axis), instead of three (x—,y—, and z—axis). There are two methods to develop 3D models or levels in XNA: 1) to develop by code; and 2), by using a program that develops 3D models/level. The program that was used to conduct this research is Autodesk Maya 2009. Before developing levels, objects, and/or characters, a programmer must have a storyline or a sketch of the game to outline the development. After the developer designs their 3D model, a Maya feature exports the 3D models to a flatten map editor. They can export this to a TARF (.tga format), and add glow, bump, textures, or other special color effects in Adobe Photoshop or other graphics programs. Maya then updates the 3D models once the components (colors, glow, etc.) are filled in. After the object is completed, Maya has a plug-in that exports to XNA (called FBX). The space simulation level is provided by the Microsoft XNA webpage. From there, the programmer assigns a “brain” to models and enhances the level. Implementing final touches with excellent sound-effects, game challenges, easy-interface/controllers, and graphics result in a higher-quality towards the “fun” factor.

15. Analysis of Brain Endocasts of Notoungulates

Julio LaTorre, UHD Biology undergraduate
Drs. Thomas Macrini and John Flynn, Research Mentors, American Museum of Natural History, NY, NY

Abstract: Notoungulates are an extinct order of mammals that were endemic to South America throughout most of the cenozoic. Little is known about relationships within the order and their relation with other placentals. Previous phylogenetic studies have been performed however none included endocranial data. For this study, endocasts from 15 taxa were analyzed for endocranial characters. Two analyses were done once characters were scored. First, the characters were mapped onto a pre-existing phylogeny in order to study notoungulate brain evolution. Furthermore, data from this study was combined with previous data and analyzed in PAUP. In the first analysis, three potentially informative characters were found to be possible synapomorphies within notoungulates. In the second, the endocranial data added no significant change to the pre-existing phylogeny.

16. Building a Diatom-Arcellacean Succession Model for a Fresh Water Marsh

Yvonne Hernandez, Phoebe Laurent, Libby Thammavongsa UHD Biology and Mathematics undergraduates
Dr. Brad Hoge*, and Dr. Ronald Barnes** Research Mentors, Department of Natural Sciences*, Department of Computer and Mathematical Sciences**, UHD

Abstract: This study provides a statistical analysis of the relationship between the diatom and arcellacean death assemblage found in natural wetlands and in artificial mitigation banks. The goal of this project is to model the succession of diatoms and arcellaceans within fresh water wetlands which can then be used to analyze the path of succession of mitigated wetlands as their assemblages converge toward that of a natural wetland. The Anahuac National Wildlife Refuge is an undisturbed natural wetland, so it provides a good example of a climax community which will serve as our reference point to study the succession of the assemblages found in the Greens Bayou Wetland Mitigation Bank (GBWMB). The use of both diatoms and arcellaceans strengthens this analysis since they represent distinct taxonomic groups. It is expected that a similar pattern

of succession for both groups will be found. It is important to have a model of mitigated wetland succession in order to determine if and when the GBWMB is providing sustainable ecological benefits to counter the adverse impacts of local wetland loss caused by human development.

17. **The Effects of Parental Education on Adult Obesity**
Amber Martinez-Rodriguez, UHD Biological & Physical Sciences undergraduate
Co-author: Javier Alamirra
Dr. Jon Aoki, Research Mentor, Department of Natural Sciences, UHD
Abstract: According to the CDC, from 1999-2003 over 20% of Texas adults were found to be obese and from 2004-2007 the number of obese adults in Texas increased to close to 30%. Although an adult's weight can be directly affected by their socioeconomic status and genetic predisposition, there is little known on how obesity in adulthood is affected by a person's parental education (Powers 2003, Lamerz 2005, Cleaveland, 2008). Furthermore, it is not known if the influence of parental education differs between the various ethnic groups found in the United States. Therefore, our study investigates the relationship between an adult's obesity in relation to their parent's level of education. Our findings show that there is indeed a relationship between the weight status of an adult and the education of their parents. However, this variation does fluctuate between the different ethnic groups. The importance of this survey lies in the idea that the educational impact on adult obesity may occur early on in childhood and that these findings may translate to initiatives that aim to reduce obesity in Texas and the United States.

18. **Detection and Identification of Bacterial Species from Dental Plaque Samples Before and After Treatment with Mouthwashes Using Differential Gradient Gel Electrophoresis**
Angelica Medina, UHD Biological & Physical Sciences undergraduate
Co-author: Rosa Villagomez
Dr. Poonam Gulati, Faculty Mentor, Department of Natural Sciences, UHD
Abstract: Extensive dental studies have revealed that bacterial communities exiting in the oral cavity include about five-hundred bacterial species. In order to study this vast number of species, scientists use different techniques, including the Denaturing Gradient Gel Electrophoresis (DGGE) - a powerful tool for nucleic-acid analysis to assess bacterial species. It is a sensitive and accurate technique to sort, identify and differentiate bacterial species in plaque samples. The aim of this research project is to detect and identify bacterial species from dental plaque samples before and after rinsing with "Crest" mouth wash. This mouthwash has been selected based on previous studies in the lab. DNA is first isolated from plaque, amplified using the Polymerase Chain Reaction (PCR), and analyzed by DGGE. The bacterial profiles from before and after mouthwash treatment will be compared. The species that are different in the profiles will be extracted from the gel and sequenced for identification.

19. **Computational Studies of RAG1 Protein Binding Domain and DNA**
Mustafa Mehmood, UHD Chemistry undergraduate
Co-author: Jesus Barron
Dr. Maria Benavides, Research Mentor, Department of Natural Sciences, UHD
Abstract: Computational studies of the interactions between RAG1 Protein Binding Domain and DNA were carried using density functional theory (DFT). Four structures that represent the interactions between select amino acids found in the binding domain and one to two DNA bases were modeled and optimized to shed light into structural aspects of these interactions. These calculations were followed by frequency calculations that yielded the computed IR spectrum and the harmonic vibrational frequencies.

20. **Dynamic Behavior of Pedestrian Bridges**
Yuhanna Njeim, Erik Cruz, Shitul Maisuria, Mario Barbosa, UHD Structural Analysis & Design undergraduates
Alberto Gomez-Rivas, PhD's, PE, Research Mentor, Engineering Technology Department, UHD
Abstract: Pedestrian bridges are in parks, streets, malls and other recreational places. However, people do not like to use them because these structures move or vibrate when people walk on them. It is possible to see evidence of this dislike in the fact that people rather run across freeways than to use these structures. The objective of the research is to measure the frequency of vibration of the Waugh pedestrian Bridge over Memorial Drive and its dynamic behavior when people pass across at difference speeds. During the process, we will build a mechanical device to produce the frequencies of the bridge and compare them with the theoretical vales given by finite element models. We will also model this bridge with two different computer programs to compare our results. We will also study how to make these bridges more people friendly in order to prevent accidents and make people feel secure when using these structures.

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.

21. Basepair Likelihood Format

Mayra Sanchez, UHD Applied Mathematics undergraduate
Co-author: Michael Eskander
Research Mentors: Fuli Yu, PhD[1], Debra Murray, PhD[1, 2], Richard Gibbs, PhD[1,2], Zhengzheng Wan[2]
[1] Molecular and Human Genetics, [2]Human Genome Sequencing Center, Baylor College of Medicine, Houston, TX.

Abstract: A person's probability to develop a disease is based on their genes and hereditary factors. Single Nucleotide Polymorphism (SNP) is the genetic makeup that differs between two individuals. There are many different ways to detect SNPs, but each varies in its benefits. Next-Generation Sequencing (NGS) was designed to minimize the time and cost of sequencing but accounts for more sequencing errors that alter our results of true SNPs. Atlas-SNP was created to identify true SNPs from NG reads. The Basepair Likelihood Format (BLF) is a supplemental program to Atlas-SNP which contains the phred-like probabilities that certain bases are present on each basepair. We created a program on Ruby, a computational tool focused on simplicity, to read the coverage and substitution input files. The output of the BLF contained the likelihood for each base on each chromosome of the reference name.

22. Signaling Through the Type I Insulin

Desiree Wilson, UHD Biology undergraduate
Dr. Hesham Amin, Research Mentor, UT-Houston, MD Anderson Cancer Center

Abstract: Type I insulin-like growth factor receptor (IGF-IR) signaling is vital for maintaining normal cellular homeostasis. IGF-I, IGF-II, and, insulin activate IGF-IR. Uncontrolled enhancement of IGF-IR signaling contributes to cancer. IGF-IIR, an inhibitory of the IGF system, acts as a "sink" that prevents IGF-II stimulatory effects on IGF-IR. Previous studies have shown *IGF-IIR* to be mutated and functionally defected in some types of solid tumors. We identified a novel role of IGF-IR signaling in some types of lymphoma and leukemia cell lines. IGF-IIR expression and function are unknown in lymphoma and leukemia. The aim of this study was to investigate the expression IGF-IIR in lymphoma and leukemia cell lines. We used RT-PCR and Western blotting to analyze the expression of IGF-IIR mRNA and protein in 12 cell lines. All cell lines expressed IGF-IIR at the mRNA level. No mutations were found in DNA sequencing analysis. Future work includes patient sample analysis.

Sponsored by: The Brown Foundation, National Science Foundation (0336612, 0728408), U.S. Army Research Office (W911NF-04-1-0024), U.S. Department of Education (P120A070025), and UH-Downtown.