



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
 Indian River State College, Fort Pierce, Florida
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	<u>Page</u>
Author Index	51
PLE: Plenary Address	1
BNQ: Banquet Address	1
AGR: Agricultural Sciences & Natural Resources	2
ANT: Anthropological Sciences	5
AOS: Atmospheric & Oceanographic Sciences	6
BIO: Biological Sciences	11
CMS: Computer/Mathematical Sciences	23
ENG: Engineering Sciences	24
ENV: Environmental Chemistry & Chemical Sciences	25
GHS: Geological/Hydrological Sciences	34
MED: Medical Sciences	35
RES: Florida Committee on Rare and Endangered Species	41
TCH: Science Teaching	43
SOC: Social Sciences	43
URB: Urban and Regional Planning	49
Acknowledgements	51

PLENARY ADDRESS | [return to top](#)

PLE-01 Applications of bioluminescence in coastal and deep-sea monitoring. E. WIDDER. Ocean Research & Conservation Association [ORCA], Inc., Duerr Laboratory for Marine Conservation, 1420 Seaway Drive, Fort Pierce, FL 34949. Bioluminescence dominates the marine visual environment at depths where sunlight is dim or absent and in surface waters at night. Bioluminescent organisms are so abundant in marine ecosystems that their significance is beyond question. To know the ocean we must learn to read and interpret its language of light. Ancient mariners were masters at this and used bioluminescence as an aide to navigation. Modern oceanographers are learning to read and interpret this language as well. Two recent applications will be described. The first reads the light using advanced data acquisition and processing techniques - separating and quantifying light signatures as part of a new class of coastal monitoring network called Kilroy that is designed to track sources of water pollution. The second applies an interpretation of the language of light to lure predators to an unobtrusive deep-sea observatory with jaw-dropping results. It is hoped that this observatory will provide new insight into the meaning of luminescent signals.

BANQUET ADDRESS | [return to top](#)

BNQ-01 Got crabs? Climate change and biological invasion in Antarctica. R.B. ARONSON. Department of Biological Sciences, Florida Institute of Technology, 150 W. Univ. Blvd, Melbourne, FL 32901. The benthic-shelf fauna of Antarctica changed radically as a result of a long-term cooling trend, which began in the middle Eocene with a step-down in temperature around 41 Ma and ultimately produced the modern polar climate. Shell-crushing ('*durophagous*') predation



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declined across the 41-Ma event, and the temperature-mediated de-escalation of durophagy established the quasi-Paleozoic community structure that persists in Antarctica to this day. The continued absence of modern, durophagous predators—crabs, bottom-feeding sharks, rays, and shell-crushing teleosts—from Antarctic shelf environments turns on the physiological limitations imposed by the polar environment. Durophagous predators are poised to return to Antarctic shelf environments, possibly within the next few decades, as sea temperatures rise rapidly and human activities in the Southern Ocean promote biological invasions. Running the Eocene record in rapid-reverse, successful establishment of durophagous predators would re-escalate and re-modernize the fauna, homogenizing it functionally with shelf faunas at lower latitudes. Conserving the endemic marine fauna of Antarctica and its unique community structure will require international commitments to environmental regulation at both regional and global levels.

AGR = AGRICULTURAL AND NATURAL RESOURCES | [return to top](#)

AGR-01 Antifeedant and lethal effects of the fungi *Isaria fumosorosea* on the Asian citrus psyllid *Diaphorina citri*. P.B. AVERY (1), V.W. WEKESA (1, 2), W.B. HUNTER (2), D.G. HALL (2), C.L. MCKENZIE (2), L.S. OSBORNE (3), C.A. POWELL (1), and M.E. ROGERS (4). (1) University of Florida, Institute of Food and Agricultural Sciences, Indian River Research and Education Center, 2199 South Rock Road, Fort Pierce, FL 34945, (2) USDA-ARS, U. S. Horticultural Research Laboratory, Subtropical Insect Research Unit, 2001 South Rock Road, Ft. Pierce, FL 34945, (3) Mid-Florida Research and Education Center, Department of Entomology and Nematology, University of Florida, IFAS, 2725 Binion Road, Apopka, FL 32703, (4) University of Florida, Citrus Research and Education Center, 700 Experimental Station Road, Lake Alfred, FL 33850. The effects of two formulations of *Isaria fumosorosea* Wize (blastospores and conidia) on feeding, honeydew deposits, and mortality of adult *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae) was assessed in bioassay arenas. Psyllids infected by either formulation had reduced feeding as indicated by significantly fewer honeydew deposits [8 and 9 times less after 5 and 7 days, respectively] with mortality reaching 100% in fungal treatments compared to 0% in the controls after 7 days. This study provides further evidence that *I. fumosorosea* (Pfr 97) can be highly effective against the psyllids causing up to 100 percent mortality by day 7. Blastospores caused a significantly higher mortality than conidia in the first 3 days. The use of this fungus can be advantageous because, apart from reducing feeding by the psyllids, those that are infected by the fungus may not be able to spread the disease, while at the same time, those that are infected by the fungus may not be able to spread the disease, while at the same time, infected psyllids may help spread fungus throughout the citrus groves. The potential of auto dissemination of Pfr 97 by psyllids in the field is still being investigated.

AGR-02 Restoring fringing mangrove habitat in the Indian River Lagoon. L.J. COHEN, L.W. HERREN, and M.T. VIRGILIO. Indian River Lagoon Aquatic Preserves Field Office, Office of Coastal and Aquatic Managed Areas, Florida Department of Environmental Protection, 3300 Lewis St., Ft. Pierce, FL 34981. Since 1995, the goal of the Indian River Lagoon (IRL) Shoreline Restoration Project has been to enhance fringing mangrove habitat along publically-owned shorelines of the IRL. From 1995-2005, a total of 11,719 red mangroves were planted in PVC encasements at 58 sites between Brevard and Palm Beach counties. In 2009, 5.8% of these were surviving, adding 421 m³ of canopy to the IRL at an approximate cost of \$1,050 per tree. To improve future planting success, three methods (mature, multistem, and PVC-encased propagules) were tested along three elevations at increments of 1.5 m from annual high water in an experimental grid design. In 2008 and 2009, 65 experimental grids were established during two planting seasons (24 in late summer and 41 in spring) at 12 sites along the IRL. Site locations spanned from Cocoa Beach to Stuart. There was no difference in survival of the three planting methods based on the three elevation increments tested ($G\text{-test} < X^2_{[0.05]4} = 9.49$). Of the 72 individuals planted per method in late summer, 4% of the multistem, 11% of the mature, and 28% of the encased propagules survived after twelve months. In spring (123 individuals planted per method), 39% of multistem, 55% mature, and 19% of the encased propagules survived after six months. PVC encasements may offer protection through hurricane season and winter storms, but results indicated that spring is the best season to plant mangroves because of low winds, low water levels, and rain. Overall planting success within the experimental grids remains low (29%), suggesting that future, ecosystem-based mangrove restoration in the IRL should place less of an emphasis on planting mangroves and more of an emphasis on planting wetland grass species, such as *Spartina* spp., *Paspalum vaginatum*, and *Sporobolus virginicus*, to encourage natural recruitment and succession.

AGR-03 Evaluating fresh market yield of Collard Greens using traditional and non-traditional cultivation techniques. C.S. GARDNER, G.L. QUEELEY and B.G. BROWN. Cooperative Extension Service, College of Engineering



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Sciences, Technology and Agriculture (CESTA) Florida A & M University, Tallahassee, FL. 32307. Collard greens (*Brassica oleracea* L) are unique to the southeastern U.S. where they play a key role in traditional southern cuisine. The crop has recently taken center stage as a nutritious low calorie item in school lunch programs and as a cash crop for small farmers. Studies conducted at the Florida A & M research facility at Quincy Florida, evaluated the market potential of fresh collard greens. The objective was to identify alternative cultivation techniques that could increase crop performance. The variety grown was top bunch, a F₁ Georgia hybrid. Alternative cultivation techniques included double row planting patterns, drip irrigation, black plastic mulch and three N fertilizer rates of 200, 225 and 250 lbs/acre. Traditional cultivation techniques involved single row planting patterns, rain-fed conditions, and a standard 175 lb N/acre rate. In-row spacing was 24 inches and between row spacing was 72 inches. The soil at the study site is an Orangeburg loamy fine sand. The experimental design was a randomized complete block with 3 replications. Planting dates were April 30, and October 1, 2009 while harvest dates were June 30, and December 14, 2009. Data on plant height and weight were analyzed using least squares dummy variable (LSDV) regression with the traditional practices as reference points. The results indicated significantly taller plants ($p < 0.05$) for double row patterns, mulched beds and fertilizer rates at 225 and 250 lbs N/acre. Irrigated plants were not significantly taller than non-irrigated plants. Mulched beds and twin row patterns produced significantly heavier plants ($p < 0.05$). Plants that received 250 lbs N/acre were significantly heavier than those that received the traditional 175 lbs N/acre rate. Irrigated plants were not significantly heavier than rain-fed plants. The results indicate that the best combination of production techniques include drip irrigated mulched beds, twin row patterns and the standard rate of 175 lbs N/acre.

AGR-04 Emerging psyllid genomics: Applications to reduce plant disease. W. HUNTER (1,2). (1) USDA, ARS, 2001 South Rock Road, Ft. Pierce, FL, 34945, (2) University of Texas at Tyler, Tyler, TX 75799. Current breakthroughs in genome sequencing, and computer science now allows in-depth analyses of multiple biological pathways. Genome applications of organisms also further supports the identification of the critical gene(s) in these pathways which when disrupted, or knocked out, can impart population suppression, as well as decreased or increased immune responses, thus providing advantageous management methods which are natural, and specific. The International psyllid genome consortium (being led by the authors) is pushing efforts to complete the genomes from two psyllids which are devastating crop pests, Asian citrus psyllid, '*Diaphorina citri*', and the potato psyllid, '*Bactericera cockerelli*.' Both of which transmit bacterial pathogens that destroy important food crops, potato, tomato, citrus, and others. Applications of genomic data, gene regulation, and the emergence and development of new plant- and viral- expression strategies are on the verge of producing 'next generation' strategies for the management and control of insects which transmit disease, aimed at the reduction of plant diseases. The importance of these developments are critical to the food security, safety, and sustainability for the USA, and future generations which will need to produce more food, in environmentally safe manners, to meet demands of an ever growing human population.

AGR-05 Entomopathogenic fungus, *Isaria fumosorosea*, and aphid parasitoid, *Lysiphlebus testaceipes*, for managing infestations of Brown Citrus Aphid, *Toxoptera citricida*. D.A. PICK (1,2), P.B. AVERY (2), W.B. HUNTER (3), C.A. POWELL (2), and D.G. HALL (3). (1) Florida Atlantic University, Harriet L Wilkes Honors College, 5353 Parkside Drive, Jupiter, FL 33458, (2) University of Florida, Institute of Food and Agricultural Sciences, Indian River Research and Education Center, 2199 South Rock Road, Fort Pierce, FL 34945, (3)USDA, ARS, U.S. Horticultural Research Laboratory, Subtropical Insect Research Unit, 2001 South Rock Road, Ft. Pierce, FL 34945. The impact of PFR 97TM (*Isaria fumosorosea* [Ifr]) on parasitism and emergence of the aphid parasitoid, *Lysiphlebus testaceipes*, on brown citrus aphids, *Toxoptera citricida* (Kirkaldy)(Hemiptera: Aphididae), was assessed under caged conditions. The fungal treatment did not negatively influence *L. testaceipes* parasitism rate, and no significant difference was observed in the emergence rate between fungal treated and non treated parasitoids. *T. citricida* mortality rates were very high in both parasitoid treatments, nearing 100% towards the end of the experiment, indicating *L. testaceipes* was highly effective at parasitizing the aphids even in the presence of Ifr. This compatibility of the bio-insecticide PFR 97TM with *L. testaceipes* demonstrated potential use in future IPM programs to manage brown citrus aphid. Thank you to: Christine Lynch for collecting data and making key protocol modifications; Brandon Paradise, Robin Barnes, and Gail Amafitano for counting aphids; Drs. Ronald Cave and William Overholt for use of the bugdorms; Phyllis Rundell, Eliza Duane, and Lindsay Brock for helping brainstorm; Deanna Pick for support and encouragement; Maria Gonzalez for materials transport; Anna Sarah Hill for rearing the aphid colonies. (This presentation has been funded by National Science Foundation Grant #0631058.)

AGR-06 Use of Muhly grass *Muchlenbergia capillaries* extract in the control of Cogongrass (*Imperata cylindrica* Lam). L.D. REID, O.U. ONOKPISE, and B.G. BROWN. Agronomy, Forestry and Natural Resources Conservation.



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College of Engineering Sciences, Technology and Agriculture (CESTA) Florida A&M University, Tallahassee, Florida 32307. *Imperata cylindrica* Lam, commonly known as cogongrass in the United States, has become one of the most serious invasive species in the southeastern states. It is ranked among the top seven most invasive species in Florida. Although chemical control has been used for managing this invasive species, yet the herbicides used remain ineffective. This study was initiated to determine the effectiveness of native plant species such as Hairawn Muhly grass for the biological control of *I. cylindrica*. For this study, root and shoot extracts of muhly grass were placed in magenta vessels and into these extracts, cogongrass genets and ramets were planted. These were placed in a growth chamber maintained at 28°C for 16/8 hours day/night photoperiod. A commercial woodchip extract was used as control. Results indicated that at six weeks after planting, root:shoot ratios decreased by up to 70%. These *in vivo* studies results revealed that biological control of cogongrass from a plant: plant perspective is feasible. This approach will lead to less dependence on chemicals while enhancing the environment and facilitating ecological restoration.

AGR Posters

AGR-P01 Rab11 gene identified in glassy-winged sharpshooter (*Homalodisca vitripennis*). T.M. GRIGSBY (1) and W.B. HUNTER (2). (1) Keiser University, Port St. Lucie, FL, (2) USDA-ARS, 2001 South Rock Road, Fort Pierce, FL 34945. This is a first report of a Rab11 protein within leafhoppers. Rab11 identified from *Homalodisca vitripennis* interacts mainly with the recycling endosome's tubular network and Golgi associated functions. The GTPases of the Rab proteins provide molecular identifiers allowing the production, maintenance and transport of intracellular compartments as in the Golgi apparatus. Gene identification is a first step in the development of RNAi to disrupt intracellular communication and molecular pathways within *H. vitripennis* which will provide new directions of research focused on limiting the economic losses caused by these important agricultural pests.

AGR-P02 Heat shock proteins as a target for phylogenetic analysis of *Homalodisca vitripennis*. H.L. SCHREIBER (1), D. HAIL (1), W.B. HUNTER (2), and B.R. BEXTINE (1). (1) Department of Biology, University of Texas at Tyler, 3900 University Blvd., Tyler, TX, 75799, (2) United States Department of Agriculture, Agricultural Research Service, U.S. Horticultural Research Laboratory, 2001 South Rock Road, Fort Pierce, FL 34945. The glassy-winged sharpshooter, *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae), is the major vector of *Xylella fastidiosa* Wells et al., the causal agent of Pierce's disease of grapes, *Vitis* spp. As genomic information becomes available, more research on leafhopper stress responses is possible. Because of the importance of the glassy-winged sharpshooter in transmission and spread of *X. fastidiosa*, a cDNA library was constructed from adults and fifth instars, resulting in 5,906 expressed sequence tags (ESTs). After quality scoring, 4,445 sequences underwent assembly which produced a set of 2,123 sequences that putatively represented distinct transcripts. BLASTX analysis identified four significant homology matches to heat shock proteins (HSP), which are the focus of this study. The overall importance and function of heat shock proteins lie in their ability to maintain protein integrity and activity during stressful conditions, such as extreme heat, cold, or drought. Phylogenetic analyses using these four heat shock protein sequences provided further support of transcript by the identification of specific motifs. This study shows that highly conserved genes such as heat shock proteins are a viable alternative to ribosomal DNA in elucidating phylogenetic relationships.

AGR-P03 Using historic aerial photographs and GIS as management tools for establishing baselines and setting goals for future shoreline restoration in the Indian River Lagoon. M.T. VIRGILIO, L.J. COHEN, and L.W. HERREN. Indian River Lagoon Aquatic Preserves Field Office, Office of Coastal and Aquatic Managed Areas, Florida Department of Environmental Protection, 3300 Lewis St., Ft. Pierce, FL 34981. Since 1995, one of the goals of the Indian River Lagoon (IRL) Shoreline Restoration Project has been to re-establish fringing mangrove habitat along publically-owned shorelines of the IRL. However, little is known about the overall spatial and temporal distribution of mangroves in the IRL. High resolution historic aerial photographs for much of Florida's coast and IRL are available from the 1940s and 1950s, providing a glimpse at pristine or near pristine shoreline habitat before land clearing and development became prominent. Prior to planting and other restoration efforts, a combination of information from land-use investigation, historic aerial photograph interpretation, and present day data collected on the ground can be used to establish restoration goals. One site located in Brevard County, FL is used as a case study to look at natural site history and to develop goals for restoration work. Historic aerial photographs from six time periods were obtained from the University of Florida Digital Collections and the Florida Department of Transportation and georeferenced using ArcGIS 9.3.1. Vector mangrove data were hand-digitized from raster data and used to calculate the total area of mangroves at the site for each time period. Aerial photographs were compared to present-day field surveys to determine accuracy of digitization. GPS waypoints were collected and overlaid onto historical



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aerial photographs as reference points allowing managers to visually identify temporal changes in shoreline features and spatial changes in mangrove/vegetation distribution. Shoreline restoration goals are site-specific and may include shoreline stabilization and succession towards a previous percent coverage of mangroves. However all shoreline sites may not have historically-supported mangroves in which case restoration goals should focus on establishing other native wetland vegetation species.

ANT = ANTHROPOLOGICAL SCIENCES [|return to top](#)

ANT Posters

ANT-P04 *Mea familia*: ethnic burial identifiers in St. Michael's Cemetery, Pensacola, Florida. A.L. GIROUX. University of Central Florida, 4000 Central Florida Blvd., Phillips Hall, Room 309, Orlando, FL 32816-1361. Grave markers from St. Michael's Cemetery, Pensacola, Florida, were studied for evidence of ethnicity and acculturation. The 1,447 grave markers dating from 1870 to 1939 were used to test two hypotheses: 1) grave markers for ethnic groups represented in the cemetery have identifiable sets of burial attributes; and 2) changes in the visible ethnic attribute sets show evidence of the acculturation of ethnic groups over time. Physical attributes pertaining to grave markers, and personal characteristics (*e.g.* sex, age) for the individuals inscribed upon the markers were collected for analysis. Historical sources were used to assign ethnicity to each marker by determining the ancestry of the individuals memorialized. Attributes for ten ethnic groups were examined. The statistical results indicate a correlation of ethnicity with marker attributes. Central Europeans had the most identifiable preferences including large markers, vertical markers, floral design motifs, and headstone molding. Other observable patterns include the use of family markers, non-marble materials, horizontal markers, relationship wording, and religious symbolism. Spatial analysis illustrates that ethnic markers were dispersed across the cemetery; this lack of segregation in the graveyard may be due to acculturation. However, the diachronic changes in burial identifiers cannot be clearly ascribed to the acculturation of immigrants. Use of marble materials and the height of markers diminished for all ethnic groups. Changes in the memorialization industry were likely contributing factors to differences in attribute selection over time. Therefore, while ethnic burial identifiers are statistically visible in the cemetery landscape, attribute changes are not exclusively caused by acculturation.

ANT-P05 Sexual dimorphism of the posterior pelvis of the Robert J. Terry Anatomical Collection and the William M. Bass Donated Skeletal Collection. L. NOVAK. Anthropology, Phillips Hall Room 309, University of Central Florida, 4000 Central Florida Blvd, Orlando, FL 32816. Studies of sexual dimorphism of the sacrum have generally been conducted as part of broader population research or on living persons and cadavers, making the anthropological literature sparse. The greater sciatic notch and the preauricular sulcus of the ilium have both been found to show sexual dimorphism, although studies of these traits often have ambiguous definitions of characteristics and lack the standardization of measurements. This research was designed to reexamine and test the accuracy of standard scoring systems and measurements of the posterior pelvis used to determine sex and to establish new formulas of traits and measurements that accurately determine sex using discriminant analysis and logistic regression. A series of metric measurements and morphological scores were recorded for 210 individuals of European- and African-American ancestry from the Bass and Terry Collections. In order to reexamine previous research conducted on the posterior pelvis, standard ratios of metric measurements were analyzed to determine ranges and cut-off values for males and females in this sample. The ratios of ala width to the maximum transverse diameter of the sacral base and the length to width of the sciatic notch have proven to be the most useful ratios in sex determination, comparable to formulas created using logistic regression. The data was also analyzed using step-wise logistic regression and discriminant analysis which determined a combination of metric measurements and morphological scores for both the sacrum and posterior ilium that are the most reliable and accurate for sex determination. The values for these selected traits can be incorporated into the log odds formula which will classify an individual as male or female. The ultimate goal of this research was to provide physical anthropologists with a series of logistic regression equations that can be used to estimate the sex of the posterior ilium and sacrum. Two equations ranging in accuracy from 79-84% were developed to determine sex of the posterior pelvis.



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AOS = ATMOSPHERIC AND OCEANOGRAPHIC SCIENCES [| return to top](#)

AOS-01 Development of a Comprehensive Maritime Management Master Plan (CM3P). M. CULVER (1), E. BROWN (1), J. LINDER (2), G. MAUL (2), and J. WINDSOR (2). (1) Brevard County Office of Natural Resources Management, 2725 Judge Fran Jamieson Way, Viera, FL 32940, (2) Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. The Brevard County Natural Resources Management Office and the University of Florida Brevard County Extension Service jointly sponsored the initial development of the Brevard County Comprehensive Maritime Management Master Plan (CM3P). During plan development, a series of public meetings were held to address and balance environmental, recreational, and economic issues affecting the future of Brevard County's waterways. The kickoff meeting was a success with over 100 individuals present, representing a wide variety of interests such as eco-tourism, ecosystem management, recreational boaters, marinas, law enforcement, local municipalities, marine industries, regulatory agencies, conservation districts and interested citizens. Subsequent public meetings generated goals, objectives and tasks to be addressed by stakeholder working groups. With support from the Indian River Lagoon National Estuary Program, facilitated stakeholder working groups have been detailing the original CM3P outline approved by the Brevard Marine Advisory Council and the Brevard Board of County Commissioners.

AOS-02 The effect of Hurricanes Frances, Jeanne, and Wilma on the nearshore currents at Sebastian Inlet, East Coast, Florida. C.J. FLANARY and L.E. HARRIS. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. The 2004 and 2005 hurricane seasons brought three major hurricanes in close proximity to Sebastian Inlet. During September 2004 Hurricanes Frances and Jeanne, making landfall at Hutchinson Island, 80 km south of Sebastian Inlet. During October 2005 Hurricane Wilma moved across Florida along a west to east path, reemerging over water at Hutchinson Island. Frances was a Category 2 storm upon landfall; Jeanne was a Category 3 storm at landfall, and Wilma was a Category 2 storm upon emergence over the Atlantic. Two collocated ADCPs collected directional current velocity profiles, directional wave data, and water temperature during these storms. The current data collected for each storm were compared to the wind data collected from three anemometer stations within the affected area of the storm paths. Normally, current velocities at this site are 0.0-0.2m/s. The data showed maximum current magnitudes reaching 2m/s for Hurricane Frances and 1.5m/s for Hurricanes Jeanne and Wilma. The surface current velocities during the hurricanes were found to be from 3 to 20% of the wind velocity. The wave heights offshore Sebastian Inlet during each hurricane reached 4m, and the wave directions rotated during the passing of the eye of each storm. The computed storm surge levels for Frances and Jeanne were highest to the north of the eye of the hurricane, approximately 36 km south of Sebastian Inlet. This sea surface slope would have produced a pressure gradient-driven current to the north, contributing to the higher current velocities that were 1.6 to 2.5 times greater post-eye passing than pre-eye passing. Although no significant tidal current was found, a low velocity coastal seiche was observed in the current direction variations. These oceanographic data provide an increased understanding of the current and wave conditions in the nearshore water column during the landfall of severe storms on the east coast of Florida. (Funding provided by the Sebastian Inlet District).

AOS-03 An *in-situ* method to study early recruitment of barnacles. E. RALSTON and G. SWAIN. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 West University Blvd, Melbourne FL, 32901. It is well known that the settlement phases of marine organisms respond to a variety of cues that determine their choice of substrate, however, there are only limited field studies that have observed this behavior. A settlement tube was designed and deployed in the Indian River Lagoon to investigate in-situ recruitment of barnacles. The device consists of a 0.3 m × 0.25 m triangular aluminum tube, 2.5 m long with one face being made of 9.5 mm thick glass. Four webcams were placed inside the tube at different depths. The glass plate is illuminated by red led's to facilitate night time observations. Pictures were taken through windows in the tube at 15 minute intervals and stored on a mini computer for later analyses. Barnacles recruited less than 3 days after the glass face was cleaned back and showed seasonality in recruitment. Incidental by-catch pictures suggest additional uses for the settlement tube including fish surveys, settlement assays and ecological monitoring.

AOS-04 Benthic habitat mapping in high energy nearshore environments using acoustic methods. B.J. DEAN and E.A. IRLANDI. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. University Blvd., Melbourne, FL 32901. Hard bottom and sedimentary habitats in the nearshore are affected by anthropogenic disturbances such as beach nourishment. Currently used monitoring practices rely on visual techniques (aerial and underwater photography) conducted on an annual basis and do not allow rigorous assessment of the effects of man induced, or even natural events, on the distribution and composition of these habitats. We investigated the use of an acoustic ground



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discrimination system (RoxAnn) to determine changes in benthic habitats in the nearshore area of northern Indian River County, FL where hard bottom outcrops occur. This area has also been subjected to numerous beach nourishment projects. We determined the precision of the acoustic method and conducted multiple surveys to assess temporal and spatial changes in bottom types. We were able to map the spatial distribution of several sediment types, bare rock surfaces, Sabellariid worm reef, sponge covered rock, and rock covered with two different algal morphologies over large areas under conditions of suboptimal visibility. Short term (monthly) changes in the distribution of rock and sand habitats were detected over a relatively calm summer season suggesting that annual monitoring is insufficient to assess the impacts of episodic disturbances such as beach nourishment on benthic habitats.

AOS-05 The influence of stormwater on dissolved fluorescent material in Crane Creek, Turkey Creek, and adjacent Indian River Lagoon. K.T. GIFFORD and J.G. WINDSOR. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. The effects of stormwater runoff on the distribution of dissolved fluorescence in Crane Creek, Turkey Creek, and the adjacent Indian River Lagoon (IRL) were observed in April, May, and July 2009. Similar changes were observed on Crane and Turkey Creek; the dissolved fluorescence decreased by 17.2 % at the first flush of heavy rainfall in May. Crane Creek appears to have a greater input of urban stormwater runoff than Turkey Creek demonstrating a predominate source of organic material. Stormwater runoff influences the dissolved fluorescent material distribution in Crane Creek, Turkey Creek, and the adjacent IRL.

AOS-06 The reappearance of the invasive jellyfish, *Phyllorhiza punctata*, in the Indian River Lagoon, Florida. J.A. HEMPHILL and K.B. JOHNSON. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. Univ. Blvd, Melbourne, FL 32901. The Australian White-spotted jellyfish, *Phyllorhiza punctata*, was observed in the Indian River Lagoon (IRL) in June 2009, the first sighting since 2001. They are believed to have been introduced via ballast water or as fouling on boat hulls of oceanic vessels. The main concern surrounding this potential invasion is jellyfish predation on native fish eggs and larvae. The new occurrence of *P. punctata* consisted of a population explosion from June 6 to July 4, 2009, which was documented using a combination of 11 boat expeditions in addition to public observations. The 15.2 km boat transect ran north from the Melbourne Causeway to the Pineda Causeway in an essentially straight line, but to the side of the navigation channel. The transect path was 5.4 m wide and the resultant area (0.082 km²) was used to calculate surface densities of *P. punctata* counted during transect runs. Randomly selected jellyfish were collected for body measurements and gut samples. Public reports helped document sightings of *P. punctata* facilitated by a news article in *Florida Today* and collaboration with SJRWMD. Confirmed abundances ranged from 3 to 54 individuals, with the highest surface density being 657.9 *P. punctata* km⁻². Bell diameters ranged from 1.2 to 42.0 cm. Jellyfish did not appear to occur south of the Melbourne Causeway in spite of repeated forays checking for their presence. They were observed to occur further north than the end of the transect (Pineda Causeway), but anecdotal information from public reports responding to the *Florida Today* article suggests that substantial blooms did not reach the northern IRL or Mosquito Lagoon.

AOS-07 Numerical model forecasting of downslope winds in the Las Vegas Valley. A. PATTANTYUS (1), S. CHIAO (1) and S. CZYCYK (2). (1) Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901, (2) Las Vegas Weather Forecast Office, 7851 S. Dean Martin Dr., Las Vegas, NV 89139-6628. Numerical simulations for severe downslope winds in the Las Vegas Valley were performed in this study. A common problem of downslope wind modeling is dealing with complex terrain. The two main issues are the overestimated mountaintop/downslope winds as well as surface temperatures. The goal of this study is to quantify uncertainty from the model forecasts as well as to evaluate different turbulence closure schemes in the mountain-valley region. Simulations of severe downslope wind events on 15 April 2008 and on 4 October 2009 will be discussed. The Weather Research and Forecasting model (WRF) has been adopted for this research. The numerical experiments are constructed using two nested domains, 4 km and 1 km grid resolution. Vertical resolution is produced with 61 levels in which a high resolution grid is utilized near the surface layer. The working hypothesis is that the choice of turbulence closures representation is not significant in the error of averaged winds at some height during stable conditions. The preliminary results demonstrated remarkable detail of the turbulent mechanisms responsible for surface gustiness. The thermally forcing, wave-breaking, non-linear gravity wave amplification and turbulent breakdown will be examined. The vertical resolution of the model was primarily responsible for the detail of the turbulent mechanism. This was shown by testing different vertical configurations of the model. The shift in model resolution down to the meso-gamma scale greatly improved its ability to resolve this mechanism, and should improve the ability of forecasters to predict similar events. Further attempts to recreate the boundary layer environment will be addressed in order to better configure an operational mesoscale model for the region.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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AOS-08 Sediment organic content's effect on the settlement of the Hard clam, *Mercenaria mercenaria*. J.T. RIDGE (1), S.P. GEIGER (2), S.P. STEPHENSON (2), and K.B. JOHNSON (1). (1) Dept. of Marine and Environmental Systems, Florida Institute of Technology, Melbourne, FL 32901, (2) Florida FWCC Fish and Wildlife Research Institute, 100 Eighth Avenue SE, St. Petersburg, FL 33701. The Hard clam, *Mercenaria mercenaria*, has exhibited infrequent population booms in the Indian River Lagoon (IRL), Florida. While once thriving throughout the lagoon, *M. mercenaria* only remains in abundance in certain regions. Potential explanations for their low populations include natural climatic events, degrading habitat quality, depensation effects, and overharvesting. In the past few decades, there has been an influx of high organic sediment into the IRL. This study examines the effect of degrading habitat quality on hard clam recruitment through the manipulation of the sediment organic content in both laboratory and field experiments. We created an algal powder from dried and blended *Gracilaria* spp. and added it to "clean" sediment to create three treatments: clean, low organic (historical IRL sediment analog), and high organic sediments. *M. mercenaria* pediveligers were allowed to settle for 48 hours in both the lab and field before processing. Preliminary results indicate that while clams may be induced to settle more readily in suitable habitats of clean or low organic sediments ($F = 9.665$, $P = 0.002$), their ability to choose suitable habitat may be significantly hindered ($F = 12.072$, $P < 0.001$) in the presence of high organic sediment, as hard clam mortality was also significantly greater ($F = 35.953$, $P < 0.001$) in this treatment. These results have dire implications for IRL clam populations, considering the amount of high organic sediment has doubled in certain areas of the IRL in the past two decades.

AOS-9 Substratum roughness preferences of *Balanus (=Amphibalanus) amphitrite*. L.H. SWEAT and K.B. JOHNSON. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. Univ. Blvd, Melbourne, FL 32901. The invasive striped acorn barnacle, *Balanus amphitrite*, is a dominant fouling organism on both natural and artificial substrata in and around the Indian River Lagoon (IRL), Florida. In a previous field study employing various surfaces, the recruitment of *B. amphitrite* was found to increase on rougher substrata. In this study, we isolated the roughness variable by presenting cultured, competent cyprids with glass panels divided into three degrees of roughness. Recruits were enumerated and measured on each treatment to determine density, percent settlement, and mean size. It is important to note that biofilms are known to affect barnacle settlement and surface roughness may influence the rate and quality of newly establishing biofilms. To determine possible biofilm effects on *B. amphitrite* settlement in the IRL, and the interplay between roughness and biofilm composition, settlement panels of three roughness treatments analogous to the glass panels used in the laboratory study were deployed for a two-week period in the IRL. The biofilms resulting from different roughness treatments were scraped and microorganisms colonizing the films were identified and enumerated. Members of the biofilm community, without regard for treatment, include, but are not limited to: diatoms in the genera *Toxarium*, *Navicula*, *Melosira*, *Synedra*, and *Cylindrotheca*; peritrich ciliates; nematodes; and cyanobacteria. Treatment-based differences in barnacle settlement and biofilm development will be discussed. Given that substratum type is a key component to the successful establishment of fouling organisms, results from these studies could aid in predicting the further establishment and range expansion of the invasive *B. amphitrite* in Florida waters.

AOS-10 Diel vertical migrations of zooplankton between the epipelagic and shallow mesopelagic zones of the Gulf Stream. W.M. WESTMAN, M.L. STADEL, and K.B. JOHNSON. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. Univ. Blvd, Melbourne, FL 32901. MOCNESS was used to examine vertical migrations of zooplankton in the Gulf Stream near the Port of Miami (Florida). The diel migration patterns of species abundant in October and November were compared between 2008 and 2009. In each year, MOCNESS plankton tows (365- μm mesh) were carried out at midday and then again after dusk at a station near the western edge of the Gulf Stream (25°42'N, 80°W). The depths of the multiple net collections ranged through the epipelagic zone and into the shallow mesopelagic as deep as 320 m. Depths selected were at the surface, halfway to the start of the pycnocline, the top and bottom of the pycnocline, halfway to the seafloor from the bottom of the pycnocline, and near the seafloor. Determination of these depths was assisted by CTD profiles and there was notable consistency between the two sample dates, though they were separated by nearly one year. In 2008, migrating species included numerous pteropods, copepods, and other types of zooplankton. Approximately 88.9% of the zooplankton species exhibited nocturnal migration, migrating into surface waters at night presumably to feed. Approximately 11.1% exhibited reverse migration, migrating into deeper waters at night. When considering all zooplankton, there was a net movement of biomass, measured as settled plankton volume, into surface waters after dusk. Fall 2009 sampling is still being processed and will be compared to the species, abundances, distributions, and migrations of 2008.

AOS-11 Microfouling communities on antifouling and fouling release coatings from three static immersion test sites in Florida. K.A. ZARGIEL and G.W. SWAIN. Department of Marine and Environmental Systems, Florida Institute of



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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Technology, 150 West University Blvd, Melbourne FL, 32901. Commercial antifouling coatings continue to evolve in an attempt to match the performance of the self polishing copolymer tributyltin systems. According to the US Navy an ideal coating should have the following characteristics: a twelve year biofouling control life cycle, hydraulically smooth, low maintenance, durability, resistant to damage, repairable, compatible with existing anticorrosion coatings, ease of application, cost effective, non-toxic and environmentally acceptable. The purpose of this study is to assess the fouling communities on and performance of eight commercially available coatings over a two year period. These coatings were exposed at three static immersion test facilities along the east coast of Florida (Daytona, Sebastian, and Miami). The data presented here describes the microfouling communities that have become established after 60 day exposure at the three test sites. The data are analyzed to address the following two objectives: to compare differences in fouling communities among eight commercial ship hull coatings and to compare fouling communities on test coatings among three test sites. Test coatings consisted of three ablative copper surfaces, two copper free biocidal systems, three fouling release coatings, and one control polyvinylchloride surface. Microfouling organisms commonly found include: blue green algae, green algae, diatoms, dinoflagellates, silicoflagellates, nematodes, peritrichs, and tintinnids. Over twenty five genera of diatoms were observed after 60 day exposure, including some of the more commonly known foulers: *Achnanthes*, *Amphora*, *Cocconeis*, *Entomoneis*, *Licmophora*, *Melosira*, *Navicula*, *Nitzschia*, *Synedra*, and *Toxarium*. The eight commercially available coatings tested in this study showed significant differences in microfouling after 60 days exposure. Differences were seen in community structure with richness and abundance changing among test sites and coating types. These preliminary results help highlight the need to test coatings at geographically different static immersion test sites.

AOS-12 A laboratory study of the effects of surface variables on the colonization of benthic substrata in flow. A.M. NEYLAND, E.A. HUGHES, and K.B. JOHNSON. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. University. Blvd, Melbourne, FL 32901. We report differences in colonization of different types of settlement substrata under various laboratory flow conditions. Our experimental flume is a standard 55-gallon aquarium with a central partition added to create a recirculating flow track. Flow is generated with submersible powerheads. Settlement and colonization patterns of cultured and field-collected plankton, are being tested. Indian River Lagoon water was collected and recirculated within the flume while texturized plastic dishes (smooth, medium, and rough surfaces, n = 33 each) were available as colonization surfaces. We observed which meroplankton or demersal animals would colonize the surfaces, and how the patterns of colonization might vary with the roughness of the surface. Copepods, ostracods, nematodes, and settled bivalves were the most abundant animals found on the settlement surfaces. More animals were found on smooth *vs.* the medium and rough treatments ($p = 0.005$ and 0.028 , respectively). A similar pattern was observed for ostracods ($p = 0.023$ and 0.045 , with higher colonization of smooth surfaces *vs.* medium and rough, respectively). Colonization of smooth plates by nematodes was greater than on surfaces of medium roughness ($p = 0.016$). Additional results will also be reported for experiments involving alternative organisms, colonization surfaces, and flow regimes.

AOS Poster

AOS-P06 El Niño episodes and corresponding Atlantic basin and landfalling tropical cyclone activity (1950-2009). R.L. BAGGETT and S. CHIAO. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. Univ. Blvd, Melbourne, FL 32901. The El Niño-Southern Oscillation phenomenon is widely attributed to a decrease from average in tropical cyclone activity in the Atlantic basin. Consequently, a misunderstanding by the public exists in that El Niño also means decreased landfalling cyclones in Florida. This leads to a false sense of safety and disregard for tropical cyclones that do develop. In this study, not all recorded El Niño years correspond to a decrease in activity or in landfalls. Data from the Climate Prediction Center from the years 1950-2009, describe warm and cold episodes as a 3 month running mean of ERSST.v3b sea surface temperature anomalies in the Niña 3.4 region located in the central Pacific Ocean (5°N-5°S, 120°-170°W). A threshold of $\pm 0.5^{\circ}$ C for five consecutive 3 month running means determines a warm or cold season. For this study, the SST anomalies greater than 0.5° C that fall within the range of the Atlantic hurricane season (May 1 - November 30) are considered, and categorized as either a Full El Niño Hurricane Season (Full Season), or a Partial El Niño Hurricane Season (Partial Season). Using the same time period (1950-2009), data from the Atlantic Oceanographic and Meteorological Laboratory Hurricane Research Division Re-Analysis Project provided information on the number of tropical cyclones per year, tracks, and intensity. The evidence suggests that El Niño conditions ought to be present throughout the entire hurricane season to authenticate a decrease in Atlantic Basin tropical cyclone activity. Partial Seasons have frequent incidences of average to above average numbers of hurricanes and major hurricanes by month, and per year, whereas Full Seasons are almost always below average in total named storms, tropical storms, hurricanes, and major hurricanes. However,



**Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
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in all Full Seasons, at least one tropical system made landfall in Florida. Further clarification is necessary when attributing an El Niño episode to a reduction in Atlantic basin activity and a decline in landfalling tropical cyclones.

AOS-P07 Micro and macrofouling communities on antifouling and fouling release coatings from three static immersion test sites in Florida. J. COOGAN, K. ZARGIEL, and G. SWAIN. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 West University Blvd, Melbourne, FL 32901. Since tributyltin's ban from use in marine paints, the marine paint industry has struggled to find a commercial antifouling coating that can match the performance of the self polishing copolymer tributyltin systems. The intent of this study is to evaluate the performance several antifouling coatings. Comparisons were made between eight different commercially available paint types at three different sites along Florida's east coast. Three replicates of each paint type were placed at static immersion sites in Miami, Sebastian, and Daytona. After 60 days of exposure the panels were removed and both the micro and macro communities were evaluated. The eight coatings tested in this study showed significant differences in fouling after 60 days exposure. These differences were seen at both the micro and macro levels of fouling with richness and abundance changing among test sites and coating types. These preliminary results show the importance of testing coatings at more than one location due to the variability of marine fouling communities and how they react to the paint types.

AOS-P08 Caribbean low-level jet and island topographic impacts on trade winds and convection. W.A. ULRICH and S. CHIAO. Department of Marine and Environmental Systems, 150 W. University Blvd., Melbourne, FL 32901. The Caribbean low-level jet (LLJ) experiences a bimodal wind pattern that peaks in the late winter and midsummer. The midsummer peak in winds often coincides with a decrease in precipitation over the Caribbean basin that is commonly referred to as the midsummer dry spell (MSD). Fluctuations in the semiannual North Atlantic Subtropical High (NASH) often correlate to the strength of the Caribbean LLJ and MSD. An important question is when the Caribbean LLJ is weak (strong), how does the island response vary? How does the mesoscale divergence and rainfall change? The Weather Research and Forecasting (WRF) model is used in this research. We intend to examine the ability of the WRF model under regional climate configuration to reproduce the Caribbean LLJ between May and July of 2007. The model grid resolution is 11.25 km. The initial and lateral boundary conditions are derived using the Global Forecasting System (GFS) 0.5 degree data and the 0.083 degree Real-Time Global Sea-Surface Temperature data. Preliminary results demonstrate the Caribbean LLJ peaks in June 2007 with maximum easterly winds in excess of 16 m s^{-1} at 900 hPa. Monthly averages in vertical motions, w , indicate a basin-wide increase in subsidence. These initial results will help with future research which aims to analyze weekly shifts in the strength of the Caribbean LLJ and the associated vertical motion as well as the island topographic effects in local convective activities. Precipitation output from the model will be compared to monthly rainfall estimates at four stations across the Caribbean basin.

AOS-P09 Numerical investigations of soil moisture gradients on the intensification of Tropical Storm Fay. T. WASHINGTON and S. CHIAO. Florida Institute of Technology, Marine and Environmental Systems, 150 W. University Blvd, Melbourne, FL 32901. Few studies have been done regarding the impact of soil moisture on the intensification of tropical cyclones over land, but rather have concentrated on tropical cyclone transition to extra-tropical conditions, and the process that occurs during a dying tropical cyclone. The goal of this study is to advance our understanding of the observed intensity of Tropical Storm Fay (2008) after landfalling over south Florida. The maximum wind speed was achieved around 1800 UTC 19 August when the center was near the western portion of Lake Okeechobee. Subsequently, TS Fay absorbed moisture that may enhance convection around the center of circulation as it passed over the warm shallow waters of Lake Okeechobee and leading to an intensification of Fay. The working hypothesis to be tested is that during Tropical Storm Fay horizontal gradients in soil moisture, land moisture, and water depth of Lake Okeechobee resulted in the intensification of Tropical Storm Fay. The model simulations are conducted using the Weather Research and Forecasting (WRF) model version 3.1.1. Soil moisture and soil liquid water of the initial condition are perturbed to examine the impacts on the intensity and precipitation distribution of TS Fay during landfall. As a mean to evaluate the model simulations, the (wet) seasonal analysis of south Florida and monthly station reports around Lake Okeechobee are compared, which include precipitation, soil moisture, and temperature data. The months of June through August of Florida's wet season monthly averages are compared with monthly observational station reports along Lake Okeechobee. The stations of Clewiston, Belle Glade, and Immokalee are examined two months before landfall and during landfall. It is our intention to examine whether or not the observed values increased, decreased, or remained the same. The sum of the monthly averages for precipitation for June through August for neutral ENSO conditions at Clewiston is 25.7" with a standard deviation of ± 1.5 ". The observed reading for June through August of 2008 was 36.8", which is 11.1" over the monthly average for a non-El Niño year. The same procedure was used for Belle Glade, with the sum of the monthly averages for precipitation for June through August under



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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non-El Niño conditions being 22.6" with a standard deviation of ± 1.3 ". The observational reading for June through August of 2008 was 29.7", which is 7.1" over the monthly averages for a non-El Niño year. The last station examined was Immokalee with the sum of the monthly averages for precipitation for June through August was 26.6" with a standard deviation of ± 1.3 ". The observational reading for June through August 2008 was 36.4" which is 9.8" inches over the monthly average for a non-El Niño year.

BIO = BIOLOGICAL SCIENCES | [return to top](#)

BIO-01 Trojan-horse phage therapy. I. DUFFY. Department of Math and Science, Saint Leo University, PO BOX 6665, Saint Leo, FL, 33574. Phage therapy is the use of bacteriophages to treat bacterial infections. With the introduction of antibiotics in the early part of the 20th century, the use of phage to treat bacterial infections was discontinued in most countries, excluding the former Soviet Union. Now, with the dramatic increase in antibiotic resistant bacteria attention has once more focused on alternative means of combating pathogenic bacteria, including phage therapy. Although there are many advantages to using phage for this purpose, there are also disadvantages, such as, how to target the phage to a specific site and how to overcome the body defenses. The aim is to describe an ongoing project in which a benign bacteria is used to transport phage, specific to a pathogenic bacteria, to the target site.

BIO-02 HABs, microalgae, and "*the most diverse estuary in north America.*" P.E. HARGRAVES (1,2,3). (1) Affiliate Professor, Harbor Branch Oceanographic Institute-FAU, 5600 US-1N, Ft. Pierce FL 34946, (2) Research Associate, Smithsonian Marine Station, 701 Seaway Drive, Ft. Pierce, FL 34949-3140, and (3) Emeritus Professor of Oceanography, University of Rhode Island, Narragansett, RI 02882. The Indian River Lagoon on Florida's East coast is home to at least 25 microalgal species that produce harmful algal blooms (HABs) elsewhere, but human toxicity is apparently almost lacking here. There are multiple reasons for this lack. Apart from HABs, microalgal diversity is clearly high but still substantially unknown. The ignorance of diversity at most taxonomic levels in the IRL makes the well-known phrase that the IRL is the most diverse estuary in North America, a misleading and scientifically indefensible statement.

BIO-03 Variation in morphological traits of the seagrass *Thalassia testudinum* populations in Florida. K.A. TILING and C.E. PROFFITT. Department of Biological Sciences, Florida Atlantic University c/o Harbor Branch Oceanographic Institute, 5775 N. Old Dixie Hwy, Fort Pierce, FL, 34946. Trait variation within a foundation plant species can have important ecological consequences that affect function and stability. Variation in morphological traits may influence population persistence. Recovery from disturbance or stress may be enhanced in some phenotypes that have, for example, larger rhizomes and more stored reserves that provide greater physical resistance to removal and increased post-disturbance growth. A previous study showed greatly reduced genotype diversity in the Indian River Lagoon (IRL; temperate/sub-tropical climate), compared to Florida Bay (tropical climate). This may influence diversity in morphology, particularly in areas where a species' range spans multiple latitudes. In the southern IRL, *Thalassia* is abundant and relatively stable away from large freshwater influences such as the St. Lucie River. In the mid IRL, it begins to decrease and becomes essentially absent north of Sebastian Inlet. As part of a larger on-going study, we conducted a broad scale survey of morphological traits for individual clones at sites that cover the range of *Thalassia* in the IRL. Key morphological traits varied between sites in the IRL including shoot density (ANOVA, $P < 0.017$), internode length (ANOVA, $P < 0.0005$), sheath length (ANOVA, $P < 0.0005$), and number of leaves (ANOVA, $P < 0.0005$), including differences in leaf age. Oldest leaf length ($P < 0.0005$), youngest leaf length ($P < 0.001$) and youngest leaf width ($P < 0.020$) all varied differently between clones. Within a site the number of leaves between clones differed significantly (ANOVA, $P < 0.002$).

BIO-04 The roles of predation, facilitation and competition in determining the architecture and fitness of young *Rhizophora mangle* (red mangrove) trees. D.J. DEVLIN and C.E. PROFFITT. Florida Atlantic University, Department of Biological Sciences, Harbor Branch Campus, 5775 Old Dixie Highway, Ft. Pierce, FL. 34946. Generally *Rhizophora mangle* trees begin to reproduce at two to three years of age. Early reproductive success is an important measure of fitness in *Rhizophora* because old trees in closed canopy forests produce few propagules. Further, the likelihood that established propagules will survive is greater in open canopy forests. *Rhizophora* tree architecture is important to overall fitness because the number of propagules that can be produced by a tree is constrained by the number of apical buds it possesses. Herbaceous plants can either facilitate or impede the formation of side branches and thus apical tips in *Rhizophora*. Facilitation of canopy development can occur as an indirect effect when herbaceous species provide refuge, thereby minimizing the likelihood of infestation by insect predators that can cause mortality or reduce canopy volume by an average



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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of fifty percent in two year old trees/saplings. However interactions between herbaceous species and *Rhizophora* are not always positive. Depending on physical conditions, some herbaceous species can act as either competitors or facilitators. For example, when physical conditions are stressful *Spartina alterniflora* facilitates *Rhizophora* growth. In contrast, when physical conditions are amenable to growth, *S. alterniflora* appears to compete with *Rhizophora* for above ground space, resulting in a reduction the number of apical buds. The interactions (positive = facilitation or negative = competition and predation) between herbaceous species and tree species can be influenced by biological and physical factors have a profound effect on the architecture and fitness of trees. Further, alterations in biological factors (outbreaks of insect predators) and physical factors (rainfall and temperature) that are predicted to occur with global change have the potential to affect the architecture and fitness of tree species.

BIO-05 Mangroves as bioindicators of pollution. C.E. PROFFITT (1), D.J. DEVLIN (1), G. COLDREN (1), and S.E. TRAVIS (2). (1) Department of Biological Sciences, Florida Atlantic University c/o Harbor Branch Oceanographic Institute, 5775 N. Old Dixie Hwy, Fort Pierce, FL, 34946, (2) Department of Biological Sciences, University of New England, Biddeford, ME 04005. Mangrove forests dominate shorelines of south Florida estuaries. These tropical species share dominance with salt marsh plants further north in the Indian River Lagoon (IRL) as cold temperatures reduce tree and seedling survival and growth. Red mangroves (*Rhizophora mangle* L.) can be useful indicators of pollution. *Rhizophora* is primarily self-pollinating and is viviparous. The large propagules that are easily seen hanging in trees are embryonic seedlings that germinate from fruits held and nourished by the maternal tree. These two points taken together mean that albino mutations are expressed in the phenotype of heterozygote embryos, and will be nourished by the maternal tree for 4-7 months while maturing. We have surveyed shorelines throughout Florida and found that areas subjected to oil spills or runoff from toxic sources have a greater incidence of trees producing albino (yellow, pink, or white) propagules. From these simple surveys albino mutation rates can be calculated for a given stretch of shoreline and compared with other sites. *Rhizophora* may also be useful as an indicator of nutrient pollution. Our data from the IRL indicate a very large range in the number of reproducing trees/km, defined here as those with mature propagules. Forests near suspected nutrient sources have much greater (2-10 ×) the numbers of reproducing trees/km than other stands. This suggests that further work linking nutrient data with mangrove reproductive output is needed. These simple field surveys can be done by anyone with moderate training, to ensure that everyone uses the same methodology, and should be an important tool allowing natural resource managers to gage pollution status, or the long-term, estuary-wide effectiveness of large-scale pollution abatement programs.

BIO-06 Different colonization rates and species combinations influence salt marsh and mangrove community development in the Indian River Lagoon (IRL). G.A. COLDREN, C.E. PROFFITT, K.A. TILING, and D.J. DEVLIN. Department of Biological Sciences, Florida Atlantic University c/o Harbor Branch Oceanographic Institute, 5775 N. Old Dixie Hwy, Fort Pierce, FL, 34946. In the Indian River Lagoon (IRL), Florida, salt marsh and mangrove species intermingle because climatic factors allow persistence of tropical species in the estuary. Gaps, such as those created by hurricanes or during site clearing for restoration, are often colonized by salt marsh species which may affect mangrove recruitment. The combination, diversity, and colonization rate of salt marsh species in gaps may influence the rate at which mangrove species colonize and fill forest gaps as well as favoring particular mangrove species dominance. The patchiness of salt marsh vegetation may also influence canopy size variation. The regeneration rates of gaps may also be influenced by the growth of both mangrove and salt marsh species. We have been studying two previously defoliated restoration sites for two years. One site had four different salt marsh species (*Spartina alterniflora*, *Spartina patens*, *Sesuvium portulacastrum*, and *Distichlis spicata*) planted in a field experiment, while at the other site, salt marsh vegetation (mainly *S. alterniflora*) colonized naturally by seedling recruitment and clonal growth. At both sites, red mangrove (*Rhizophora mangle*) was initially planted at specific densities, but all three species of mangrove (*Rhizophora*, *Avicennia germinans*, *Laguncularia racemosa*) were allowed to naturally recruit. We measure this natural recruitment by *Rhizophora*, *Avicennia* and *Laguncularia*. *S. alterniflora* had different clonal expansion rates in the two sites but showed greater area cover increase than other species. *S. Patens* showed the least increase in area cover. The presence of different salt marsh species, combinations of species, and species richness had significant effects on the colonization rates of *Avicennia* and a lesser effect on *Rhizophora*, and *Laguncularia*.

BIO-07 An ecological assessment of the floodplain forest canopy of the Loxahatchee National Wild and Scenic River. R.E. ROBERTS (1) and M.Y. HEDGEPEETH (2). (1) FDEP, Florida Park Service, District 5 Office, 13798 S.E. Federal Highway, Hobe Sound, Fl 33455, (2) South Florida Water Management District, 3301 Gun Club Road, West Palm Beach, Fl 33401. In a 2003 study of the Loxahatchee River floodplain and its major tributaries, ten vegetative belt transects consisting of 138 vegetative plots and four environmental variables (river mile, elevation, soil type and forest type) were



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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investigated. Datasets were analyzed for abundance, frequency of occurrence and basal area. The software package PC ORD was used to run multivariate analysis. Results were graphed as dendrograms and/or scatterplots of both plot and species distribution. In addition, we examined diameter at breast height (dbh) size class frequencies of target species to assess recruitment, growth and comparative age between 1985, 1995 and 2003 vegetative studies. As noted in other Florida river studies, mixed groups of forest types were prevalent on the floodplain of the Loxahatchee River. In analyzing the 2003 canopy frequency of occurrence dataset, the resulting algorithm identified two major canopy groups (upland/hammock and bottomland hardwood/swamp) with six sub-groups consisting of mesic and hydric hammock, upland/hammock mix, riverine swamp, riverine bottomland hardwood and swamp mix, tidal swamp and tidal hammock mix. Ordination results suggested that, particularly in the riverine reach, hydroperiods are not adequate in depth and duration which may account for the invasion of non-hydric and non-native plant species and landscape displacement of the hydric species. Also, in the riverine reach, there was a decrease in new recruits (5-20 cm) and a loss of more mature trees among most of the target species since 1985. In the upper tidal reach, bald cypress showed an increase in recruitment and a loss of mature trees (61-80 cm and 81-99+ cm). In the lower tidal reach, the low diversity indicated that salinity, elevation and tidal inundation were limiting factors to plant diversity in this area. Throughout the river floodplain, the bald cypress exhibited a decline corresponding to river mile and salinity.

BIO-08 Bacteria found in *Ctenopharyngodon idella* regulates *Hydrilla*. R. LINGO and H.F. CAREY. St. Leo University, Math & Sciences, 33701 State Road 52, Saint Leo, FL 33574-6665. *Hydrilla* is a water species plant found in lakes and has become a problem. Recent methods use fish such as *Ctenopharyngodon idella* and Tilapia, or chemicals to regulate the plant growth; however, there are consequences such as over population of *C. idella* and Tilapia, and pollutants from the chemicals. Since *C. idella* only eat vegetation in the lakes, it has certain bacteria and enzymes in the intestine that helps digest their food. There might be a connection between the bacteria in the intestines of this fish and *Hydrilla* seeds such as the bacteria could be used as an herbicide for *Hydrilla* if used correctly. To test whether or not the bacteria can regulate *Hydrilla* the *Hydrilla* seeds will be inoculated with the bacteria from the intestine and put on an agar plate to see the bacteria growth on the seeds. Also the seeds will be inoculated with the bacteria and grown using a germination test.

BIO-09 Genomic and proteomic studies of *Procambarus alleni* and *Procambarus fallax*. J. MACBETH, T. MATTOX, T. MITCHELL, A. WOOLNINE, and C. TOTH. Department of Biology, Palm Beach Atlantic University, 1301 South Olive Avenue, West Palm Beach, FL 33401. The classification of crayfish has largely been based on morphology. However this is an oversight when thought of convergent evolution come into play. Similar morphology could merely dictate a similar need by separate species to adapt a similar method of survival in their physical appearance. Therefore it is through the use of genetic analysis that species can be compared in a non-subjective way. It was the aim of this project to compare the genetic make-up and protein content of the two species of crayfish in an attempt to show them as evolutionary distinct species, not just variants of the same species. *Procambarus alleni* and *Procambarus fallax*, that can be located in Big Pine, Florida were analyzed, based on their DNA, RNA, and proteins and compared. Gel electrophoresis and protein isoelectric focusing (IEF) were run on both samples of crayfish for comparison. The data collected demonstrated that *P. alleni* and *P. fallax* do display genetic variability's in their protein, RNA and DNA. DNA was analyzed using Random Polymorphic DNA (RAPD). RNA isolation was performed using MO Bio laboratories Ultra Clean tissue RNA isolation kit and visualized on 37% Formaldehyde gel. Protein analysis was performed using GE Healthcare PhastGel system with a pH gradient of 3-9. The results from all three molecular analyses showed differences indicating that the two species are not variation of one species but two distinct species altogether. DNA analysis showed a 33% discrepancy between the species when using the conserved versus novel banding pattern. These differences between the two species can be used in further genetic studies, especially sequencing, to locate exact differences or mutations that may have occurred to provide an explanation on crayfish population declines.

BIO-10 Ecological character displacement by the lizard *Anolis carolinensis* in response to an invader, *A. sagrei*. Y.E. STUART (1), T.S. CAMPBELL (2), and J.B. LOSOS (1). (1) Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, MA 02138, (2) Department of Biology, University of Tampa, Tampa, FL 33606. Strong competition between closely related species for similar resources is thought to lead to ecological character displacement (ECD) correlated ecological and phenotypic divergence between species to reduce competition. While ECD is widely accepted, the number of case studies that show that interspecific resource competition indeed leads to adaptive shifts are surprisingly few and mostly based on comparative, not experimental, data. Lizards in the genus *Anolis* are ideal to experimentally test the ECD hypothesis; *Anolis* species are diverse, have similar ecological needs, and have been shown to compete in nature. Importantly, evidence suggests that *Anolis* species mitigate competition by optimizing their morphology



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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to use divergent habitats. Over the past 65 years, *A. sagrei* has invaded Florida from Cuba and is now broadly sympatric with Florida's native anole, *A. carolinensis*. In Mosquito Lagoon, Florida during the mid-1990s, *A. sagrei* was purposefully introduced onto small islands containing *A. carolinensis* to study the demographic effects of *A. sagrei* on *A. carolinensis*. Several control islands were left un-invaded. This work created a natural experiment to which we returned to test whether *A. sagrei* has driven ECD in *A. carolinensis*. We predicted that competition from *A. sagrei* caused an arboreal shift by *A. carolinensis* to reduce competition, subsequently driving adaptive morphological evolution toward the larger toepads characteristic of arboreal anoles. Results are consistent with our ECD hypotheses and suggest that competition may cause adaptive evolution in *Anolis*: (1) we find a significant, approximately one-meter increase in mean perch height of *A. carolinensis* populations in the presence of *A. sagrei* (n=3) compared to those populations in the absence of *A. sagrei* (n=3), and (2) we find a marginally significant increase in toepad area in the presence of *A. sagrei*. Future dissertation work will increase island-population sample size and include additional experimental manipulations.

BIO-11 Prey capture in *Belonesox belizanus* and *Micropterus floridanus*: Implications for the interactions between exotic and native fishes in Florida. R.G. TURINGAN (1) and J.R. KERFOOT (2). (1) Department of Biological Sciences, Florida Institute of Technology, 150 West University Boulevard, Melbourne, FL 32901, (2) Department of Biological Sciences, Union University, 1050 Union University Drive, Jackson, TN 38305. The extent to which exotic species negatively impact native species may be evident in the changes in the trophic dynamics of an ecosystem after the establishment of an invasive population. The intensity of biological interactions between invasive and native fish species may be inferred from the degree of overlap in their food habits and feeding behavior. This study was designed to compare the kinematics and mode of prey-capture between young-of-the-year (YOY) native Florida largemouth bass, *Micropterus floridanus*, and invasive pike killifish, *Belonesox belizanus*. Principal component analysis revealed a pattern of overlap in prey-capture kinematic space between species. Subsequent t-tests comparing the loading scores of each of the first two principal components, using species as a grouping factor revealed that in general, the kinematics of prey-capture were similar between *M. floridanus* and *B. belizanus*. However, both species differed in feeding mode; *B. belizanus* employs ram-feeding whereas *M. floridanus* uses ram-suction to capture prey. Similarity in prey-capture kinematics and disparity in feeding mode may facilitate the interaction between these coexisting native and invasive species.

BIO-12 Experimental manipulation of former muck farm fields to reduce the abundance of house mice near Apopka, Florida. J.R. ABELSON, and I.J. STOUT. Department of Biology, University of Central Florida, P.O. Box 162368, Orlando, FL 32816-2368. Questions concerning the role of the North Shore Restoration Area (NSRA) of Lake Apopka in the maintenance of regional house mice populations prompted management actions by the St. Johns River Water Management District. This 3,238-hectare site of former muck farms has been subject to mowing several times per year since 2001. In addition, plowed strips (10-15-m in width) have been maintained on the eastern boundary and on the boundary of most fields. A major outbreak of house mice in the region in 1998-99 followed by a lesser increase of mice in 2006 suggested an evaluation of the management efforts. Experiment one utilized six fields, three randomly selected fields were mown at regular intervals, whereas three fields were allowed to develop vegetative cover without interference. Trapping grids (5 × 5) with 25 trap stations were centered in each of the fields. Two traps were placed at each station and opened once per week for 21 weeks beginning in March 2008. A plowed strip divided each grid to determine the likelihood of house mice moving across the strip. A replicate of experiment one was done with no barrier strips. Our results indicated during spring and summer, no significant difference ($p < 0.05$) existed in the number of individual house mice tagged and released on cut and uncut grids. House mice were found to cross and re-cross the plowed strips on grids in experiment one. The accumulation of litter over the course of the experiments may have explained the lack of a significant treatment (mowing) effect. The results of the two experiments suggested mowing does not reduce house mice on the muck fields. Fire breaks and travel lanes continue to be required; however, the plowed strips do not act as barriers to movements of house mice. (This work was supported by the St. Johns River Water Management District.)

BIO-13 Population distribution of house mice (*Mus* sp.) in north west Orange County in 2007: Harbinger of another plague event? I.J. STOUT and J.R. ABELSON. Department of Biology, University of Central Florida, P.O. Box 162368, Orlando, FL 32816-2368. Populations of house mice reached plague numbers the summer and fall of 1999 in north west Orange County. Reports of unusual numbers of mice were noted by health officials in 2006. In early 2007, we conducted a live trap mark and release survey of public (North Shore Restoration Area [NSRA], St. Johns River Water Management District) and private lands in the vicinity of Apopka, Plymouth, and Zellwood. Five live trapping grids were sampled biweekly for seven months at the NSRA. A total of 436 small mammals were captured and house mice (104) comprised 23.8% of the sample. In Orange County, 11 sites were available for live trapping from May-August 2007. Transects of live



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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traps were arranged to fit the area and configuration of these sites. During 42 trapping sessions, 65 house mice were live trapped in 1,042 trap nights. House mice were not live trapped on five of the 11 sites. Trapping success increased from 3.1% in May to 56.9% in August. Our data suggested house mice were locally common on public and private lands in the study region during the spring and summer of 2007. No evidence of a pending population outbreak was observed. (Support for the work was provided by the Orange County Health Department and St. Johns River Water Management District.)

BIO-14 Morphometric and meristic changes in the pedicellarial base plates and tubercles with growth of the snakestar *Asteroporpa annulata*. N.W. BECKER and R.L. TURNER. Department of Biological Sciences, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. Pedicellariae, the small grasping organs long known to occur on seastars and sea urchins, have only recently been discovered in basketstars and snakestars of the family Gorgonocephalidae. In contrast to our knowledge of pedicellariae in other echinoderms, we now have much to learn about them in ophiuroids. Our study examined how such structures change on the arm as segments grow. The widths and numbers of pedicellarial base plates and the tubercles attached to them were measured and counted on nine segments harvested at ten-segment intervals along an arm in the snakestar *Asteroporpa annulata*. Analysis showed a general increase in the numbers and widths of base plates among segments of increasing age from the arm tip to its base. Variation in median width of base plates was greatest in the middle of the arm. There was no trend in the widths of tubercles during growth of segments, but their number per segment increased with age. As segments grow, new base plates are added among existing base plates, existing base plates grow, and the widths of base plates varies greatly in segments of intermediate growth. Addition of base plates (and accompanying tubercles and valves) provides greater prey-capture ability along the arms in this snakestar, in contrast to basketstars, which add pedicellariae by branching of the arm tips but lose pedicellariae from older segments.

BIO-15 Formation and growth of vertebrae in brittlestars: do ossicles ever fuse? H.M. CROCE and R.L. TURNER. Department of Biological Sciences, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. It has long been thought that vertebral ossicles in brittlestar arms evolved by fusion of paired ambulacral ossicles. Researchers examining the development of ophiuroids often focused on external rather than internal features, and, due to the presence of the ventral and lateral arm plates, development of the vertebrae has not been well studied. Here, the development of vertebral ossicles in *Ophiophragmus filigraneus* (Echinodermata: Ophiuroidea) near the growing tip of the arm was examined. Arm tips, cleaned of soft tissue with bleach, were studied using scanning electron microscopy. It was found that vertebral ossicles originate under the terminal plate in halves of unequal size, suggesting alternated development. These two halves grow towards one another with much branching of the stereom, eventually interdigitating in the manner of a three-dimensional jigsaw puzzle. As the vertebrae grow, their halves interlock more tightly, creating a suture line, which before has been taken as evidence for the incomplete fusion of the halves. Some evidence of fusion is found in more mature vertebrae, in which the suture line on the distal face was sometimes not visible. Further study is needed to determine conclusively whether fusion, either partially or in full, occurs between the two halves of vertebral ossicles in ophiuroids, or if, as this study suggests, interdigitation forms an immobile joint, here referred to as the rigid ambulacral joint, between the halves.

BIO-16 Density, distribution and size of the starfish *Luidia clathrata* in Tampa Bay. J.C. COBB (1), J.M. LAWRENCE (2) and T. TALBOT-OLIVER (2). (1) Fish and Wildlife Research Institute, St. Petersburg, FL 33701 (2) Department of Integrative Biology, University of South Florida, Tampa, FL 33620. Density, distribution and size are basic characteristics of populations. We investigated a population of *Luidia clathrata* at Courtney Campbell Causeway in Tampa Bay. Size frequency distribution was monitored from 1971 to 1972 and from 2007 to 2009. An abrupt increase in mean size (arm length from center of disc to arm tip) from 48 to 71 mm occurred between November and December 1971, probably from migration. In contrast, mean arm length increased gradually from 36 mm in June 2006 to 77 mm in November 2008. Although other cohorts may have been present during this period, they may not have been documented because of intermittent sampling. Increase in size was slow over periods of consecutive monthly sampling, suggesting low availability of food. Small individuals were infrequently encountered, suggesting recruitment occurred elsewhere. Maximum mean arm length of *L. clathrata* at this site was ca. 70 mm over the 28 year period. Density and distribution were monitored from 2007 to 2009 by deploying a 1 m² quadrat along 1 to 4 transects, 30-58 m in length, on each observation date. Mean density ranged between 0.13 and 1.27 individuals m⁻². Low density indicates also low food availability. Morisita's standardized index of dispersion for all 14 transects ranged between -0.39 and 0.31, indicating random distribution on all dates. Random distribution of *L. clathrata* at this site suggests random distribution of prey.

BIO-17 Distribution of seastar (Echinodermata, Asteroidea) species in Tampa Bay in spring, 2009. S.L. PARKS (1) and J.M. LAWRENCE (2). (1) Fish and Wildlife Research Institute, St. Petersburg, FL 33701, (2) Department of



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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Integrative Biology, University of South Florida, Tampa, FL 33620. Estuaries are among the most variable of habitats. Temperature, salinity, oxygen concentration and pH vary over space and time. We investigated the distribution of seastar species and level of these abiotic variables throughout the bay, including the opening to the Gulf of Mexico and Boca Ciega Bay, in February and March and May and June 2009. The most abundant species, *Luidia clathrata*, occurred in Old Tampa Bay, mid-bay and near the mouth of the Alafia River. It did not occur with other seastar species. *L. senegalensis* occurred only in Boca Ciega Bay, *L. lawrencei* only at the mouth of the bay, and *Astropecten articulatus* at the mouth and mid part of the bay. Abiotic variables differed little with site at the season of collection (salinity: 30 to 35 ppt, temperature: 15 to 19 °C, oxygen concentration: 7.4 to 10 mg/L, pH: 7.7 to 8.0). The variables are known to differ more on the bottom during summer in Old Tampa Bay when salinity can decrease to 14 ppt, temperature increase to 30 °C, oxygen concentration decrease to 5.5 mg/L and pH increase to 9.3. *L. clathrata* can function at 16 ppt salinity. Its absence from areas where salinities are higher possibly results from biotic factors while the absence of the other species from Tampa Bay possibly results from abiotic factors.

BIO-18 A spatial and temporal analysis of urchin recovery in the Florida Keys. M. CHIAPPONE (1, 2), L.M. RUTTEN (2) and S.L. MILLER (2). (1) Miami Dade College, Homestead Campus, 500 College Terrace, Homestead, FL 33030, (2) Center for Marine Science, University of North Carolina-Wilmington, 515 Caribbean Drive, Key Largo, FL 33037. The 1983-84 Caribbean-wide mass mortality of the long-spined sea urchin *Diadema antillarum* Philippi was followed by a second mortality event in the Florida Keys in 1991. The demise of this once ubiquitous urchin is considered one of the many factors responsible for the changes observed on Florida reefs such as an increase in macroalgal cover and concurrent declines in crustose coralline algae and coral. Over a 10-year period (1999-2009), we examined densities and test sizes of *D. antillarum* and other urchin species at over 1,000 sites spanning ~350 km of the southeast Florida shelf encompassing multiple habitat types from inshore to the deeper fore reef. Underwater visual surveys along belt transects were used to enumerate the number of individuals and test sizes in a stratified random sampling design that incorporated benthic habitat types, geographic regions, and management zones inside and outside of no-fishing zones. While pre-1983 densities in the Florida Keys were reported to be as high as 5 individuals/m², surveys since 1999 indicate that current densities are still well below 1 individual/m²; however, there has been a notable shift in the average size and size range of individuals. Surveys of 1,053 Florida Keys sites yielded a maximum site-level density of 0.33 individuals/m² over a 10-year period. While other sea urchins such as *Eucidaris tribuloides* (Lamarck) and *Echinometra viridis* Agassiz exhibit density and habitat distribution patterns similar to historical observations, these species do not appear to have increased in abundance in response to reduced *D. antillarum* densities. Potential explanations for the slow recovery of *D. antillarum* to pre-1983 densities include poor larval survivorship, high relative predation due to a lack of adult conspecifics, suitable recruitment sites, and/or reduced fertilization success.

BIO-19 Community structure of *Acropora* framework reefs in the Florida Keys: Historical perspective and current patterns. M. CHIAPPONE (1,2), L.M. RUTTEN (2) and S.L. MILLER (2). (1) Miami Dade College, Homestead Campus, 500 College Terrace, Homestead, FL 33030, (2) Center for Marine Science, University of North Carolina at Wilmington, 515 Caribbean Drive, Key Largo, FL 33037. The Florida Keys reef tract is a semi-continuous series of bank-barrier reefs bounded nearshore by inner shelf habitats and Pleistocene islands and offshore by the Straits of Florida. A prominent feature of the reef tract is the presence of emergent or nearly emergent *Acropora* coral framework reefs with spur and groove topography. These reefs initially developed 5-6 ka atop a ridge of older Pleistocene corals and sands, and although they comprise < 5% of the subtidal marine area of the south Florida shelf, they have been a focus of scientific surveys and management activities since the 1960s. Surveys of 43 spur and groove reefs comprising 246 discrete sampling locations during 1999-2009 were undertaken to describe the richness, abundance, size, and condition of reef benthos that provide context to historical surveys. From the earliest published records, there is little doubt that *Acropora palmata*, the primary framework builder, has declined significantly due principally to disease, and interlocking significant stands of this coral remain in only a few locations. The demise of *Millepora complanata* and other corals due to several coral bleaching episodes, along with a 100-fold decrease in the abundance of the urchin *Diadema antillarum*, also contributed to coral reef change. Most reefs continue to exhibit high topographic complexity, but are dominated by a mixture of smaller, weedy agaricid and poritid corals, along with other invertebrates such as gorgonians and the colonial zoanthid *Palythoa*, depending upon along-shelf position. Although the reef surface at most sites is dominated by algae, the assemblage mostly consists of diminutive “turf” and coralline species, indicative of either intense wave action and/or herbivory. Given the current patterns of carbonate-secreting organisms (< 25%) it is possible that most reefs have or will enter a “drowned” or relict state.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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BIO-20 Morphometric analysis of the Hawaiian river shrimp, *Macrobrachium grandimanus*. L.N. VAN MAURIK, J.L. WORTHAM, and M.G. MCRAE. Department of Biology, University of Tampa, 401 W. Kennedy Blvd, Tampa, FL 33606. A morphometric study of the chelipeds was performed on a species of river shrimp, *Macrobrachium grandimanus*. Morphometric analysis is commonly used to differentiate similar species along with morphotypes within a species. There are biological implications of these morphotypes which can reveal a societal hierarchy of development within this species relating to territories and mate protection. A sample of shrimp (N=158) was collected from Hawaii and later analyzed. A total of five morphometric characters were measured for the relative left and right second pereopods: propodus palm length, propodus total length, dactylus length, chela width, and cheliped total length. Other measurements referring to the size of an individual such as carapace length, carapace width, and wet weight were measured. Through previous grooming observations of this species, it became necessary to evaluate any morphological differences between males and females along with large and small individuals. Four different morphotypes of males and females were discovered based on the relative size of the second pereopods. Statistical analyses were performed. All individuals were sexed by the visual affirmation of a male reproductive structure, the appendix masculina, which is located on the second pleopod of males. Females lack this structure which is relevant to the possibility of simultaneous hermaphroditism in some caridean shrimp. Females were also identified by having a mass of eggs (gravid) carried under the pleopods. Morphometric analyses revealed the presence of a setal patch in two of the morphotypes. A detailed grooming study rejected our hypothesis that the setal patch was used as a grooming structure. The function of this setal patch is not known and further research is needed.

BIO-21 Claw biomechanics of the Stone crab *Menippe mercenaria*. N. SIU (1), D. HUBER (1), and L. WHITENACK (2). (1) Biology Department, University of Tampa, Tampa, FL, 33606, (2) Department of Geology, University of South Florida, Tampa FL, 336202. The success of an organism in its environment significantly relies on its trophic apparatus and its strategy for energy acquisition. The common Stone crab *Menippe mercenaria* is abundant throughout coastal waters of the Western Atlantic, the Caribbean Sea and the Gulf of Mexico. The success of *M. mercenaria* throughout its range is primarily attributed to its powerful chelae, which allow it to tap into a niche most other competitors cannot, the consumption of heavily mineralized molluscs (molluscivory). In this study, voluntary pinch forces were measured from live specimens (n = 9) using a piezoelectric load cell and theoretical pinch forces were calculated through biomechanical modeling of claws (n = 3). Maximum voluntary pinch forces and mechanical advantage ratios of the chelae were used to estimate the specific tension of the chelae adducting musculature of *M. mercenaria*. Maximum voluntary and theoretical pinch forces were 573 N and 505 N respectively. Mechanical advantage of the chelae was 0.91 and the specific tension of the chelae adducting musculature was 98.3 N/cm². The high leverage and muscle stress of *M. mercenaria* results in the production of immense compressive forces which facilitate the consumption of extremely hard prey in a relatively competitor free ecological niche. The leverage and muscle stress of *M. mercenaria* are considerably greater than those of aquatic vertebrates that consume hard prey as well.

BIO-22 Density and distribution of the larvae of the commercially important blue crab, *Callinectes sapidus* in the Florida Current off the southeast coast of Florida, USA. G.L. WISNIEWSKI (1), A.C. HIRONS (1), and J.M. SHENKER (2). (1) Nova Southeastern University Oceanographic Center, 8000 North Ocean Drive, Dania Beach, FL 33004, (2) Department of Biological Sciences, Florida Institute of Technology, Melbourne, FL 32901. Knowledge of the temporal and spatial distribution and density of the larvae of blue crab, *Callinectes sapidus*, in the nearshore and offshore waters of Florida's eastern coast is minimal. Such data, however, can be crucial to our understanding of the population dynamics of this vital fishery species. To obtain baseline data of the occurrence of blue crab larvae in southeastern Florida waters, larval densities were obtained from zooplankton tows made during bimonthly research cruises in 2007 at three stations on an east-west transect along the inshore edge of the Florida Current northeast of Port Everglades, Ft. Lauderdale, Florida. Over the course of the sampling period, 4% of the larvae collected were 1st stage zoeae, 2% were 4th stage zoeae, 3% were 5th stage zoeae, 4% were 6th stage zoeae and 86% were the megalops stage. Zoel densities peaked in September, with larvae distributed within the 25 m depth range. Densities of megalopae peaked in May with minimal occurrences throughout the remainder of the year and were also concentrated in the upper 25 m of the water column. These results suggest annual spawning with a peak in February and March and may indicate active movement of late-stage larvae to surface waters for transport into estuaries for juvenile development. Further results are expected to provide additional insight to blue crab larval patterns and life history from this region and aid continued research on this commercially important species.

BIO-23 Relating oyster reef (*Crassostrea virginica*) complexity to the size distribution of Xanthid crabs. M. ROMERO and W.L. ELLIS. Department of Mathematics and Sciences, Saint Leo University, University Campus- MC2188, P.O. Box 6665, St. Leo, FL 33574. Structurally complex habitats provide refuge from predators and environmental stress.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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Therefore, structural complexity can exert a strong influence on the distribution of mobile organisms. Previous research conducted using artificial structures, indicates that Xanthid crabs (e.g. *Menippe* sp.) select areas with refuge spaces slightly wider than their carapace. These studies suggest that the availability of size-appropriate refuges is a primary limiting factor of crab population growth. The purpose of our study was to determine if the size distribution of Xanthid crabs on oyster reefs (*Crassostrea virginica*) is related to the size of available interstitial spaces between oysters. Fifteen oyster clusters were collected from the intertidal zone in Tampa Bay (Florida), and all mobile fauna were removed. The oyster clusters were returned to the lower intertidal zone at a uniform depth and remained for one month, until retrieved. All crabs were then removed from the oyster, identified, and measured (carapace width). The oyster clusters were CT scanned, producing a total of 646 cross sectional images. The total interstitial area (*i.e.*, space bounded by the convex hull minus space occupied by the oyster), total cross-section perimeter, and convex hull perimeter was measured for each image (ImageJ software). The interstitial area available to various size classes of crab (<10 mm, 10-15 mm and >15 mm carapace width) was also estimated for each oyster cluster. Areas smaller than the crabs' carapace width were considered inaccessible. Results indicate that the abundance of small crabs (<10 mm) was positively correlated with the total cross sectional perimeter of oyster clusters (a proxy measure of surface area), but not interstitial area. Larger juvenile crabs (>15 mm) were not found on all oyster clusters, just those with accessible interstitial areas and large ratios of total cross-section perimeter to convex hull perimeter.

BIO-24 Oyster reef restoration in southeast Florida: Macroinvertebrate communities shaped by discharges from Lake Okeechobee. E. SALEWSKI and C.E. PROFFITT. Department of Biological Sciences, Florida Atlantic University c/o Harbor Branch Oceanographic Institute, 5775 N. Old Dixie Hwy, Fort Pierce, FL, 34946. Oyster reef restoration is a component of the Comprehensive Everglades Restoration Plan (CERP); however, few studies of oyster reef community ecology have been conducted in southeast Florida. Oyster reefs not only provide structure to the estuarine floor, but also provide habitat for juvenile fishes and other sessile species, refuge from predation, and a food source for other species. Our research focuses on the development of the invertebrate community associated with newly created oyster reefs and making comparisons with results from existing restored and natural reefs. Approximately 240 oyster reef patches have been constructed in the St. Lucie Estuary, Florida using harvested fossilized shell since August 2009; and eventually 1,300 reef patches will be created in both the St Lucie River (1100) and Loxahatchee River (200) estuaries. Colonization of sessile and motile species was noted on the created reefs three weeks after installation; however, oyster spat settlement remained sparse. Within four months, spat settlement increased, as did colonization by sessile and motile species. Our study will evaluate the effects of reduced salinities and increased sedimentation resulting from freshwater releases from Lake Okeechobee on the oyster reef community.

BIO-25 Assessing benthic health in stressed subtropical estuaries, eastern Florida, USA using AMBI and M-AMBI. B.G. TUNBERG (1), A. BORJA (2), and M.S. JONES (1). (1) Smithsonian Marine Station, 701 Seaway Drive, Fort Pierce, FL 34949, (2) AZTI-Tecnalia, Marine Research Division, Herrera Kaia, Portualdea s/n, 20110 Pasaia, Spain. The Indian River lagoon (IRL) and the St. Lucie Estuary (SLE) are affected by a variety of anthropogenic pressures. Benthic macroinvertebrates have been monitored quarterly since early 2005, at 15 stations, in order to assess benthic health. Since the SLE and IRL are situated in a subtropical area, it is affected by two major climatic seasons, dry (winter) and wet (summer). This contribution investigates the application of the AZTI's Marine Biotic Index (AMBI) and multivariate-AMBI (M-AMBI), to assess the ecological status of these estuaries. AMBI was firstly calculated after assigning most of the previously unassigned species to each of the five ecological groups. Three main benthic assemblages, associated to oligohaline, meso-polyhaline and euhaline stretches, have been identified. Reference conditions of richness, Shannon's diversity and AMBI have been derived for these assemblages; M-AMBI has then been calculated. Both methods show that the inner part of the SLE is affected by anthropogenic pressures (increased freshwater inflow, elevated nutrient input, and sedimentation), whilst the IRL is less affected. We have demonstrated that AMBI is insensitive to the dramatic seasonal changes occurring in the SLE/IRL. At some of the stations a significant positive trend has been identified, linked to the water discharges. The use of both tools seems to be promising in assessing benthic health in this area.

BIO-26 Effect of colony size on the social structure and reproductive success of captive yellowhead jawfish (*Opistognathus aurifrons*). B. BURKE and J. LIN. Biological Sciences, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. Jawfishes are among the highest collected marine fish for aquarium trade in the states of Florida and Hawaii. Worldwide, there are over 60 species of jawfishes, but the yellowhead jawfish is the most colorful of the otherwise dull Caribbean family and also most popular in the aquarium trade. Although the life cycle of this species has been successfully documented, there are no commercially raised organisms available in the aquarium trade. Current research investigates the effects of colony size (density) on the onset of reproduction and reproductive success of yellowhead jawfish.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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This species has previously been documented to live solitary as burrow-dwellers, but preliminary observations reveal multiple fish occupying individual burrows. Subcutaneous tags are administered to mark individual fish and monitor movement throughout the colony over time and eventually determine if sex is directly related to location within the colony. Understanding the social structure formed at the onset of reproduction will help determine how many individuals can successfully live in a colony and the space requirements in a laboratory setting for the colony to successfully reproduce.

BIO-27 Geographic morphism and genetic structure of yellowhead jawfish, *Opistognathus aurifrons*. A.L.F.C HO and J. LIN. Department of Biology, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. Yellowhead jawfish, *Opistognathus aurifrons*, are a popular marine ornamental species. Although the fish is popular in and commercially harvested for the ornamental trade, very little is known about its abundances, recruitment, and genetic structure. Understanding the genetic structure of a population for a given species is crucial to understanding dispersal patterns, genetic connectivity, and the process of speciation. Furthermore, elucidating genetic structure can give valuable insights into the health of a population and its genetic biodiversity, especially as it pertains to stock management for harvested species. As such, the goals of this study are to characterize the cephalic melanistic structure, the morphological structure, and the genetic structure of four different “populations” (Aruba, Florida, St. Thomas, and Bimini) of *O. aurifrons*, and to determine if there is a correspondence between chromatic, morphological, and genetic variation. Previously noted geographic differences in cephalic melanistic patterning in *O. aurifrons* are supported by current findings. Using Discriminant Function Analysis, 13 parameters of observed cephalic melanistic patterning elucidated clear separation between Bimini and other “populations”. Florida, St. Thomas, and Aruba formed a slightly overlapping continuum in patterning, with St. Thomas between Florida and Aruba. Although Florida lay within the continuum, Florida specimens showed no variability with only St. Thomas specimens overlapping into Florida. Whether genetic subdivision and morphometric subdivision is co-occurring with observed differences in cephalic melanistic patterning remains to be determined.

BIO-28 Performance consequences of diet-induced variation in the sheepshead, *Archosargus probatocephalus*. B.P. MALIAO, R.J. MALIAO and R.G. TURINGAN. Department of Biological Sciences, Florida Institute of Technology, 150 West University Boulevard, Melbourne, FL 32901. Some fishes in the Indian River Lagoon (IRL), Florida settle on different habitats and likely exploit different prey resources. It has been shown that the functional characteristics of the feeding apparatus in widely distributed fish are correlated with food habits. Although it has been shown that diet influences the development of the feeding mechanism in fishes, empirical evidence showing that these diet-induced developmental changes have functional consequences is limited. This study is designed to investigate the effects of durophagous feeding habit on the development of feeding mechanism and feeding performance in the sheepshead, *Archosargus probatocephalus*. Young of the year *A. probatocephalus* from one location in the IRL were reared under two diet regimes: whole clam (hard diet) and crushed clam (soft diet) for about one year. Fish fed hard diet developed more robust jaw-bones and muscles relative to soft-diet fish. Post-rearing performance trials indicated that: (1) soft-diet fish fed on small and medium clams whereas hard-diet fish fed on large clams; (2) soft-diet fish fed relatively less on whole clam relative to hard-diet fish; and (3) soft-diet fish lost interest in whole clams after first exposure to this prey type, whereas hard-diet fish consistently fed on whole clams. It is conceivable that hard-diet fish develop more robust jaw bones and muscles because this phenotype allows them to perform well in durophagous conditions.

BIO-29 Trophic study of escolar, snake mackerel, lancetfish, and oilfish in the South Atlantic Bight and Gulf of Mexico using stomach content analysis and carbon and nitrogen stable isotope analyses. H.R. DA SILVA and D.W. KERSTETTER. Nova Southeastern University Oceanographic Center, 8000 North Ocean Drive, Dania Beach, FL 33004. Stomach content analysis and carbon and nitrogen stable isotope analysis used in combination can provide a robust analysis of the diet and ecological role of organisms not possible for either technique used alone. This combined analysis methodology was applied to four mesopelagic teleost fishes (snake mackerel *Gempylus serpens*, lancetfish *Alepisaurus* spp., oilfish *Ruvettus pretiosus*, and escolar *Lepidocybium flavobrunneum*) collected from the South Atlantic Bight and Gulf of Mexico over a period of two years. These species are diel vertical migrators and the differences in the diets of these organisms is presently unknown. However, understanding their trophic role within the pelagic ecosystem is vital for on-going pelagic fisheries ecosystem modeling. Combined stomach content and stable isotope analyses were performed on these fishes and compared with species, length, weight, sex, location, and maturity. The results from the stomach content analyses show snake mackerel as having the most diverse diet and escolar having the least diverse diet. The carbon to nitrogen ratios by percent (C/N) for snake mackerel and small oilfish are characteristic of proteinaceous organisms while the higher percent C/N ratios for escolar and large oilfish are characteristic of more lipid-rich tissues. Stable isotope analyses



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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indicate large snake mackerel may occupy the highest trophic position of the studied species with the highest values for both $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$. Small oilfish have similar $\delta^{13}\text{C}$ values to the snake mackerel, but have a lower average $\delta^{15}\text{N}$ value. Large oilfish and escolar have similar $\delta^{15}\text{N}$ values as the snake mackerel, with much lower $\delta^{13}\text{C}$ values than the small oilfish and snake mackerel. These preliminary data suggest a similar carbon source for snake mackerel and small oilfish, but with large oilfish and escolar obtaining nutrients and source carbon from a different part of the ecosystem. (Project supported by NOAA Contract #8404-S-006 awarded to Nova Southeastern University).

BIO-30 Visual physiology of the smooth dogfish (*Mustelus canis*) with implications on behavioral ecology. M. KALINOSKI (1), R.W. BRILL (2) and A.C. HIRONS (1). (1) Nova Southeastern University, Oceanographic Center, 8000 North Ocean Drive, Dania Beach, FL 33008, (2) Cooperative Marine Education and Research Program, Virginia Institute of Marine Science, Rt. 1208 Great Road, Gloucester Point, VA 23062. In the underwater environment, the visual world of many marine organisms is composed of spatial, temporal, and spectral elements. How organisms process these elements depends on the light intensity in their habitats. The visual system of the smooth dogfish (*Mustelus canis*) was examined using standard corneal electrophysiological methods. Electroretinography (ERG) measures the summed retinal potentials that account for optical filtering of light photons by the ocular media. This method is well suited for determining the fundamental capabilities of the visual system. Recording retinal responses to experimentally manipulated light stimuli allows for quantification of several visual parameters, including spectral range, irradiance sensitivity, and contrast discrimination. *M. canis* has a maximal spectral response to blue light between 460-480nm, and a low temporal resolution with an ERG response of 14Hz signifying extremely good sight under scotopic (dim light) conditions. This 14Hz ERG response is very low compared to other elasmobranch species such as *Carcharhinus plumbeus* (54Hz) and *Galeocerdo cuvier* (38Hz). *M. canis* is primarily a demersal species, occurring in low light habitats along the inshore seas and estuaries of the western Atlantic Ocean. Understanding how *M. canis* utilizes its integrated array of visual and sensory structures can contribute to the continued conservation of this species. (Project supported by a grant from the South Florida Chapter of the Explorer's Club awarded to the senior author).

BIO-31 Biomechanics of spinal deformities in captive Sandtiger sharks *Carcharias taurus*. D. NOAKER (1), D. HUBER (1), P. ANDERSON (2), and I. BERZINS (3). (1) Department of Biology, The University of Tampa, Tampa, FL 33606, (2) The Florida Aquarium, Tampa, FL 33602, (3) The John G. Shedd Aquarium, Chicago, IL 60605. The Sandtiger shark *Carcharias taurus* is a popular exhibit specimen in public aquaria. However, captive *C. taurus* are prone to developing spinal deformities that often result in euthanasia. Biomechanical analyses of sections of vertebral columns and individual vertebrae from healthy and deformed *C. taurus* were conducted to characterize the mechanical basis of these skeletal deformities. Vertebral sections were subjected to bending tests from all directions, while individual vertebrae were subjected to compression to failure tests, both using an MTS Mini-Bionix 858 material testing system. Mineral content data of individual vertebrae was determined as well. The flexural stiffness (resistance to bending) of vertebral columns from healthy animals was greater than that of deformed animals due to greater second moment of area. Second moment of area is a structural property that measures the distribution of skeletal material away from the central axis of the vertebral column. From these data it was also determined that the force required to buckle the vertebral column was greater in the healthy specimens as well. The compressive stiffness, ultimate strength, and mineral content of individual vertebrae from deformed specimens were lower than those of other healthy species for which data is available in the literature. Analysis of the compressive properties of individual vertebrae from healthy *C. taurus* is ongoing. Given that *C. taurus* is under "critically threatened" conservation status, it is critical to determine the causes of spinal deformities in captive specimens so that public aquaria can be educated on better husbandry and management techniques.

BIO-32 Structural and material properties of the jaws of the Lemon shark *Negaprion brevirostris* and Horn shark *Heterodontus francisci*. K. JAGNANDAN and D. HUBER. Department of Biology, University of Tampa, Tampa, FL 33606. The Lemon shark *Negaprion brevirostris* consumes soft-bodied organisms such as teleosts and small elasmobranchs using sharp teeth for tearing through prey. Conversely, the Horn shark *Heterodontus francisci* consumes hard prey (durophagy) such as molluscs and echinoderms, which are crushed between its powerful jaws. To determine whether jaw biomechanics reflect the ecological differences of these species, the structural properties (determined by jaw shape) and material properties (determined by cartilage composition) of their jaws were investigated. Material properties of the jaws were examined by subjecting cylindrical cores of unmineralized cartilage from the lower jaws of both species to stress-relaxation tests on an MTS Mini-Bionix 858 material testing system. Structural properties of the upper and lower jaws were examined by estimating their second moment of area from digital reconstructions of CT scans. Second moment of area, which estimates the distribution of skeletal material and approximates resistance to bending, was calculated at 10% intervals



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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along the upper and lower jaws. Stress-relaxation tests indicated that the unmineralized jaw cartilage of the Horn shark had significantly greater force resistance (53.1 N), stress (8.5 MPa), and stiffness (56.1 MPa) than the Lemon shark (23.9 N, 5.7 MPa, 42.5 MPa respectively). However, equilibrium properties under sustained loading showed no differences between these species. Second moment of area calculations are currently in progress, but greater second moment of area will likely be found in the jaws of the Horn shark. The material, and likely structural, properties of the jaws of the horn shark indicate that they are better able to resist bending during feeding as compared to the lemon shark, and present a biomechanical correlation to the ecological differences of these species.

BIO-33 Spiral valve parasites of selected tropical pelagic elasmobranchs from the western North Atlantic Ocean. M. TAYLOR (1), H. LAUBACH (2), and D.W. KERSTETTER (1). (1) Nova Southeastern University Oceanographic Center, 8000 North Ocean Drive, Dania Beach, FL 33004, (2) College of Medical Sciences, Nova Southeastern University, 3200 South University Drive, Ft. Lauderdale, FL 33328. Concerns regarding population status of many elasmobranchs have prompted recent investigations into less obvious sources of declines, such as the incidence of mortality due to parasites. Endoparasite (internal) loads in the elasmobranch spiral valve may be a source of such unaccounted mortality and morbidity by both inhibiting nutrient uptake and stimulating inflammatory responses within the gastrointestinal tract in the host. The species studied include the night shark (*Carcharhinus signatus*), silky shark (*Carcharias falciformis*) and pelagic stingray (*Pteroplatytrygon violacea*), none of which have been previously examined for full endoparasite fauna or total endoparasite loads. Specimens were obtained as incidental by-catch aboard pelagic longline fishing vessels operating in offshore tropical western North Atlantic Ocean waters from September 2008 and December 2009. Spiral valves were dissected from the elasmobranchs at sea and preserved whole in a 90:10 seawater:buffered formalin solution. Parasites were manually extracted in the laboratory from preserved spiral valves, then individually stained and mounted for identification. Total spiral valve parasite loads were compared against the total length and weight of the host; however, preliminary results show no relationship between these factors. Similarly, no correlations have been observed in comparisons of parasite load to species, sex, or seasonality. To date, 128 elasmobranchs were examined, yielding over 600 parasites. The majority have been cestodes, although trematodes and nematodes are also represented throughout the samples. These results have important implications through the establishment of baseline values for expected spiral valve parasite load and species compositions for pelagic shark and stingray hosts.

BIO-34 Habitat utilization of four cetaceans along the United States eastern coast. C. CROSS (1), L. GARRISON (2), and D.W. KERSTETTER (1). (1) Nova Southeastern University, 8000 North Ocean Drive, Dania Beach, FL 33004, (2) National Oceanic and Atmospheric Administration, 75 Virginia Beach Drive, Miami, FL 33149. Detailed knowledge of the specific habitat features associated with the spatial distribution of cetacean species can have implications for marine mammal management efforts including the identification of areas with biological significance, minimization of vessel and fisheries interactions, and more accurate abundance estimates. This cetacean habitat study focused on the Mid-Atlantic Bight continental shelf break and slope, a region influenced by variable hydrographic and bathymetric features. Shipboard visual surveys were conducted from June-August 2006 over 4,432 km of trackline. Surface layer hydrographic parameters including water temperature, salinity and fluorescence were collected continually throughout the survey. Additionally, physical data were collected at 406 expendable bathythermograph (XBT) stations and 120 conductivity-temperature-depth (CTD) stations. Zooplankton samples were collected at 57 stations. Sperm whales (*Physeter macrocephalus*), pilot whales (*Globicephala* spp.), bottlenose dolphins (*Tursiops truncatus*), and Atlantic spotted dolphins (*Stenella frontalis*) were among the most commonly sighted cetaceans. Temperature-depth profiles from XBT data were examined to determine important features in the water column including the depth of the mixed layer and the depth and temperature at depth of the thermocline. CTD data were similarly examined. Temperature and salinity values at depth were used to generate interpolated values that were extracted for each sighting, and bathymetry data were used to determine the depth and slope percent rise at each sighting. The parameter values associated with each of the four main cetacean species were used to develop predictive habitat models. Analyses of these models show that each species displays specific preferred habitat characteristics based on physical and bathymetric features.

BIO-35 Manatee census of the Harbor Branch Channel utilizing photo-identification techniques. L. NYS. Harbor Branch Oceanographic Institute, Florida Atlantic University 5600 US 1 North, Fort Pierce, FL 34946. Anecdotal accounts of manatees congregating in the Harbor Branch channel have been reported by staff scientists, with up to 70 manatees sighted simultaneously. However, despite over three decades of observation by campus employees, there are few empirical data recorded. The purpose of this study was to: 1) identify individual manatees using photo-identification techniques; 2) collect baseline data on abundance and environmental parameters at three different observation sites to determine habitat use; 3)



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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create a boat strike guide to recognize manatees in need of immediate rescue; 4) develop a Microsoft Access database for data archival; and 5) establish a long-term volunteer-based network to collect year-round data for future analyses. During the study period, 31 distinct manatees were identified at Harbor Branch. The data provide the first evidence for site fidelity across months (Summer 2009), and across years from opportunistic photographs (2004, 2006, 2008, 2009). Four manatees were matched with the statewide Manatee Individual Photo-identification System database, indicating that at least some of the manatees in the channel are migrants. The highest abundance of manatees was observed in the small boats marina, suggesting that this location is preferential manatee habitat. Water temperature at the two deepest depths measured (0.6 m and 1.50 m) were the only two significantly different environmental parameters influencing the number of manatees present at each site. The results of this study provide evidence for the Harbor Branch channel as an important manatee habitat during summer months. Further study including year round photo-identification, environmental and behavioral data collection will help to determine seasonal differences and the significance of the channel as critical year-round manatee habitat.

BIO-36 Trophic structure of the Northwest Hawaiian Islands and resident Monk seals (*Monachus schauinslandi*) during the 20th-Century. N.M. THOMPSON (1), A.C. HIRONS (1), C. LITTNAN (2), and C. POTTER (3). (1) Nova Southeastern University Oceanographic Center, Dania Beach, FL 33004; (2) NOAA Pacific Island Fisheries Science Center, 2570 Dole Street, Honolulu, HI 96822-2396, (3) National Museum of Natural History, Smithsonian Institution, 10th St NW, Washington, DC 20004. The Hawaiian Monk seal (*Monachus schauinslandi*) is an endangered species only found within the Hawaiian Archipelago. The majority of the breeding population for this seal is located around six islands in the Northwest Hawaiian Island chain (NWHI). Overall, both juvenile and adult seals have a wide range in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ from 1912-2006 ($\delta^{13}\text{C}$: -12.5‰; $\delta^{15}\text{N}$: 12.6‰). Seals in the northern NWHI were enriched in $\delta^{13}\text{C}$ by nearly 2‰ and depleted in $\delta^{15}\text{N}$ by nearly 6‰ during the 96 years. Meanwhile, seals within the middle and southern extent of the NWHI showed little to very slight decreases in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$. Comparison of modern monk seals with selected potential prey throughout the NWHI indicates possible trophic reliance on a mixture of reef fish, eels, crabs and lobster.

BIO Posters

BIO-P10 Does water current influence the feeding performance and growth of *Amphiprion ocellaris* larvae? D.B. BURGUET and R.G. TURINGAN. Department of Biological Sciences, Florida Institute of Technology, 150 West University Boulevard, Melbourne, FL 32901. The ability of marine fish larvae to capture prey plays an important role in their survivorship, especially during the very early stage in their life history. Feeding performance in fish larvae is affected by a number of factors such as prey availability, swimming and feeding behavior, and physical properties of the environment, including water movement. This study attempts to establish a correlation between current speed and the feeding performance, as well as growth in the larvae of *Amphiprion ocellaris*. *A. ocellaris* larvae were hatched and reared in different current speeds: 0cm/sec and 1cm/sec. First feeding and 4 DPH larvae were subsequently sampled for measurement of gape and food habits. Area of mouth opening was significantly larger for individuals reared in a current compared to those reared in still water ($z = -3.165$; $n = 47$; $\hat{I} \pm = 0.002$). Larvae reared in moving water also consumed more prey relative to those reared in still water. Notochord length of larvae reared in moving water also were significantly longer compared to conspecifics reared in still water ($z = -2.134$; $n = 93$; $\hat{I} \pm = 0.033$). These results have important implications for our understanding of the factors that influence the rate of survivorship (or mortality) in marine fish larvae, both in the wild and in captivity.

BIO-P11 The effects of prey type on the prey-capture kinematics of the cryptic coral-reef fish *Taenianotus triacanthus*. A.C. HANNON, B.M. COMPTON, and R.G. TURINGAN. Department of Biological Sciences, Florida Institute of Technology, 150 West University Boulevard, Melbourne, FL 32901. The ability of fishes to capture different types of prey depend on their ability to modulate their feeding behavior depending on the size, morphology, escape response and swimming ability of their prey. This phenomenon is seldom tested on cryptic predators, such as *Taenianotus triacanthus*. This study was designed to examine the prey-capture behavior and to determine the effects of prey type on the prey-capture kinematics of *T. triacanthus*. Fish were filmed using a Red Lake high-speed video camera while feeding on live fish, *Gambusia affinis*, live ghost shrimp, and dead *G. affinis*. Results indicate that prey does have an effect on the kinematics of prey capture in *T. triacanthus*. *T. triacanthus* rapidly opened and closed its jaws when feeding on elusive prey compared to their strike behavior when feed on non-elusive prey. This study provides information that help us understand how predators adapt to changing prey resources.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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BIO-P12 Fluorescence spectroscopic study of heat shock protein 70-mediated insulin disaggregation. T. HERMAN. Stetson University, Biochemistry, 421 N. Woodland Blvd, DeLand, FL 32723. Protein disaggregation is the phenomenon by which aggregated proteins are converted to their native and functional conformations. Native protein structures are metastable and eventually undergo unfolding, which can lead to aggregation. The cell has several means to counter-act protein aggregation including protein proteolysis and disaggregation. Degenerative diseases like Alzheimer's disease and Parkinson's disease arise when the rate of disaggregation and proteolysis is outpaced by the rate of aggregation. In these cases, aggregation is associated with the formation of plaques of protein aggregates. Study of disaggregation is vital to understanding and combating these diseases. The protein Heat Shock Protein 70 (HSP 70) catalyzes disaggregation, thereby converting nonfunctional aggregates to their functional structures. HSP 70 works in conjunction with the HSP 100 complex by identifying aggregated proteins and routing aggregates to the central channel of the HSP 100 complex for refolding and disaggregation. It remains unclear however, if HSP 70 can mediate disaggregation in the absence of HSP 100. To investigate the possibility of HSP70 mediating protein disaggregation sans HSP100, insulin aggregate was chosen as the model substrate. Using fluorescence spectroscopy, disaggregation rates of insulin by isolated HSP 70 was measured. Disaggregation was determined as the change of fluorescence as a function of time. Initial results suggest that HSP 70 does interact with insulin aggregates. Further investigation is necessary to refine and enhance sensitivity of fluorescent monitoring of insulin disaggregation by HSP 70. This model serves to further explore disaggregation of proteins and eventually will contribute to treatments of degenerative diseases.

BIO-P13 Does the presence of a predator affect the feeding performance of the Indian River Lagoon fish *Gobiosox strumosus* larvae? A. SPITERY, J. KENYON, M. WITTENRICH and R.G. TURINGAN. Department of Biological Sciences, Florida Institute of Technology, 150 West University Boulevard, Melbourne, FL 32901. Predation and starvation are key factors that influence the rate of mortality in marine fish larvae. This hypothesis has rarely been tested on estuarine fishes. This study was designed to examine the stage-specific effects of the presence of a fish predator on the feeding performance of the larvae of the IRL fish *Gobiosox strumosus*. Three, seven and 11 days post-hatch (DPH) *G. strumosus* were allowed to eat (rotifers, *Brachionus* sp.) for two hours under two feeding regimes: one with the presence of a fish predator and the other without the presence of the fish predator. Gut contents of the larvae were subsequently examined and compared between the two treatments. Larvae that were fed without the presence of a predator ate more prey compared to those that were fed in the presence of a predator. Interestingly, this magnitude of a difference increased with age of the *G. strumosus* larvae. This study concludes that not only does the presence of a predator affect the feeding performance of fish larvae, but, this effect is magnified with age of the fish larvae.

CMS = COMPUTER/MATHEMATICAL SCIENCES [|return to top|](#)

CMS-01 Motivic Homotopy Theory. A. SHKEMBI. Saint Leo University Mathematics and Sciences University Campus, MC 2188, PO Box 6665, Saint Leo, FL 33574. The object of the talk will be to give an introduction to Motivic Homotopy Theory. It will focus on the similarities and differences between this theory and the Classical Homotopy Theory. We will give a brief discussion on some new developments and on their impact in the general subject of homotopy theory.

CMS-02 Reducing the number of prerequisite courses results in an equal success rate. J.A. WHITE (1) and S.B. WHITE (2). (1) Department of Mathematics and Sciences, Saint Leo University, Saint Leo, FL 33574, (2) Department of Mathematics, St. Petersburg College, St. Petersburg, FL 33707. In this study, we compared Introductory Statistics final exam scores on a common exam for several semesters. The course was entirely online and offered through a Catholic university. In the program, students take all of their courses online. The first set of final exam scores were from students who had taken Elementary Algebra then Intermediate Algebra and finally Finite Mathematics as the prerequisite sequence. The second group took Elementary Algebra followed directly by Finite Mathematics as the reduced prerequisite sequence for Statistics. There was no significant difference in final exam scores in Introductory Statistics for the two groups.

CMS Poster

CMS-P14 Design of a remote automation controller with the CAN 2.0B standard. W. SEAMAN and M.A. KHABOU. Department of Electrical and Computer Engineering, University of West Florida, 11000 University Pkwy, Pensacola, FL 32514. Over the past 100 years, electric and electronic controls have made automation a standard of living. Refrigerators, washing machines, microwave ovens and many other devices have automated processes that were once



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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tedious. Such devices also now contain enough electronic controls to optimize energy consumption and keep them operating in optimal conditions, preventing premature failure. Microcontrollers and mini-computers now control and transparently automate a plethora of processes both in the home and in the workplace. The internet, on the other hand, has brought an information revolution. News, information, shopping, online banking and stock trading, socializing, and more are available within fingertip reach. Now, much information is accessible by simply grabbing a mobile phone or a variety of other devices, introducing portability to real-time information. The new challenge is to practically integrate the availability of information with the controls for the average user, so that a broad base of users can gain fluid control over their own environments. Controlled environments allow for maximizing comfort while minimizing energy consumption, and as users become more mobile, so must the connection between them and their environments. Previously, remote automation was only available in specialized industrial systems or high-end consumer devices, but the availability of this technology is beginning to come within reach of the typical users. This project explores the creation of an entry level device that provides automated switching of lights and appliances and control of a typical heating and cooling system. This is all done through a web interface, so that the system can be accessed from anywhere in the world. The key advantage to this system is the interconnection of the system via a Controller Area Network (CAN) bus. The CAN protocol is a mature, reliable technology that can be used to minimize the necessary cabling infrastructure through the use of a common bus between devices, thereby reducing material and installation costs. This, in turn, increases energy efficiency across the board by adding controls to a much broader base of users.

ENG = ENGINEERING SCIENCES | [return to top](#)

ENG-01 Design and construction of the Boscombe Multi-Purpose Artificial Surfing Reef. J.M. HEARIN (1,2), S.T. MEAD (2), and J.C. BORRERO (2). (1) Coastal Engineering, Florida Institute of Technology, 150 W. Univ. Blvd, Melbourne, FL 32901, (2) ASR Limited, Marine Consulting and Research, Raglan, New Zealand. A multi-purpose reef for recreational and commercial benefit was developed for Boscombe, U.K. While primarily for surfing, the coastal protection aspects of the structure were considered as well. Extensive field studies were performed to collect wave, tide, bathymetric and ecological data. The challenges of working with a small and unpredictable wave climate were overcome by creating a design with a large footprint that could magnify and make the most of even the smallest and least favorable wave conditions. The final design called for a reef volume of approximately 13,000 m³ to be built from approximately 50 large sand filled geotextile containers. The final reef design incorporated the following main features; a dual level reef with a focus section designed to draw maximum wave energy onto the reef and a ridge along the crest to break waves in a manner suitable for high-quality surfing. The design has a crest height of 0.2-0.7 m above chart datum. The reef produces a predominant right hand surfing ride approximately 75 m long with a shorter - 20 m long - left hand break. This design was set in water depths of 3-5 m (CD). The geotextile containers were filled in-situ by pumping a sand water slurry from shore out to the reef. The first layer of the structure was built in the first construction season (summer 2008) with the remainder of the reef completed in second construction window during summer 2009. The Boscombe Reef is now complete and open for service. An independent monitoring programme is in place to determine the reefs effectiveness as a recreational amenity and as a coastal protection structure. The most recent data from this monitoring will be presented here.

ENG-02 Investigation of grooming tools for ship hull coating maintenance. M. TRIBOU. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. Ship hull grooming has been proposed as a proactive, in-water, mechanical method to maintain biocide-free marine coatings in a "fouling-free" condition. Grooming may be defined as the gentle cleaning of an immersed surface at a frequency sufficient to prevent the permanent attachment and growth of fouling. For this reason grooming tools need to be developed that are less aggressive than the traditional ship hull cleaning brushes. A fiberglass raceway tank (8×1×1 meters) has been designed and constructed to accommodate four 60 × 100 cm test panels per side for the testing of grooming tools. The grooming tool is mounted to an instrumented carriage that runs the length of the raceway and controls the forces and speed at which grooming is performed. The test panels are coated and then subjected to fouling prior to testing. The fouling is characterized prior to each grooming test by visual assessment, biofilm adhesion and thickness measurements. Grooming tool performance is determined in terms of the fouling and physical condition to both the test surface and grooming tool after one grooming event. The results from five grooming tools on three biocide-free marine coating surfaces will be presented. (Funded by the Office of Naval Research Grant # N00014-02-1-0217).



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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ENG Poster

ENG-P15 Outer ship hull characterization using photometric analysis. K. MCMONAGLE (1), G. SWAIN (1), and E. RIBEIRO (2). (1) Department of Marine and Environmental Systems, and (2) Computer Science Department, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. At present there are no simple and accurate methods to assess the condition and measure roughness of in-water ship hull coatings. Ship hull roughness and biofouling are known to increase drag, costs, and exhaust gas emissions. Monitoring and measurement of ship hull condition are critical to the efficient management of ship operations. We proposed an underwater smart camera which uses algorithms from computer vision to aid in hull coating assessments and measure coating roughness. The prototype camera uses photometric stereo to generate a three dimensional model of the coating surface on which roughness is measured. The first step toward future automation of the camera uses textons (illumination invariant, statistically representative textural elements of an image) to classify “good” and “bad” images based on generalized coating type, fouling, damage, and image noise from scattering or bubbles. Data are presented to show the potential application of this method.

ENV = ENVIRONMENTAL CHEMISTRY AND CHEMICAL SCIENCES |[return to top](#)|

ENV-01 Composting secondary municipal biosolids using chlorine dioxide for disinfection and seeding for competitive exclusion of pathogen regrowth. C.J. BROWN, J. BRUNSON, and F. MUSSARI. School of Engineering, University of North Florida, 1 UNF Drive, Jacksonville, FL 32224. Biosolids are an important resource that can and should be safely recycled. In the U.S., the use of biosolids in agriculture is controlled by the U.S. Environmental Protection Agency, through what is known as the 503 Regulations (40 CFR Part 503). The 503 regulations set the standards for treatment of biosolids with regard to pathogen and vector attraction reduction prior to land application. One of methods available to achieve the required levels of pathogen and vector attraction reduction in municipal biosolids is composting. Composting can require considerable time, space, and financial resources due to odor generation control, control of pathogens, and other variables. This study describes the results of an experimental process used to produce compost more quickly and cheaply utilizing Class B biosolids made directly from secondary (non-digested) wastewater sludge by the addition of chlorine dioxide, without the addition of bark chips, wood-waste or other bulking agents typically incorporated into compost.

ENV-02 On-site treatment and detention system (OSTDS) leachate detection using three anthropogenic chemical indicators. D.I. MCGINNIS. Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. Univ. Blvd, Melbourne, FL 32901. This research evaluated the effectiveness of Triclosan®, caffeine, and fluorescent whitening agents (FWA) in detecting leachate from on-site treatment and detention systems (OSTDS). Surface and groundwater samples were collected from three sites over an eight month period from January 2009 to August 2009 and analyzed for pH, electrical conductivity, turbidity, nitrate-nitrite nitrogen ($\text{NO}_x\text{-N}$), ammonium nitrogen ($\text{NH}_4^+\text{-N}$), soluble reactive phosphate, fecal coliform, Triclosan®, caffeine, and FWA. Sites were assessed first using $\text{NO}_x\text{-N}$, $\text{NH}_4^+\text{-N}$, SRP, and fecal coliform to detect OSTDS impact to surface water and OSTDS leachate plumes in groundwater. Where impact was observed or a plume detected, chemical indicators of contamination were evaluated to see if one or more identified the same impact or plume. All indicators of contamination were generally low in surface water samples suggesting that OSTDS impact to surface water was not observed during the study. One distinct leachate plume was detected in groundwater during the study and caffeine was found to be the most consistent chemical indicator of that leachate plume.

ENV-03 Multi-angle laser light scattering studies of DNA. J. BAUM, R. JONES, and T. MANNING. Chemistry Department, Valdosta State University, Valdosta, GA 31698. Light Scattering coupled with refractive index measurements can be used to measure the size and mass of a macromolecule or an aggregate. In this study, we experimentally employ a Helium-Neon laser based light scattering system (18 detectors) to study geometric factors of DNA in the liquid phase. A refractometer is used to measure its refractive index and a laser light scattering instrument than determines its size and molar mass. In terms of data treatment, the Zimm, Berry, Debye and Random Coil formalisms are used to study the ss-DNA. Results that include the radius of gyration, number-average molar mass, weight-average molar mass, Z-average molar mass will be reported in the talk.

ENV-04 Removal of selected dyes using a supported chelating agent, Octolig®. W.-S. CHANG, D.F. MARTIN, and M. SMALL. Department of Chemistry, University of South Florida, 4202 East Fowler Avenue, Tampa, FL 33620. A representative range of dyes were selected for attempted removal from aqueous solutions (deionized or well water) using a



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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commercial material Octolig®. This is a polyethylenediamine covalently bound to a high-surface-area silica gel. Aqueous solutions (ca μM) were passed over a chromatography column packed with Octolig® at a rate of 10 mL/min. Concentrations were determined spectrophotometrically to evaluate the percent removal (shown parenthetically): Methylene Blue (~2%), Rose Bengal (99%), Eosin Y (99%), Erythrosin (~100%) and zinc phthalocyanine tetrasulfonate (99%). Removal is ascribed to an encapsulation process (Stull and Martin, 2009), and the variation can be ascribed to the variations in structures and the effect of functional groups.

ENV-05 Removal of nuisance anions with Octolig®, a supported chelating agent. D.F. MARTIN and E. SCHULMAN. Institute for Environmental Studies, Department of Chemistry, University of South Florida, 4202 East Fowler Avenue, Tampa, FL 33620. Octolig® (CAS Registry number = 404899-06-5) is a commercially available (Metre-general, Inc.) supported chelating agent designed to remove transition-metal ions. The material consists of polyethylenediamine moieties covalently bonded to a high surface-area silica gel. Previous work (Martin et al., 2009) demonstrated that Octolig® could remove perchlorate ion from aqueous solutions, and subsequent work (Stull and Martin, 2009) indicated the ability to remove nitrate, nitrite, phosphate, and sulfate ions from aqueous solutions. The present work describes the successful removal of selenious acid, as well as arsenate, molybdate, and chromate ions from well water solutions by passing samples over a chromatography column packed with Octolig®. Analyses indicated successful removal of these materials (99%). The mode of action will be considered. Earlier work indicated the ability of metal derivatives to remove anionic species, but direct removal by Octolig® would represent an economic advantage.

ENV-06 Growth of *Lyngbya majuscula* in Crystal River water treated with Octolig®. K.L. THATCHER and D.F. MARTIN. IES, Department of Chemistry, University of South Florida, 4202 East Fowler Avenue, Tampa, FL 33620. *Lyngbya majuscula*, a nuisance cyanobacterium from the Crystal River (west central Florida) was grown under laboratory conditions in river water (control, 5 replicates) and in treated river water (test, 5 replicates) contained in inverted stoppered 500-mL Erlenmeyer flasks. The treated water had been passed over a chromatography column packed with Octolig®. This material consists of polymeric chelating agents covalently attached to silica gel. Octolig® has a notable tendency to remove transition metal ions, such as iron, that can serve as micro nutrients. It also has the ability to remove nitrate and phosphate ions through encapsulation. Over a 11-14 day period changes in fresh weight, dissolved oxygen levels, pH, or appearance were significantly different for test and control. All changes were consistent with an interpretation of significant impairment of *Lyngbya* growth. Green

ENV-07 A chemistry approach to marine natural products synthesis. C. LANNON (1), S. EVANS (1), J. NIENOW (1), T. MANNING (1), D. PHILLIPS (2), P. KLAUSMEYER (3), D. NEWMAN (3), and T. POTTER (4). (1) Chemistry, Valdosta State University, Valdosta, GA, 31698, (2) Mass Spec Lab, Biology and Chemistry, University of Georgia, Athens, GA 30602, (3) Natural Products Division, National Cancer Institute, Bethesda, MD 20892, (4) USDA Watershed Lab, Tifton, GA 31794. Our group is developing a new approach to the synthesis of marine natural products (MNP) using bryostatin-1 as a proof of concept. Many MNP's are extracted from sessile organisms such as sponges, bryozoans and corals but are produced by symbiotic marine microbes. Bryostatin-1 is extracted from the bryozoan *Bugula neritina*. Our six step process includes: (1) the preparation of a unique chemical surface in the lab that is designed to mimic the marine organism that the microbe will colonize; (2) deploying the surface in the host ecosystem (Gulf of Mexico); (3) allowing the surface to remain in this ecosystem for a period of time that allows for it to be colonized; (4) removing the surface from the ocean and setting it in a runway that is supplied with fresh ocean water to complete the growout under controlled conditions; (5) remove the surface, allow it to dry and extract it with the correct solvent mixture; and (6) perform a separation and analysis of the product. We have tested dozens of artificial surfaces to colonize the microbes of interest and have found two surfaces to be consistently productive. In addition to discussing the process and results to date, we will show how our approach follows the EPA's 12 step guidelines for a "Green" chemical process.

ENV-08 Rapid fatty acid analysis using direct analysis in real time mass spectrometry. P.J. COHEN and N. NESNAS. Department of Chemistry, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. Fatty acid analysis is used for quality control in many applications including fuels, foods, and pharmaceuticals. Current methods are slow and lack versatility. DART-TOF-MS (direct analysis in real time - time of flight - mass spectrometry) allows high throughput, rapid analysis, easy sample preparation, and can be used on samples throughout processing. We demonstrate optimal methodology for FAME (fatty acid methyl ester) analysis using DART-TOF-MS and discuss application for fuel quality prediction from algal sources. Sample preparation was optimized for raw algae, crude oil, and biodiesel from



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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Nannochloropsis sp. Ionization effects were studied using fatty acid standards with respect to temperature, gas flow rate, concentration, and doping. Future studies and potential uses are proposed.

ENV-09 Biologically active compounds from marine cyanobacteria of Florida. T.J. MEICKLE (1, 2), S. GUNASEKARA (1), H. LUESCH (3), and V.J. PAUL (1). (1) Smithsonian Marine Station at Fort Pierce, 701 Seaway Drive, Fort Pierce, FL 34949, (2) Florida Atlantic University, 777 Glades Road, Boca Raton, FL 33431, (3) Department of Medicinal Chemistry, University of Florida, 1600 SW Archer Road, Gainesville, FL, 32610. Blooms of cyanobacteria are well known for being harmful to the environment, animals, and humans. These blooms can deplete oxygen and block sunlight needed by other organisms as well as produce secondary metabolites that are toxic or interfere with interactions of organisms. The structures and activities of secondary metabolites isolated from cyanobacteria are as diverse as the organisms they come from. Cyanobacteria are known for producing chemically unique peptides, but are also a source of interesting polyketides, marcolides, and alkaloids. These compounds show an array of biological activities, including cytotoxicity, antibacterial, and antifungal activities. Samples of persistent cyanobacterial blooms have been collected from various sites along the coast of Florida, including a coral reef near Fort Lauderdale (*Lyngbya polychroa*), a seagrass bed in the Indian River Lagoon (*Lyngbya majuscula*), and a seagrass bed in the Florida Keys (*Lyngbya majuscula*). Through bioassay guided fractionation, secondary metabolites are being isolated and identified from these samples. All extracts and fractions of the samples are tested for their ability to inhibit the growth of cancer cells and marine fungi. Compounds isolated from these samples thus far include microcolin A, microcolin B, desacetyl microcolin B, and malyngolide. Isolation and characterization of more active compounds from these samples is ongoing.

ENV-10 Photochemistry at 100,000 feet. C. SHIPMAN, K. EDWARDS. R. HETZEL. and T. MANNING. Department of Chemistry, Valdosta State University, Valdosta, GA 31698. The results of a weather balloon launch that soared to 100,000 feet carrying a chemical payload for photochemical experiments is outlined. First, the economics of the setup including the GPS units used to track and locate the payload once it landed, the digital camera used to document the four-hour flight and the mounting system used to secure the fluorinated graphite and graphite dust on the exterior of the styrofoam container will be described. At this altitude, there are higher radiation fluxes of ultraviolet and vacuum light as well as extremes in pressure and temperature. The impact of this radiation in converting graphite sheets and fluorinated graphite dust into exfoliated graphite and carbon nanotubes will be discussed both quantitatively and qualitatively. The experiment cost approximately \$500 (balloon, camera, GPS, etc) and can carry a maximum of two kg of payload. Both a technical and economical comparison is made concerning the synthesis of carbon nanotubes using this method compared to other techniques such as laser vaporization, low pressure helium arc, and chemical vapor deposition (CVD).

ENV-11 An ultrasonic extraction method for analysis of pesticides in sediments. J. WU, Y. LIN, and P.C. WILSON. University of Florida/IFAS-IRREC, 2199 South Rock Road, Fort Pierce, FL 34945. In recent years, public concern over the adverse impacts of pesticides on environmental resources and human health has been raised. These concerns arise from pesticide use within the agricultural industries, as well as their use for residential landscape maintenance. Depending on chemical properties, pesticides may be transported into canal systems, lakes, and estuaries from the original application sites in runoff and drainage water. Once in these aquatic systems, they may partition into sediments where they may present risks to benthic organisms through contact and ingestion. Previous work has detected several pesticides in several tributaries to the St. Lucie Estuary and Indian River Lagoon. However, very little work has focused on sediments, partially because of the lack of an efficient and simple extraction method. The standard method for extracting organic pesticides from sediments is by using a Soxhlet apparatus, which refluxes solvent through the sample for 12 to 24 hours. This method requires large volumes of organic solvents, specialized glassware, boiling flask heaters, a relatively large amount of hood space to accommodate the apparatus, and only a limited number of samples can be extracted at a given time. This investigation focused on developing a simple and effective ultrasonic extraction method for extracting selected pesticides from sediments. Pesticides evaluated included bifenthrin, fenvalerate, l-cyhalothrin, fipronil, atrazine, norflurazon, simazine, and malathion. For extractions, 5 g of sediments collected from local canals was mixed with 5 g Na₂SO₄. Twenty ml of methylene chloride: acetone (50:50) was added, the samples were shaken, and then sonicated twice for 20 min. using a standard ultrasonic cleaner. Following sonication, extracts were filtered, concentrated to 1 mL in methyl-tert-butyl ether, and then cleaned up before analysis by GC-ECD or GC-TSD. Recoveries for all of the compounds were greater than 90%, indicating that this method is effective and feasible.

ENV-12 The effect of salinity on the survival of fire ants (*Solenopsis invicta*) in coastal habitats. J.T. CLAYBORN, D.L. CASSILL, and A. HOARE. Department of Environmental Science and Policy, University of South Florida St.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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Petersburg, 140 7th Avenue South St. Petersburg, FL 33701. Fire ants are invasive organisms inhabiting diverse ecosystems in Florida including coastal environments. Fire ants thrive in disturbed habitats such as flood zones along lakes, rivers and tidal zones along the coast. The ability of fire ants to form rafts and float during floods or coastal storms allow them to survive cycles of heavy rain, storms and hurricanes. Little is known about the ability of fire ants to form rafts and survive in storm waters of varying salinity. Experiments to determine the formation and survival of fire ants within the rafts were conducted along a salinity gradient, along with an experiment designed to assess fire ants ability to survive in sand moistened with a similar salinity gradient. In both experiments, ant mortality was directly correlated with increasing salinity levels. The results of the two experiments suggest that coastal areas are high-risk habitats for fire ants, and colony density may be lower near salt water sources in comparison to freshwater. (Project supported in part by the STREAMS program, USFSP).

ENV-13 Metabolic response in mangrove killfish to emersion and hypoxic conditions through NMR spectrometry. A.P. MACY and A.B. BROWN. Department of Chemistry, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. *Kryptolebias marmoratus* is a fish that inhabits tide pools and has unusual methods to cope with the falling water level. They hide in crab burrows, and so when the tide goes out, they are trapped in small pools of stagnant water that slowly accumulate toxic H₂S. The fish have been known to jump out of these pools, and they have adapted to living out of water as well. In our study, we track the levels of 7 different phosphorous-containing compounds under normal (receiving aerating water), hypoxic, and emersed conditions using NMR spectrometry. We accomplish this goal by positioning the live organism in the space between a 5 mm NMR tube inside a 10 mm NMR tube. Studies have shown a certain ratio for levels of phosphocreatine and inorganic phosphate under normal conditions. That ratio is accentuated in a lack of water, and the ratio reverses under hypoxic conditions. The particular ratio is dependent upon the individual fish, but the trend is consistent with the species. Special thanks to Jon Shenker, Dan Wagner, and Scott Taylor for technical assistance.

ENV-14 Effect of media pH on pigment ratios in filamentous cyanobacteria representative of Everglades periphyton. M. WEST and J.W. LOUDA. Department of Chemistry and Biochemistry, Florida Atlantic University, Boca Raton, FL 33431. *Scytonema hoffmanii*, a dominant cyanobacterial species representative of the pristine Everglades, was cultured in BG-11 medium under a photon flux of 90 μmol m⁻² s⁻¹ at pH 6, 7, and 8. Photosynthetic and accessory pigments (chlorophylls, carotenoids, scytonemin) were characterized and quantified using RP-HPLC (reversed phase-high performance liquid chromatography). Trends in the ratios of chlorophyll to accessory pigments were observed and were found to be coincident with noticeable growth inhibition at pH = 6 and 7. That is, for Chl/Myxo, Chl/Zea, and Chl/Echin, at all pH values, ratios decreased with the cultures' age (Chl = chlorophyll-*a*, Myxo = myxoxanthophyll, Zea = zeaxanthin, Echin = echinenone). This could indicate decreasing Chl, increasing accessory pigments or both simultaneously. Decreases in the ratios βcar/Zea and βcar/Echin (βcar = beta-carotene) were found at all pH values, suggesting a roughly equivalent conversion rate, increasing with cultures' age, of beta carotene to its polar biosynthetic derivatives, decreasing βcar production, or both at all pH levels studied. For Chl/βcar, pH 6 and 7 ratios remained constant and pH 8 ratio increased, while for Chl/Total Car pH 6 and 7 ratios decreased and pH 8 ratio remained constant, suggesting decreases in Chl, an increased production of beta carotene, or both in pH-stressed *S. hoffmanii* cultures. The most abundant myxoxanthophyll sugar moiety was determined to have a MW of 164 using MALDI-TOF (matrix assisted laser desorption-time of flight mass spectrometry) and is tentatively identified as rhamnose. Future work will include pigment ratios monitoring of *Schizothrix* sp. using RP-HPLC and identification of other cell wall components of both species using GC-MS (gas chromatography-mass spectrometry) and NMR (nuclear magnetic resonance).

ENV-15 A cyanobacterial pigment tentatively classified as a visible light sunscreen. C.S. GRANT and J.W. LOUDA. Department of Chemistry and Biochemistry, Florida Atlantic University, Boca Raton, FL 33431. A novel pigment has been isolated from (a) samples collected in areas of the Florida Everglades and (b) lab grown cultures of *Scytonema hoffmanii*, which were subject to or grown at high light intensities, respectively. This pigment is believed to be related in structure to the pigment scytonemin. Scytonemin is a known ultraviolet-screening, photostable sheath pigment found in cyanobacterial mats, and is believed to play a role in the survival mechanism of some species of cyanobacteria against UV damage. This new pigment has absorption maxima in the visible regions of the electromagnetic spectrum (440, 562 nm) and we speculate that it may be protecting cytochrome and chlorophyll-*a* absorption bands from photodamage. Treatment of the pigment with the mild reducing agent sodium borohydride (NaBH₄) yields a derivative with absorption maxima (352, 502 nm) hypsochromically shifted to an extent to suggest the presence of at least 2 conjugated carbonyl (ketone, aldehyde) moieties. MALDI-TOF mass spectroscopy was used as an initial screening tool for the presence of scytonemin as well as this new pigment. LC-MS was then used to identify and compare the fragmentation patterns of these two pigments. The IR,



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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UV-Vis and NMR spectra of the two pigments are reported and comparisons made to further elucidate the structure of the new pigment.

ENV-16 Pigment-based chemotaxonomy-relationships to phytoplankton biomass. C. GRANT and J.W. LOUDA. Department of Chemistry and Biochemistry, Florida Atlantic University, Boca Raton, FL 33431. This study is aimed at increasing the extension of pigment based chemotaxonomy to allow estimates of 'true' biomass components. We are therefore examining the relationships of chlorophyll *a* (CHL_a) with chemotaxonomically-relevant diagnostic pigments, two classes of functional carbohydrates, proteins and total organic carbon. Many parameters affect these relationships and we are therefore using nutrient replete conditions and examining only the influence of light (photon flux density). We hope that correlations will exist between CHL_a and these components and thereby allow extension of chemotaxonomy beyond cell number / biovolume relationships. That is, the goal is to estimate biomass in terms of colloidal and storage carbohydrates, proteins and organic carbon based on taxon-specific CHL_a contributions in natural microalgal communities. Lab grown algal cultures including cyanobacteria, chlorophytes, diatoms, dinoflagellates and others are being investigated. Correlations between CHL_a and these components were used to create a database and hence a regression equation for expressing them as functions of CHL_a, with the possibility of applications to field samples. This hopefully will provide directions to the possible use of pigment-based chemotaxonomy to estimate algal organic carbon, protein and carbohydrates not only for actual field samples but with extension to remote sensing such as satellite telemeters systems (SeaWiFS *etc.*).

ENV-17 Pigment-based chemotaxonomic assessment of periphyton. J.W. LOUDA (1), P. MONGKHONSRI (1), and S.E. HAGERTHEY (2). (1) Organic Geochemistry Group, Florida Atlantic University, Boca Raton, FL 33431, (2) Everglades Division, South Florida Water Management District, West Palm Beach, FL 33416. Pigment-based chemotaxonomy utilizes taxon-specific biomarker pigments, chlorophylls and carotenoids, to estimate periphyton (microalgal) community structure. This technique potentially offers faster and objective, relative to microscopic examinations, estimates of periphyton but is applicable only to the Class or Division level. As part of the Comprehensive Everglades Restoration Plan (CERP) Management and Assessment Plan (MAP), we have recently completed a three-year investigation of pigment-based periphyton community assessment. Overall, bulk community structure (*e.g.*, cyanobacteria > chlorophytes > diatoms, *etc.*) can indeed be described but exacting agreement with microscopic-based chemotaxonomy (*viz.*, biovolume) is lacking. From its inception, pigment-based chemotaxonomy calculated and still calculates taxon-specific chlorophyll-*a* (CHL_a) contributions as part of the total CHL_a of a community. This may still be required in the broadest application of the method. However, we now have initiated studies to relate CHL_a to other "biomass" indices (protein, carbohydrate, carbon). Much of this is considered in a companion paper (Grant and Louda). In this talk, we cover the need to subdivide ecosystem studies as much as possible. That is, we found it necessary to adapt chemotaxonomic formulae to samples within regions of similar physicochemical influences (hardness, pH, nutrients, *etc.*) in order to minimize community estimation errors. This, of course, stems from the growth not only of different species or clades within a species in each region but from alteration of pigment complements within a species under differing nutrient, light or other stressors.

ENV-18 Compilation of a spatiotemporal biogeochemical database of mercury and methyl-mercury in the freshwater Florida Everglades. S. O'BRIEN (1), W. LOUDA (1), G.M. NAJA (2), M. HARWELL (3), and D. SURRATT (4). (1) Department of Chemistry and Biochemistry & The Environmental Sciences Program, Florida Atlantic University, Boca Raton, FL 33431, (2) Everglades Foundation, Science Department, Palmetto Bay, FL 33190, (3) US Fish & Wildlife/ENP, Vero Beach, FL 32960, (4) Everglades National Park, DOI Everglades Program Team, Boynton Beach, FL 33473. The Everglades freshwater ecosystems are the most studied wetlands and marshlands in the world, with efforts over the last 25 years resulting in copious quantities of scientific data. The main objective of this work is to collect, compile, and consolidate available scientific data related to total mercury and methyl-mercury in surface water, porewater, soil, floc, periphyton and fish (an established Hg-bioaccumulation indicator) from different locations: the Arthur R. Marshall Loxahatchee National Wildlife Refuge (aka WCA-1A), Water Conservation Areas 2A, 2B, 3A, 3B, and Everglades National Park. Many agencies are participating in this collective work, mainly Florida Atlantic University, Everglades Foundation and DOI Everglades National Park. This interdisciplinary and interagency effort will elucidate the environmental methylmercury trends and local peaks, providing thus a solid scientific foundation for policy makers, among other aspects, also with regards to fish consumption advisories. The Excel and ACCESS databases being developed compile data from US-EPA (REMAP phase I, II and III), SFWMD and other agencies and universities, and is divided by region, year and season (dry and wet). The focus is on mercury and methylmercury but other linked parameters (sulfate, phosphorus, nitrogen, conductivity, pH, DOC, *etc.*) are also captured – when available. The geo-coordinates are specified for each sample as well as the quality control procedures, the analytical protocol and the minimum detection levels for the analyses. The final public access



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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database will be web published through Everglades National Park and will be used for determining the spatial and temporal changes in mercury methylation patterns across the freshwater Everglades.

ENV-19 The physicochemical and photoautotrophic characterization of Little Lake Worth, a semi-restricted marine basin. K. PRIZE-BOLTER and J.W. LOUDA. Environmental Sciences Program, Florida Atlantic University, Boca Raton, FL 33431. Little Lake Worth (LLW) was dredged as a 'borrow pit' for fill, creating the surrounding communities lands and connected just north of the main Lake Worth lagoon in the 1950s and measures 800 m × 200 m and up to 9 m deep. Non-point pollution including runoff from fertilizers and septic tanks has caused nutrient overload. Elevated productivity, relative to the main lagoon, and direct organic input has lead to the accumulation of a thick black sulfidic muck in the deeper and focused depo-centers of the basin. Shallower areas are typical sand in nature. LLW stratifies in the summer because of physical, thermal, chemical, and biological conditions. During the stratification, a thermocline occurs with an average 3°C drop in temperature between 5-6 m. Below the thermocline, dissolved oxygen (DO) plummets (5-6 to < 1 mg/L) and hydrogen sulfide presence creates a coincident chemocline and a well isolated anoxic layer. Samples taken from these depths were analyzed with HPLC and found to contain large concentrations of 14 homologues of bacteriochlorophyll-*e*, the signature pigment of a brown colored species of sulfur bacteria (*Chlorobium phaeobacteriodes*). This lake is an anomaly altogether, since it is not naturally occurring and therefore difficult to classify by traditional methods. Mixis (breakdown of stratification) occurs in the fall due to decreases in temperature, causing changes in density, and increases in wind strength (cold fronts). In surface waters during stratification (*viz.*, mixed layer) and throughout the water column during periods without stratification, diatoms (pigment = fucoxanthin) are the most dominant oxygenic phototrophs present.

ENV-20 (no abstract: the label "ENV-20" was erroneously skipped over in the Program Book)

ENV-21 Derivation of a GIS-based watershed-scale conceptual model for the St. Jones River, Delaware from habitat-scale conceptual models. M.A. REITER (1), M. SAINTIL (2), Z. YANG (2), and D. POKRAJAC (3). (1) Department of Integrated Environmental Science, Bethune-Cookman University, Daytona Beach, FL 32114, (2) Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901, (3) Department of Computer and Information Sciences, Delaware State University, Dover, DE 19901. Resource management in a complex coastal ecosystem like the St. Jones River watershed, DE involves ecological, social, political, and economic considerations. Conceptual modeling is a useful tool for identifying pathways between drivers, stressors, Valued Ecosystem Components (VECs), and services that are central to understanding how such a complex ecosystem operates. In 2002, a Four-Component, Level 1 conceptual model was formed for the key habitats of the St. Jones River watershed, but since the habitat level of resolution is too fine for some important watershed-scale issues we developed a functional watershed-scale model using the existing narrowed habitat-scale models. The narrowed habitat-scale conceptual models and associated matrices were combined with data from the 2002 land use/land cover GIS-based maps of Kent County DE to assemble a diagrammatic and numerical watershed-scale conceptual model incorporating the calculated area of each habitat within the watershed. The numerical component of the assembled watershed model was subsequently subjected to the same Monte Carlo narrowing methodology used for the habitat versions to refine the diagrammatic component of the watershed-scale model. The narrowed numerical representation of the model was used to generate forecasts for changes in the parameters "Agriculture" and "Forest", showing that land use changes involving these habitats propagated through the watershed model and impacted key parameters where research attention and management decisions at the watershed scale could be focused. The forecast and simulation results seemed to indicate that the watershed-scale conceptual model does lead to different conclusions than the habitat-scale conceptual models for some issues at the larger watershed scale.

ENV-22 High-frequency water quality monitoring in the Central Indian River Lagoon, Florida. M.D. HANISAK and K.S. DAVIS. Harbor Branch Oceanographic Institute at Florida Atlantic University, 5600 US 1 North, Fort Pierce, Florida 34946. Water quality in the Indian River Lagoon (IRL) has changed significantly over the past eight decades due to watershed alteration and land drainage patterns. Site-specific water quality studies, on a frequent sampling interval, are needed to address water quality management issues, including those affecting critical seagrass habitat. High-frequency water quality monitoring, along a perceived water quality and seagrass gradient, has been underway since May 2005 in the IRL between northern Vero Beach and Fort Pierce. Temperature, salinity, dissolved oxygen, pH, turbidity, and chlorophyll *a* are being continuously monitored with datasonde multiprobes; color, suspended solids, nutrients, and light attenuation coefficients (K) are measured weekly. Overall, from north to south, salinity increases, while turbidity, color, suspended solids, and chlorophyll *a* (all attenuators of light) decrease, as do nutrients and K. Pulses of inorganic nitrogen are associated with the initial onset of the rainy season; secondary peaks, especially of NH₄⁺, are evident following storms and other major



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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periods of freshwater discharge. The magnitude of most of these patterns varies considerably from year to year due to interannual variability in precipitation and freshwater discharge into the lagoon. Results to date demonstrate the tremendous climate-related interannual variability in water quality in the IRL and can be used in models of expected positive improvements in estuarine health following the reduction of freshwater inputs, which are recognized as the most significant human impacts on this estuary. This intensive water quality monitoring provides a foundation/opportunity for collaborative research on other trophic levels and *in situ* experiments along this ecologically significant water quality gradient that is representative of the challenges faced by estuaries in the 21st century.

ENV-23 Seagrass communities along a water quality gradient in the Central Indian River Lagoon, Florida. K.S. DAVIS and M.D. HANISAK. Harbor Branch Oceanographic Institute at Florida Atlantic University, 5600 US 1 North, Fort Pierce, Florida 34946. Seagrass plays a critical role in the biological productivity and species diversity of the Indian River Lagoon (IRL). Water quality in the IRL has changed significantly over the past eight decades due to watershed alteration and land drainage patterns. Seagrass decline in the IRL has been largely attributed to unfavorable water quality conditions and the resulting decrease in water clarity. Seagrass monitoring was conducted from 2005 to 2009, twice a year for two years, at four sites, and for two additional years, with two additional sites (a total of six sites), near Vero Beach and Fort Pierce. Seagrass parameters were: species composition, percent cover, canopy height, shoot density, and above- and below-ground biomass of seagrass. The six sites ranged from near-monospecific beds of *Halodule wrightii* to more diverse, mixed communities of *H. wrightii*, *Syringodium filiforme*, and *Thalassia testudinum*. From north to south, size of seagrass beds, seagrass cover and abundance, all increased along a water quality gradient that is related to freshwater discharges in Vero Beach. From north to south salinity significantly increased and turbidity, color, suspended solids, and chlorophyll a (all attenuators of light) significantly decreased, as did nutrients. While seasonal differences in important seagrass parameters were significant, there were few interannual changes during the four years of monitoring. There were significant increases in seagrass cover and biomass following significant periods of improved water quality and higher light penetration associated with drought conditions. These data on seagrass status in the central IRL are a baseline to assess changes in this critical resource following the planned reduction of freshwater inputs, which are recognized as the most significant human impacts on this estuary.

ENV-24 Comparison of chemotaxonomic methods for determination of algal class composition in Florida Everglades periphyton. J.L. BROWNE (1), E.G. NOONBURG (1), S.E. HAGERTHEY (2), and J.W. LOUDA (1). (1) Environmental Sciences Program, Florida Atlantic University, 777 Glades Rd., Boca Raton, FL 33431, (2) Everglades Division, South Florida Water Management District, 3301 Gun Club Rd., West Palm Beach, FL 33406. Pigment-based chemotaxonomy uses relative amounts of photosynthetic pigments (biomarkers) within algae samples to determine the algal class composition of each sample. Chemotaxonomy has been applied successfully within the marine and, to a lesser extent, freshwater phytoplankton communities, but its efficacy for periphyton has not yet been established. In this study, one fixed-coefficient method (simultaneous linear equations [SLE]) and two numerical methods (CHEMTAX and the Bayesian Compositional Estimator [BCE]) were used to determine the algal class composition of periphyton from the Florida Everglades. The numerical methods were first calibrated by using artificial datasets, then by analyzing a series of data from mixed lab cultures of known composition. All three methods were then used to analyze periphyton samples from five areas in the Everglades. Results from each method were compared to each other and to results obtained from microscopic analysis of the samples. All methods were able to return accurate sample compositions for the mixed lab cultures. However, when examining natural periphyton samples, correlation between pigment methods and microscopic results was generally poor. SLE returned consistently better estimations of diatoms than either of the numerical methods, whereas CHEMTAX often estimated chlorophytes and cyanobacteria more accurately than the other methods. BCE was more sensitive to initial perturbations and overall experienced more convergence and identifiability problems than did CHEMTAX, leading to highly variable correlations. Generally, use of pigment data for the estimation of phytoplankton samples was found to be easier than with filamentous dominated samples, such as Everglades periphyton.

ENV-25 Volusia Blue Spring's ecological status: The value of a stakeholder-based alternative. C.J. BLEASDALE and M.A. REITER. Department of Integrated Environmental Science, Bethune-Cookman University, Daytona Beach, FL 32114. The Florida Department of Environmental Protection recently rated Volusia Blue Spring as "impaired for nutrients." This assessment was based on cyclical levels of nitrate pollution above 0.6 micrograms per liter, increased cyanobacteria cover, and numerous invasive and exotic species. However, this assessment represents a viewpoint based on an attempt to apply a general ecological rubric of impairment to a managed system with notable human use and impacts from beyond the park's boundaries. Alternatively, we could choose to apply a stakeholder-based assessment focusing on the identification and



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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support of the Valued Ecosystem Components (VECs) of the system. Lacking a stakeholder workshop, the long history of Blue Spring provides some indication of likely VECs based on current and past management and use choices. The history of the spring's use and management suggests that a stakeholder-based assessment would likely focus on VECs such as recreational use and manatee preservation. The existing data suggests that Blue Spring, while showing some signs of ecological impairment relative to a pristine Florida spring system, may well support likely VECs for the system at relatively healthy levels. Further, attempts to manage for the ecological parameters of Blue Spring would require significant alterations without an indication that the VECs of the system could be improved by actions taken within the park alone. An assessment of "impairment" that cannot be altered by park managers and does not take into account all of the desired attributes of the spring runs the risk of being disregarded as functionally useless, whereas a stakeholder-based assessment could provide the tools necessary for an analysis of Blue Spring that takes into account both the unique features of the park's ecology and the desired services that lead to Blue Spring's current popularity.

ENV-26 Changes in the hydrobiid [Family Hydrobiidae, Mud snails] community of Blue Spring State Park, Volusia County, Florida. R.J. MOSS, M.A. REITER, and A.J. BROOKS-WALTER. Department of Integrated Environmental Science, Bethune-Cookman University, Daytona Beach, FL 32114. The Blue Spring hydrobe (*Aphaostracon asthenes*) and the Blue Spring Pigmy siltsnail (*Floridobia parva*) were studied in 1991 and more recently in 2008. These studies have documented a reduction in the numbers, density, and areal distribution of the Hydrobiids in the spring run over this time, particularly during periods of activity by humans, manatees (*Trichechus manatus latirostris*), sailfin catfish (*Pterygoplichthys disjunctivus*), and tropical storms (e.g., Fay). However, snails have been shown to disperse into cleared areas in the absence of significant disturbance. Given the reduced populations, the need to identify specimens accurately to species became essential, yet such identification usually results in the death of the specimens. In an attempt to get an accurate idea of species representation, a day's collection from the two sites with highest abundance were sacrificed and sent to the Florida Department of Environmental Protection for identification. The samples contained specimens of *F. parva* and *Pyrgophorus platyrachis*, but *Aphaostracon asthenes* was not present. Later sacrificed samples taken by our research team also identified two specimens of *Littoridinops monroensis*. Neither the *Pyrgophorus* nor the *Littoridinops* were identified in samples from Blue Spring in 1991, nor are they endemic to the run. This discovery makes it necessary to change the approach of the study to determine the relative proportion of endemic and non-endemic species in the known population centers within the spring run, whether any *A. asthenes* remain in the run, and if there has been a permanent shift in the Hydrobiid community since 1991.

ENV Posters

ENV-P16 Aza-fullerenes, nanotubes and grapheme: Nomenclature and synthesis. R. HETZEL (1), T. MANNING (1), D. LOVINGOOD (1), J. NIENOW (1), and D. PHILLIPS (2). (1) Dept. Of Chemistry, Valdosta State University, Valdosta, GA 31698, (2) Mass Spectrometry Lab, University of Georgia, Athens, GA 30601. This presentation will focus on two areas related to nitrogen containing fullerenes (aza), nanotubes and individual graphene sheets, synthesis and nomenclature. First, our results to date using two techniques, a high voltage discharge and a microwave synthesis approach, will be discussed. In both approaches pyrrole has been used as the starting product and a number of techniques including UV/Vis, FT-IR, FT-Raman and mass spectrometry are used to quantitatively and qualitatively identify the results. Second, we have developed a new nomenclature system for naming any spherical, tubular or sheet like structure made of any element. This system was developed because we found the existing system for naming carbon fullerenes, proposed by IUPAC, lacked flexibility when naming compounds composed of spherical, tubular or sheet-like forms not made of carbon.

ENV-P17 Seagrass epifauna along a water quality gradient in the Central Indian River Lagoon, Florida. L. JENNINGS and M.D. HANISAK. Harbor Branch Oceanographic Institute at Florida Atlantic University, 5600 US 1 North, Fort Pierce, Florida 34946. Seagrass, epiphytes, and grazing epifauna are critical components of trophic webs in the Indian River Lagoon (IRL). Seagrass epifauna were sampled along a water quality gradient in the Central IRL, as an ancillary part of a study on the relationship of water quality, seagrass status, and algal composition/abundance. Sampling of epifauna with an epifaunal sampler (Virnstein and Howard 1987) was conducted concurrently with seagrass monitoring from 2005 to 2009, twice a year for two years, at four sites, and for two additional years, with two additional sites (a total of six sites), near Vero Beach and Fort Pierce. The seagrass epifauna is a diverse community consisting of amphipods, grass shrimp, caprellids, tenaids, and gastropods. From north to south, epifaunal diversity and abundance increased along a water quality gradient that is related to freshwater discharges in Vero Beach. From north to south salinity significantly increased and turbidity, color, suspended solids, and chlorophyll *a* significantly decreased, as did nutrients. Epifaunal diversity and abundance increased



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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from 2005 to 2009. This temporal change is believed to be related to recovery from a depression of the epifaunal community during the “wet period” of 2004 and 2005, when the Central Indian River Lagoon experienced significantly reduced salinities as a result of three major hurricanes. Amphipods are the dominant taxa and perform a key role of cleaning sea grass blades of epiphytic growth. These epifauna data will be linked to measurements of both seagrasses and seagrass epiphytes to better understand their interactions and how these communities are all related to water quality, and in particular to freshwater inputs, which are recognized as the most significant human impacts on the IRL.

ENV-P18 A survey of the Hydrobiid populations at Blue Spring State Park. C.K. JNBAPTISTE, M.A. REITER, and A.J. BROOKS-WALTER. Department of Integrated Environmental Science, Bethune-Cookman University, Daytona Beach, FL 32114. Blue Spring in Orange City FL is home to rare snail species including the Blue Spring Pygmy Siltsnail (*Floridobia parva*) and Blue Spring Hydrobe (*Aphaostracon asthenes*) that have adapted to the isolated and relatively stable habitat that the spring provides. In response to recent fluctuations in the health of the spring, we have conducted surveys of snail densities and abundance throughout the spring. The data thus far obtained are from sites along the spring run corresponding to regions where past data (similar surveys in the early 90s) and more recent preliminary surveys indicated that snails were present. Standardized samples of substrate and filaments were taken via snorkeling, and the snail populations evaluated and counted by eye and with hand lenses and microscopes. Overall, our results show a pronounced restriction in distribution and lower abundance of the snails as compared to the 90s data. This observation in itself has mandated extreme caution in our methodology (in order to minimize disturbance to the existing populations) and the need to carry out taxonomic identification of the populations. Taxonomic studies have confirmed the existence of *F. parva* among other species that were not identified in 1990 surveys. However, we have yet to identify any extant *A. asthenes* specimens. We are continuing our efforts to evaluate the snail communities and our results pose implications for the conservation potential of the species at Blue Spring State Park.

ENV-P19 Carbon dynamics in rapidly urbanizing landscapes: A pilot study on the urban to rural gradient in eastern Orlando, Florida. J. LAB, R. HINKLE, J. LI, and J. WEISHAMPEL. Department of Biology, University of Central Florida 4000 Central Florida Blvd., Orlando, FL 32816. The linkage of anthropogenic influences including social, economic and political drivers are widely known to affect the biophysical controls of ecosystem processes thus making urban areas key to understanding a large component of forces that drive climate change, such as the emissions of carbon dioxide. There are still many questions related to understanding the dynamics of carbon dioxide sequestration and release in such urban ecosystems. The Orlando Florida area is one of the most rapidly growing urban areas in the U.S. and is an excellent site to address ecological dynamics of carbon flux within urban landscapes. This project will focus on the historical quantification of changes in land use as represented by the Landscape Development Intensity (LDI) Coefficient Value within the eddy flux footprint of 200 square kilometers, which represents a highly urban-to-rural gradient across a 16 kilometer transect from west-to-east. The LDI is a land use assessment method derived from weighting coefficients calculated from the amount of energy needed to maintain the corresponding land use based on the amount of nonrenewable energies used. It can also be used as an index of potential human disturbance. Within this project, we demonstrate how land use changes have affected the landscape’s capability to sequester atmospheric carbon dioxide. (Project supported in part by the UCF Research and Mentoring Program).

ENV-P20 Effect of chirality on formation of multi-layer polypeptide nanofilms. H.S. LATIMER (1), J.C. DOROMAL (1) and D.T. HAYNIE (2). (1) Academy at the Lakes, Land O’Lakes, FL 34639, (2) Department of Physics, University of South Florida, Tampa, FL 33620. The goal of our research is to better understand formation of polypeptide nanofilms by exploring differences in films made from peptides of opposite chirality. This work will be applied to developing standard procedures for polypeptide nanofilm synthesis so that the technology is commercially practical. We composed six samples of nanofilm on quartz using the layer by layer (LBL) self-assembly method. Three of the samples were made of small molecule L-glutamic acid (left orientation) and histidine polypeptides, and three were made of small molecule D-glutamic acid (right orientation) and histidine polypeptides. The experiment was repeated using large molecule L-glutamic acid and tryptophan polypeptides and small molecule L-glutamic acid and tryptophan polypeptides. UV spectroscopy revealed reproducible differences in films formed by opposite glutamic acid enantiomers. These differences are being probed by circular dichroism (CD).

ENV-P21 “There is chemistry in the air.” N. NESNAS and R. GUO. Department of Chemistry, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. Organic reactions have been long studied in organic solvents. Due to the recent increasing environmental concerns, more and more studies are focused on using “green” solvents such as



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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water or solvent-free mixtures. We are introducing a new concept, involving carbon-carbon bond formation in the air, and from here on termed: “*Chemistry in the air.*” Direct analysis in real time (DART) mass spec is used to test product formation in the air. Products were analyzed from reactions such as the aldol condensation, Diels-Alder cycloaddition, and electrophilic aromatic substitution. (This work has been submitted to Analyst in November 2009.)

ENV-P22 Computational studies of piperazimycins. A. SMITH, C.S. MERRITT, and T. MANNING. Department of Chemistry, Valdosta State University, Valdosta, GA 31698. Piperazimycins are cytotoxic hexadepsipeptides extracted from the from marine bacteria Streptomyces. They were originated isolated from marine sediments located near the island of Guam in the Pacific Ocean. There are three piperazimycins, designated A, B, and C, which are composed of the rare amino acids hydroxyacetic acid, α -methylserine, γ -hydroxypiperazic acid, and γ -chloropiperazic acid. Piperazimycin A has been demonstrated to have anti-cancer activity when screened by the National Cancer Institute’s 60 cancer cell line panel. This study examines two facets of the marine natural product using computational methods (typical Semiempirical Calculations). First the binding of iron (II) and iron (III) to Piperazimycin is examined by modeling dozens of conformations. This work is completed to test the theory that the natural products biological function is that of a siderophore. In all cases the iron cations assume a hexavalent binding scheme and a octahedral geometry. Second, a host of other cations (*i.e.* Cu(I), Cu(II), Mg(II), Ca(II), Zn(II), K(I), Na(I), VO₂⁺, *etc.*) are modeled to determine the free energy of the metal-ligand interaction when the cation is locked in the middle of pipers central six membered ring. This work provides insight to the stability constant for the metal-ligand complexes.

GHS = GEOLOGICAL/HYDROLOGICAL SCIENCES |[return to top](#)|

GHS-01 Using Nexrad precipitation data in groundwater models: An evaluation of contouring algorithm error. C.J. BROWN, P. WELSH, and M. FAGAN. School of Engineering, University of North Florida, 1 UNF Drive, Jacksonville, FL 32224. Next Generation Radar (Nexrad) precipitation data is becoming more widely available in Florida for use as inputs in various surface water and groundwater hydrology models. Nexrad precipitation data can be processed in many different ways resulting in different spatial rainfall maps generated by multiple entities or organizations. One issue that has not been evaluated fully is the errors introduced into Nexrad processed data sets by the use of different data contouring algorithms. This study compares the differences and relative errors introduced using five standard contouring methods. In addition, this study also reviews error propagation due to contouring Nexrad data across coarse model grids.

GHS Posters

GHS-P23 Water quality analysis of Lake Myrtle. D.C. ENGLEHARDT and A.L. JORDAN. Department of Biology, Academy at the Lakes, Land O Lakes, FL 34639. Like much of Florida, the population in Pasco County has increases rapidly (143%) in recent years. I am studying impacts of rapid population growth by comparing water quality in two lakes. Lake Myrtle is in an area undergoing rapid population growth while Lake Dowling is in an undeveloped area. Water quality tests include dissolved oxygen, nitrate ion concentration, turbidity, pH, and conductivity. Past dissolved oxygen readings (< 5 mg/L) from Lake Myrtle suggest that the lake is undergoing eutrophication. Local standards for dissolved oxygen are > 5 mg/L. Levels below this may indicated eutrophication, amassing of nutrients and sediment that results in increased plant productivity. This plant growth and decay causes a decline in dissolved oxygen that can kill fish and animal populations. Large algal blooms in the lake support the possibility of eutrophication. Continued monitoring will reveal if there is a long term trend in lowered quality water.

GHS-P24 Regional ground water study using isotopic analysis of Weeki Wachee Spring basin. C.M. HARRO (1), D.J. DEWITT (2), and J.G. WYNN (3). (1) Academy at the Lakes, Land O Lakes, FL 34639, (2) Resource Data and Restoration Department, Southwest Florida Water Management District, Brooksville, FL 34604, and (3) Department of Geology, University of South Florida, Tampa, FL 33620. Our research utilizes isotope analysis to investigate surface and ground water drainage into karst formations in the Weeki Wachee Springs Basin in Hernando County, Florida. On the Sandhill Boy Scout Reservation particularly, ground water supply and surface water resources may be impacted by drainage through the karst topography. This limits residents’ ground water supplies and results in drying up of wells, springs, lakes and sinkholes. As Floridan Aquifer levels drop, ground water shortages will become increasingly critical. Past studies using a fluorescent dye trace have not revealed connections between regional ground water and the Weeki Wachee Springs Basin area. This study utilizes rain water, surface water, and ground water for isotopic analysis. $\delta^{18}\text{O}$ and δD ratios were analyzed



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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using isotopic tracers to identify differences in the evaporated isotopic signature and develop a mixing model to illustrate interactions among water sources. Ground water sampling was performed by Southwest Florida Water Management District (SWFWMD) using the Water Quality Monitoring Program Standard Operating Procedures (SOP). Samples were analyzed in the isotope laboratory at the University of South Florida (USF).

GHS-P25 Quantitating water savings in an ideal watershed community. C. HOLLANDER and A.L. JORDAN. Academy at the Lakes, Land O Lakes, FL 34639. My work focuses on modeling differences in aquifer replenishment and contamination between a typical Florida community and a community designed with water protective principles. Aquifers supply 22% of public water in the United States. Yet, many communities are designed without consideration for aquifer protection and preservation. Several community design features have been purported to help protect aquifers. To test the impact of each design feature, two communities and the underlying geology were built. Geological features modeled include top soil, sand, confined and unconfined aquifers. One community uses traditional water management features including retention ponds, sloped asphalt roofs, impermeable concrete, and turf grass, which requires fertilization. The other community is an ideal watershed community with green roofs, pervious concrete, wetlands and Florida friendly plants, which do not require fertilization and watering. After investigating each variable (*i.e.*, pervious versus impervious concrete, green roof versus shingle roof), water from the aquifers of both communities was tested for turbidity, pH, conductivity, water volume and ammonium levels.

MED = MEDICAL SCIENCES [| return to top](#)

MED-01 Fast- and slow-twitch muscle response to temporary denervation. S. ACKBARALI, K. ALKHENAIZI and S. SESODIA. School of Podiatric Medicine, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. Denervation alters skeletal myofiber size and myofiber type proportions. The purpose of this study was to examine myofiber size and type proportions in functionally and anatomically different skeletal muscles after an acute period of denervation. It was hypothesized that the two muscles would respond similarly to denervation. Unilateral removal of 0.5 cm of the sciatic nerve of the left hindlimb was carried out in one group of Wistar rats (DEN; n=4) and the left sciatic nerve (n=4) was crushed for 20 seconds in a second group (REINN; n=4). The muscles in the unoperated limb in each group served as control (CON). At 21 days the fast-twitch extensor digitorum longus (EDL) and slow-twitch soleus (SOL) muscles were removed from both hindlimbs of each rat and snap-frozen in melting isopentane. Serial frozen sections (10 µm thick) were cut from each muscle and stained for different myosin heavy chain (MHC) isoforms and for myosin ATPase. The cross-sectional area (CSA) of 100 myofibers was measured using Scion Image Software 1.63™ and the myofiber type proportion in each muscle was calculated. In the DEN EDL type 2, but not type 1, myofibers were smaller than their corresponding CON myofibers. Type 1 myofiber proportion was double that in CON EDL. In REINN EDL, all myofibers were comparable in size to their corresponding CON myofibers and much larger than DEN myofibers. Myofiber type proportions were different from those in CON EDL. In DEN SOL all myofibers were smaller than the corresponding ones in CON SOL. Type 1 myofiber proportion was lower, but type 2 myofiber proportion was greater, than that in CON SOL. In REINN SOL all myofibers were smaller than those in CON SOL but larger than those in DEN SOL. Myofiber proportions in REINN SOL were similar to those in CON SOL. These data do not support our initial hypothesis.

MED-02 Stereological measurement of the duodenal glycocalyx carbohydrates in piglets treated with probiotics. C. GLINTON (1), R. NEMCOVA (2), L.B. DRIBIN (3), and A.T. MARIASSY (3). (1) College of Health Sciences, Graduate Biomedical Sciences, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161, (2) University of Vet. Med., Kosice, Slovak Republic and (3) NSU, College of Medical Sciences, Ft. Lauderdale, FL, 33328. The surface glycoproteins and stored carbohydrates are altered in response to a number of agents. Carbohydrate residues are known to be receptors for microorganisms as well as protective masking to prevent colonization. Pro-biotic cultures are known to interfere with colonization of the gut by pathogenic micro flora. We quantitated the lectin detectable carbohydrates in the duodenal glycocalyx of a pro-biotic, *Lactobacillus casei*, (Lcb. casei) fed with culture added to milk (3), and control milk only (3) piglets. Fixed and paraffin embedded duodenal sections were reacted with lectins and localized carbohydrates detected with Vector ABC kit®. The lectin binding patterns of the duodenal mucosal glycocalyx were estimated by stereological method with a linear micrometer superimposed on to digitized images of the duodenum. When micrometer divisions landed on the positive reaction product site it was counted as a hit. The results of the stereological estimates were expressed as % of hits from total possible test lines or reaction product density. Epithelial carbohydrate reactivity ranged from 0 to 60%, stained only with BSA, UEA and GNL, occasional epithelial cell from 0 to 47% bound BSA, MAL and GNL lectins. The lectin



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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binding of the pro-biotic treated piglet duodenum generally increased in intensity, glycocalyx decreased and goblet cells increased in reactivity. These alterations of the carbohydrate environment may adversely affect the expression of carbohydrate receptors, and increase in secreted mucus barrier carbohydrates thus preventing the attachment of pathogenic micro flora. (Supported by NSU Faculty Research Grant.)

MED-03 Stereological assessment of the lectin reactive carbohydrates in sheep tracheal glycocalyx in experimental *P. hemolytica* pneumonia. A.J. GUINNE (1) and A.T. MARIASSY (2). (1) College of Health Sciences, Graduate Biomedical Sciences, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161, and (2) Nova Southeastern University, College of Medical Sciences, Ft. Lauderdale, FL 33328. Airway surface lined with epithelial cells is an interface of external environment's interaction with the lung defenses. Carbohydrates in the epithelial glycocalyx play an important role in a number of these functions. The purpose of this study was to examine tracheal epithelium of the *P. hemolytica* infected sheep to quantitatively determine their carbohydrate content with lectin probes. HRP converted DAB substrate detected the binding sites to the specific carbohydrates as distinct brown deposits in DIC images of airway histological sections. These brown deposits on the airway glycocalyx were assessed by stereology and counted as "hits," whereas, the translucent or non-stained epithelial surface were not counted as "hits." Stereological tool was a transparent ruler (47-62) lines per image width. Counted hits were divided by the total possible hits for each tallied image. Statistical comparison of infected and non-infected sheep showed significant differences of the β -gal(1-3)-D-galNAc sugar that was detected with PNA probe in the non-infected sheep but not in the infected sheep ($p < 0.000$). Whereas α -mannose sugar identified by the PSA probe, visibly reacted in the infected sheep but not the non-infected sheep ($p < 0.000$). These results show a marked difference in the carbohydrate composition rendered by the airway infection and indicate that *P. hemolytica* pneumonia induces expression of carbohydrates that may play roles in resistance to bacterial adhesion, airway surface protection and the ability of the airway epithelium to repair. (Supported by NSU Faculty Research Grant.)

MED-04 Neutrophil and eosinophil infiltration of airways in asthma. S. HIRADY (1) and A.T. MARIASSY (2). (1) College of Health Sciences, Graduate Biomedical Sciences, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161, and (2) Nova Southeastern University, College of Medical Sciences, Ft. Lauderdale, FL 33328. Bronchial asthma is a chronic inflammatory disorder of the airways involving an array of inflammatory cells and multiple mediators. Attempts have been made to define different asthma syndromes on the basis of specific inflammatory cell types found in bronchial wall infiltrates. We have previously studied the role of eosinophil infiltration and its relation to the degree of epithelial denudation in sudden-onset (<1 h) and slow-onset (>3 h) asthmatic deaths (AJRCCM 165 (8):A509). We present here our findings of the quantitative assessment, particularly of neutrophil and eosinophil infiltration and marginated cells in the bronchial vessels in the two asthma syndromes. We used direct counting of over 5,000 cells in lamina propria on paraffin embedded H&E stained tissues from randomly selected small bronchi at autopsy from 10 cases of fatal asthma (<1 h) and from 11 subjects of fatal asthma (>3 h). The available documentation did not reflect history of chronic bronchitis in the examined cases. Fatal asthma (>3 h) subjects when compared to fatal asthma (<1 h) cases had higher average total cell number (389 vs. 76; $p < 0.05$), the largest difference was in the number of vascular marginated neutrophils (290 vs. 27; $p < 0.05$). The slow-onset of asthma (>3 h) cases had also a larger number of eosinophils when compared to the slow-onset (<1 h) asthmatics. From our examined cases we found that high neutrophil infiltration was not seen in all cases of the late-onset asthma deaths, however, the higher the neutrophil infiltration and the larger the inflammatory cell presence in the bronchi closely related to the late onset (>3 h) of asthmatic deaths. The large neutrophil pool of both tissue emigrated and blood vessel marginated cells indicates a likely role in the terminal events since the late onset asthma is associated with bronchial basement membrane denudation and epithelial loss, exposing the airway surface to pathogens. (Funded by NSU Faculty Research Grant.)

MED-05 Morphometric assessment of the duodenal carbohydrates in probiotics treated piglets. T.R. PHILIPS (1), R. NEMCOVA (2), L.B. DRIBIN (3) and A.T. MARIASSY (3). (1) College of Health Sciences, Graduate Biomedical Sciences, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161, (2) University of Vet. Med., Kosice, Slovak Republic and (3) NSU, College of Medical Sciences, Ft. Lauderdale, FL, 33328. Surface glycoproteins and stored carbohydrates are altered in response to many agents. Carbohydrate residues are known to be both receptors for attachment of microorganisms as well as repellent for other agents. Probiotic cultures are known to interfere with colonization of the gut by pathogenic microflora. We examined the lectin detectable expression of carbohydrates in the duodenum of probiotic, *Lactobacillus casei*, (*Lcb. casei*) fed milk culture (3), and control (3) weaned piglets. Fixed and paraffin embedded duodenal sections were reacted with lectins and the localized carbohydrates were detected with Vector ABC kit®(CA). The lectin-binding patterns of the duodenal mucosa were measured with a computerized morphometry program, Image-Pro®Plus.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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Percentage of brown deposits, indicating the localized carbo-residues, were expressed as % of the total measured area of epithelium. Epithelial glycocalyx ranged from 0 to + 12%; epithelial goblet cells from 0 to +15% were stained only with BSA, UEA and GNL, occasional epithelial cell from 0 to 18% bound BSA, MAL and GNL lectins. Mucous cell in the duodenal glands, bound BSA, UEA and GNL lectins, while only some serous cells were stained with UEA. The lectin binding of the probiotic treated piglet duodenum generally increased in intensity, glycocalyx decreased and goblet cells increased in reactivity. Taken together, the results suggest an alteration of the carbohydrate environment of the duodenum, which adversely effects the expression of receptors, thus preventing the attachment of pathogenic microflora. (Supported by NSU Faculty Research Grant.)

MED-06 Does ultra-fine dust exposure of the adult rat cause airway remodeling? H.A. RAUF (1) and A.T. MARIASSY (2). (1) College of Health Sciences, Graduate Biomedical Sciences, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161 and (2) NSU, College of Medical Sciences, Ft. Lauderdale, FL 33328. Particulate air pollution is known to adversely affect the respiratory system. We hypothesized that exposure of adult rats (4 exposed and 4 controls) would cause an increase in the connective tissue (C.T.) area of the airway wall in response to inhaled particulates. Exposure protocol and the model justification were published in *Anatomy Histology Embryology* 30: 345-349, 2001. We used a computer based morphometric program, Image-Pro Plus® to measure the airways basement membrane (BM) length and the associated CT area on 128 methylene blue stained, digitized bronchial cross section images. The assessment was expressed as ratio of CT area per BM length. The CT/BM ratios of the individual rats were analyzed with TTEST there was a dramatic, 37% increase of the CT/BM ratios, from 354.5 to 556.5 ($p < 0.05$), nearly doubling the CT area ratios. The results confirm the generally accepted paradigm that airway wall responds to severe load of inhaled particles by an inflammatory reaction that at least in this experimental protocol resulted in a fibrotic enlargement akin to scar formation. The measurement therefore shows a significant up-swing in airway remodeling. This shift reflects the airways response to irritation by inflammation. The mechanism of the cell signaling and consequent collagen deposition and the interstitial space expansion and the pathways to this end remain to be further explored. (Supported by the NSU Faculty Research Grant.)

MED-07 Morphometry of the smooth muscle in the bronchial wall of asthmatics and control subjects. P.K. SIDHU (1), M. YU (1), and A.T. MARIASSY (2). (1) College of Health Sciences, Graduate Biomedical Sciences, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161, (2) NSU, College of Medical Sciences, Ft. Lauderdale, FL 33328. In asthma attacks, airway passages become diminished, making breathing difficult for the afflicted subjects. The constriction severity is affected by the smooth muscle mass and the volume of the bronchial wall itself. We hypothesized that the smooth muscle of the bronchi in severe asthmatics will be more voluminous in comparison to the non-asthmatics. To test this, we examined digitized images of paraffin embedded, H&E stained bronchial sections from asthmatics and control individuals. We measured the bronchial basement membrane length and the area of smooth muscle in histological sections with Image-Pro® Plus, a morphometry program. Smooth muscle area / length of the basement membrane ratios were used to compare the bronchi from asthmatic to those of control subjects. Bronchial smooth muscle area to basement membrane ratio was 4.19 ± 2.01 SDEV in the asthmatics and 2.38 ± 1.48 SDEV in controls ($P < 0.05$). Our measurements confirm the hypothesis that asthma patients have more massive bronchial muscle than the respiratory disease free subjects. (Supported by NSU Faculty Research Grant.)

MED-08 Variations of the origin of the arcuate artery. B.N. SINGH, W. BURMEISTER, K. MACHADO, L.A. RODRIGUEZ, and A.L. SANTOS. School of Podiatric Medicine, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. The purpose of this study is to investigate the origin of the arcuate artery. The anterior tibial artery forms the dorsalis pedis. The dorsalis pedis forms the first dorsal metatarsal branch and the arcuate artery. However, this cadaveric study will prove the arcuate artery may be formed by the lateral tarsal artery and other variations. This cadaveric study was performed on 20 feet from 10 cadavers of both sexes, age range from 61 to 94. The arterial network was sketched and photographed. Blunt dissection was used to assess the anterior tibial artery as it forms the dorsalis pedis. Blunt dissection was used to observe the arcuate artery and its origin. The results indicated the arcuate artery in 12/20 (60%) specimen, originated from the dorsalis pedis. In 6/20 specimen, the arcuate artery originated from the lateral tarsal artery. In 2/20 specimen other points of origination were noted. The dorsal arterial network of the lower extremity is important for the podiatrist to consider when performing transmetatarsal amputations. Variation in the arcuate artery is important in choosing the correct procedure and in healing of the amputation site.

MED-09 Morphometric assessment of the carbohydrate residues in the epithelium of *Eimeria* infected pheasant duodenum. N. SPOONER-ZAHN (1), D. HRABEC (1), M. GOLDOVA (2), and A.T. MARIASSY (3). (1) College of



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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Health Sciences (Biomedical Sciences), Barry University, Miami Shores, FL 33161, (2) University of Vet. Med. Kosice, Slovakia, and (3) Nova Southeastern University, College of Medical Sciences, Ft. Lauderdale, FL 33328. The coccidial colonization of the specific pheasant intestinal segments is based on the interaction of carbohydrates and lectins on the duodenal epithelium of the pheasant caused by the infiltration of the parasite. We quantified the carbohydrate expression of epithelial lining, resulting from an experimental *Eimeria duodenalis* infection with lectin probes in duodenal epithelium of a control and *E. Duodenalis* (5k/animal) infected pheasant chicks at 6 days post infection (p.i.). Lectin binding was detected by Avidin-Biotin, Vector Kit[®] and quantified with the computerized morphometry program Image-Pro-Plus[®] Reaction product positive areas were determined and related to the total measured epithelial areas. Carbohydrate localization values were ascertained on digital images and expressed as percent of positive areas per measured epithelium. The percent positive areas were then evaluated by ANOVA. There were statistically significant ($p > 0.05$) differences among lectin expression between the control and infected pheasants 6 p.i. We conclude that the pathogenesis of parasite-host interaction in coccidiosis is associated with an altered expression of carbohydrates on both epithelial and coccidial surfaces. (NSU Faculty Research Grant.)

MED-10 Bronchial basement membrane carbohydrate alterations in asthma: A quantitative assessment. S.N. VALDIZAN (1) C.E. YORI (1), and A.T. MARIASSY (2). (1) College of Health Sciences, Graduate Biomedical Sciences, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161, (2) Nova Southeastern University, 3200 South University Ft. Lauderdale, FL 33328. The remodeling of the bronchiolar walls is one of the major consequences of the chronic inflammation of the airways resulting in asthma. We present here a morphometric assessment of the basement membrane carbohydrate composition as detected with lectin molecular probes in asthmatics and in non-asthmatic controls. We randomly chose paraffin embedded bronchial cross sections (airways with cartilage & submucosal glands, >2 mm diameter) from two cases of fatal asthma and from two control subjects (accidental death). Controls consisted of non-biotinylated lectins and carbohydrate pre-incubation. Bronchial wall remodeling showed significant alterations of the BM carbohydrates. Preliminary data indicates, that a larger percentage of the airway BM area and greater area per bronchiolar size were different in the asthmatics as compared to the control. Measured reaction product areas were: 16.5-4.5 % with PNA; 38.6-7.2% GSAL: 43.1-15.7% UEA I.; and 61.5-15.7% with MAL II. lectins. These findings indicate a shift in carbohydrate composition of BM, which may be responsible for the loss of epithelium, change in storage of growth factors for epithelial renewal and the inability of BM to maintain a structural barrier and a scaffolding for the airway wall integrity in severe asthma. The significance of these changes remains to be further examined. (Supported by NSU Faculty Grant.)

MED Posters

MED-P26 Identity of mouse dural mast cells stained sequentially with toluidine blue and alcian blue/safranin. A. ANCHA (1), M.E. HAGGERTY (1), T.N. DE LA LUZ (1), A.A. SMITH (2), and E.L. ORR (1). (1) Graduate Program in Biomedical Sciences, Barry University, 11300 NE 2nd Ave., Miami Shores, FL 33161, (2) Barry University School of Podiatric Medicine, 11300 NE 2nd Ave, Miami Shores, FL 33161. Classically, rodent mast cells (MCs) have been classified as serosal (connective tissue) or as mucosal MCs based primarily on the predominant sulfated glycosaminoglycan stored in their granules. Rodent serosal MCs are present in connective tissue and have a high content of heparin and are therefore stained with toluidine blue (TB+) or with safranin (S+) but are not stained with alcian blue (AB-) which stains chondroitin sulfate but not heparin. In contrast, rodent mucosal MCs are classically present in the gut mucosa and stain with alcian blue (AB+) but not toluidine blue (TB-) or safranin (S-). More recently, and in tissues other than in the gut, a third population of MCs have been defined as intermediate (mixed) in type, being stained with both alcian blue and safranin (AB+/S+). In all of the research on different MC populations comparing their staining properties, toluidine blue (TB) stained preparations were compared to separate alcian blue/safranin (AB/S) preparations, though some studies stained consecutive sections in an effort to evaluate the identity or lack of identity between "serosal," "mucosal," or "mixed" types of MCs. In the research presented here, we sequentially stained the same preparations of mouse dura mater with TB and then with AB/S. Our initial results reveal that TB-stained dural MCs can be re-stained with AB/S. More importantly, the individual MCs that were either AB+/S+, AB+/S- or AB-/S+ (on re-staining), were all (>95%) initially TB+ (*i.e.*, AB/S staining did not reveal additional MCs that were initially TB-). These results also indicate that TB is not specific for heparin, or that virtually all dural MCs also contain chondroitin sulfate stainable with AB AB/S, or that differential staining with AB/S does not effectively identify mucosal and mixed populations of MCs in the mouse dura mater.

MED-P27 Gender effects on intravenous cocaine seizure thresholds in two strains of epileptic rats. C.E. REIGEL (1) and A.T. LOVERING (2). (1) Department of Pharmacology, Nova Southeastern University, 3200 South University Drive,



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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Fort Lauderdale, FL 33328, (2) Department of Human Physiology, University of Oregon, 1240 University of Oregon, Eugene, OR 97403. Cocaine is a stimulant that produces dose-dependent increasing CNS excitement, causing seizures at high doses. Two strains of genetically epilepsy-prone rats (GEPRs) exhibit differential sensitivity to cocaine-induced seizures. The severe seizure strain (GEPR-9) possesses lower intravenous cocaine seizure thresholds than non-epileptic controls. In the moderate seizure strain (GEPR-3), intravenous cocaine seizure thresholds are elevated over non-epileptic controls or GEPR-9s. Anecdotal reports suggest that male human subjects are more sensitive to the CNS stimulant effects of cocaine than female human subjects. We examined intravenous cocaine seizure thresholds in male and female subjects in both GEPR strains. Cocaine was administered intravenously (10 mg/kg/ml/min) to unrestrained, un-anesthetized rats via a chronic silastic catheter to the onset of seizure. Catheters were implanted under ketamine/xylazine anesthesia (70 mg/kg, 6 mg/kg, IP, respectively) 3 days prior seizure threshold determination. Consistent with previous findings, intravenous cocaine seizure thresholds were lower in GEPR-9s than GEPR-3s. Cocaine seizure thresholds were significantly lower in male GEPR-9s than female GEPR-9s. Cocaine seizure thresholds were not different in male and female GEPR-3s.

MED-P28 Mast cells in the subjacent dura mater are activated by *ex vivo* skull trauma. M. TEISBERG (1), D. PERRY (1), A.A. SMITH (2), and E.L. ORR (1). (1) Barry University Graduate Program in Biomedical Science, (2) Barry University School of Podiatric Medicine, 11300 NE 2nd Ave, Miami Shores, FL 33161. Scoring the mouse skull induces mast cells (MCs) in the subjacent dura mater to “degranulate” and release histamine (Stokely and Orr, 2008). The mechanism(s) for trauma-induced MC activation are unknown. Research on MCs in the dura and other tissues suggests that mechanical and/or thermal stimuli may activate MCs either directly or indirectly *via* local neurogenic mechanisms. To begin assessing whether trauma-induced MC activation occurs directly or indirectly, we examined whether scoring the mouse skull *ex vivo* would activate MCs in the subjacent dura mater. Anesthetized adult male C57Bl/6J mice were decapitated and the whole calvarium with attached dura mater carefully isolated. A single groove was cut into the right or left parietal bone (using a Dremel tool and bit) and the calvarium/dural unit then incubated for 10 min in saline before fixation by immersion in 10% NBF. The dura was stained *in situ* with acidified toluidine blue, carefully separated from the skull, mounted onto glass slides and coverslipped (under water) for histological evaluation of MC numbers and integrity. We determined that dural MCs remain morphologically intact when the calvarial skull and dura are isolated as a unit. Further, scoring the skull *ex vivo* only activates (“degranulates”) MCs in the immediately subjacent dura indicating that an intact peripheral nervous system and intact circulatory system are NOT required for skull trauma to activate dural MCs. Whether dural MCs are activated directly or indirectly *via* sensory or autonomic neural elements still present in the isolated dura remains to be determined.

PSS = PHYSICS & SPACE SCIENCES [|return to top|](#)

PSS-01 Development of gas electron multiplier detectors for muon tomography. M. ABERCROMBIE, A. MENENDEZ, A. QUINTERO, and M. HOHLMANN. Department of Physics & Space Science, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. The use of Gas Electron Multiplier (GEM) detectors for a muon tomography station promises to overcome many of the limitations encountered by similar techniques. This station will be able to use naturally occurring and abundant cosmic ray muons to identify the composition and position of concealed items. GEM detectors are particularly well-suited for this task due to their excellent spatial resolution. The assembly process of both 10 cm × 10 cm and 30 cm × 30 cm triple GEM detectors includes the preparation and mounting of GEM foils, the introduction of a gas which allows electrons to ionize and cascade through a created uniform electric field, and the readout of individual events. Because the stretching and gluing of the foils is such a delicate process, we are studying the performance of honeycomb spacers between GEM foils. Avoiding this procedure would be a significant improvement in the construction of GEM detectors.

PSS-02 A comparison of different contrast functions of FastICA algorithm in a MIMO OFDM system. Y. DU, N. WU, Y. FANG, and K.K. YEN. Department of Electrical and Computer Engineering, Florida International University, 10555 West Flagler Street, Room 3860, Miami, FL 33174. The techniques of MIMO (Multiple Input and Multiple Output) OFDM (Orthogonal Frequency Division Multiplexing) systems have been adopted by the 4th generation of wireless communication standard. To detect users' signals at the receiver of a MIMO OFDM system, the channel state information is required and a usually-used method is to retransmit frames constantly from the transmitter. The detection by blind signal separation (BSS) techniques is a novel approach to solve this problem without retransmitting frames in MIMO OFDM systems. FastICA (Fast Independent Component Analysis) is one of the most important algorithms of BSS techniques. The objective of this paper is to propose a FastICA based MIMO OFDM system with additive white Gaussian noise (AWGN),



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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compare different contrast functions of FastICA algorithm, and find a contrast function with better bit error ratio (BER) performance and robustness. The simulation results show that the log-based contrast function has better performance than other contrast functions.

PSS-03 Combining space exploration, nanotechnology and science fiction: Nanosatellites. B. LANE, M. BRACKIN, T. GAYLOR, A. FREDERIKSEN, and T. MANNING. Chemistry, Valdosta State University, 1500 Patterson Ave, Valdosta, GA 31698. Europa, one of Jupiter's moons, has been projected by a number of scientists as the most likely location in the solar system for life. Below its surface, there are large bodies of water that have extreme conditions similar to that found in deep sea vents found on earth. Scientists working in nanotechnology have not only delved into new scientific principles but have also found new technologies. In this presentation, students were presented with a hypothetical futuristic scenario where astronauts are going to land on Europa but a microbe has been detected, by an unmanned probe, in the water. They have to deliver genetic material before the astronauts arrive to alter the microbe and make the landing location safe. Students designed a nano satellite which has six basic nanotechnology type components to delivery genetic material. The satellite, which essentially is a large molecule, is built in the molecular modeling program and molecular mechanics calculations are used to optimize its structure. Each individual component is based on current accepted science and technology but the mission is only proposed. The six components include a: (1) single molecule magnet (Fe8) that is the 5 nm long satellites computer; (2) a hydrogenated C60 that serves as a memory device; (3) a graphite tube that serves as the body of the satellite; (4) a C60-chlorophyll system that is used to generate electricity; (4) a EDA-C60 spring system that is used to hold the microbial gene for delivery; and (6) a DNA-dye (C102) system that is used to convert thermal energy into heat to power the satellite. The presentation will discuss the details of how each component works but also show how the blending of planetary science, nanotechnology and science fiction and produce an intriguing project for students in a physical chemistry class.

PSS-04 Monte Carlo simulations of a first prototype micropattern gas detector system used for muon tomography. J.B. LOCKE, K. GNANVO, and M. HOHLMANN. Department of Physics and Space Sciences, Florida Institute of Technology, 150 West University Boulevard, Melbourne, FL 32901. Muon tomography is a versatile technology and can be used, for instance, to detect shielded nuclear threat material in shipping containers. Muons are particles, similar to electrons, created naturally by cosmic radiation striking the Earth's atmosphere. Many of these muons survive long enough to reach sea level with average energies of about 4 GeV and a flux of about 100,000 muons per square meter per minute. A muon tomography system is made of at least two stations consisting of micropattern gas electron multiplier detectors. The top station detects the incoming path of a muon and the bottom station detects the outgoing path. A simple algorithm is used to find the point of closest approach and the angle between the incoming and outgoing paths. Using the scattering angle and the point of closest approach, the type and the location of the material which scattered the muon are determined. The muon tomography system currently under construction has a tomography volume of 30×30×10 cubic centimeters. However, due to limited electronic instrumentation, only 5×5 square centimeters of the XY plane will be used for the initial hardware tests projected for early 2010. Monte Carlo computer simulations using the GEANT4 utility for a muon tomography system with this configuration are presented. The simulated scenarios consist of the tomography system with cubes of tungsten of various sizes placed in the tomography volume. The primary factors considered are the ability and speed of the system to reconstruct a target. The results from these simulations will be compared to actual results from the muon tomography system currently under construction.

PSS-05 Multiuser scheduling schemes for MIMO-OFDM systems. N. WU, Y. FANG, Y. DU, and K.K. YEN. Department of Electrical Engineering, Florida International University, 10555 W Flagler St, Miami, FL 33174. Scheduling schemes play an important role in the system performance of broadband wireless systems. Scheduling schemes are defined as the method of user selection and how to allocate available resources to selected users. Multiuser scheduling schemes take into account the different data rate requirements for services such as video streaming and internet surfing. Drawback of conventional scheduling schemes such as RR and MaxSNR Proportional Fair (PF) scheme provides trade-off between efficiency and fairness PF scheme is extended to include OFDM-based systems namely OPF. Three variations of OPF for multi-rate multimedia services are proposed: Adaptive OPF, Multimedia AOPF, Normalized MAOPF. Comparison of all scheduling schemes using efficiency and fairness criteria based on the throughput, mean delay, user satisfaction rate and average user rate comparisons, a scheme with best overall performance in terms of efficiency and fairness is picked.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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PSS Posters

PSS-P29 Performance of a USCMS Tier-3 computing cluster at Florida Tech. X. FAVE, P. FORD, and M. HOHLMANN. Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. The Tier-3 High Performance Computing Cluster at Florida Tech is being used for data production of the CMS experiment at the CERN Large Hadron Collider as well as for local analyses and has undergone significant changes during the course of the semester. The system software has been upgraded to include the latest version of the virtual data toolkit, the Grid User Management System (GUMS), and the Physics Experiment Data Exports system (PhEDEx). A development node was converted into a separate Storage Element with 64GB of RAM to replace our previous Berkley Storage Manger System configuration. Performance tests of the cluster were conducted to ensure maximum efficiency and speed and it is now achieving 941 Mbits/sec data transfer between the frontend and the Network Attached Storage (NAS). Currently the cluster is being used by several faculty members for their projects, which include the modeling of accretion flows from binary stars and the studying of propagation of solar energetic particles as well as to run our own Muon Tomography simulations.

PSS-P30 Quarknet muon data analysis with shower array studies. J. FISCHER, A. CITATI and M. HOHLMANN. Physics/Space Science, Florida Institute of Technology, Melbourne, FL 32901. In collaboration with Fermilab, the Florida Institute of Technology's Quarknet Project captures and collects data from cosmic ray muons. We use plastic scintillator paddles, photomultiplier tubes, a DAQ card, and a computer to detect these muons. We measure the muon flux with different orientations of detectors configured for quadruple coincidence in which the plastic scintillator paddles are stacked on top of each other. For time-stamping our data, we use GPS systems atop our building. Using Fermilab's Cosmic eLabs, we analyze the data from our data collections and measure flux and lifetime. Using muon shower array orientation, in which the paddles are oriented side-by-side, we measure muon shower array studies.

RES = FLORIDA COMMITTEE ON RARE AND ENDANGERED SPECIES [|return to top](#)

RES-01 Population interconnectivity across the range of the Southeastern beach mouse (*Peromyscus polionotus niveiventris*). H.M. KALKVIK, I.J. STOUT, and C.L. PARKINSON. Department of Biology, University of Central Florida, 4000 Central Florida Blvd, Orlando, FL 32816. Southeastern beach mice were distributed on barrier islands on the Atlantic Coast of Florida from Ponce de Leon Inlet to Miami Beach. They are now limited to a few locations on state, county and federal properties with intact dune and scrub habitat. The consequences of human development and fragmentation of beach mouse habitat are unclear, and there have been no evaluations of the interconnectivity between remaining locations. Connectivity is essential for preventing local extirpations caused by genetic or demographic factors. Using fast evolving genetic markers, we quantified the level of genetic differentiation throughout the current range of the Southeastern beach mouse. These data allowed an assessment of the level of gene flow or fragmentation within the remaining locations. We sampled tissues from at least 350 individuals at 10 sites and amplified 10 microsatellite loci. Preliminary results indicate that within and between Cape Canaveral and Canaveral National Seashore, gene flow is occurring with low levels of genetic differentiation. This suggests the habitat in these areas is sufficient for maintaining movement across the landscape. Other populations in Volusia and Indian River Counties are isolated by commercially developed beaches, and these sites are characterized by higher levels of genetic differentiation and lower genetic diversity. This indicates that anthropogenic impacts on the beach habitat near these locations reduces or prevents dispersal of beach mice from the remaining distribution. Based on our findings, the isolation of these populations should be taken into consideration in management plans for future persistence of the subspecies. Isolated populations are more prone to going extinct, and possible translocation of mice to these isolated locations may be necessary to counter detrimental genetic and demographic effects. By identifying the genetic impacts of habitat alteration on the Southeastern beach mouse, we have identified where active management is likely necessary to ensure the persistence of this threatened mammal. (This work was supported by the U.S. Fish and Wildlife Service.)

RES-02 The impacts of reduction mowing on gopher tortoises and other species in a nature preserve in Palm Beach County, Florida. J.A. MOORE. Florida Atlantic University, Wilkes Honors College, 5353 Parkside Dr, Jupiter, FL 33458. The Abacoa Greenway is an urban preserve for gopher tortoises and other protected species in Jupiter, Florida. Gopher tortoises prefer habitats with open sunny spots for nesting and basking. Fire is a normal element in gopher tortoise habitat, and when natural fires are suppressed, habitats may become too overgrown. As a site becomes overgrown, tortoises respond by digging new burrows in more optimal places. To maintain open spaces in areas where fire is not allowed, some land



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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managers have advocated using reduction mowing of vegetation as an alternative. We evaluated the distribution of tortoise burrows throughout the study site both before and after extensive reduction mowing took place in late 2006 in the greenway. We divided the site into peripheral and interior spaces and our results suggest that the tortoises preferred peripheral sites prior to mowing and interior sites after mowing. However, the way in which the mowing was done has had numerous other unanticipated consequences, which will be discussed.

RES-03 A survey of the endangered lichen, *Cladonia perforata*, along the Atlantic Coastal Ridge in Florida. J.A. MOORE and S.L. RICHARDSON. Florida Atlantic University, Wilkes Honors College, 5353 Parkside Dr., Jupiter, FL 33458. *Cladonia perforata* is a federally-listed, endangered lichen found only in Florida. It was originally described from Okaloosa County in the Florida panhandle and later discovered on the Lake Wales Ridge and Atlantic Coastal Ridge. It remains very rare and is currently known from a total of five protected sites on the Atlantic Coastal Ridge. We recently conducted a survey of suitable scrub habitats at several protected and privately owned sites along the Atlantic Coastal Ridge from Palm Beach to Indian River County. The objectives of this project were to: 1) resurvey the known populations at the five known protected areas to estimate density, abundance, ecology, and spatial extent of this species; and 2) use a combination of aerial photographs and ground surveys to find any other subpopulations of *C. perforata* outside of the five known protected areas along the Atlantic Coastal Ridge. To date, 52 sites have been examined for *C. perforata*. It has been confirmed at 4 of the 5 previously known sites and identified at an additional 11 sites along the Atlantic Coastal Ridge. We will also present an analysis of habitat and microhabitat information.

RES-04 Preliminary analysis of home range sizes in the southeastern beach mouse (*Peromyscus polionotus niveiventris*) on the Kennedy Space Center. D.M. ODDY and S.L. GANN. Innovative Health Applications, Kennedy Space Center, FL. 32899. The southeastern beach mouse (*Peromyscus polionotus niveiventris*) is one of seven subspecies of the old-field mouse that reside in the coastal ecosystems of Florida and Alabama. The Kennedy Space Center and surrounding federal lands are the last stronghold for this subspecies whose range has declined by 79%. While demography and population estimation data have been collected for this threatened species, home range sizes have never been determined. Forty five beach mice (23 males and 22 females) were fitted with a BD-2NC radio collar from Holohil Systems Ltd. Fifteen mice were tracked in Summer 2008, 10 in Fall 2008, 10 in Winter 2008, and 10 in Spring of 2009. The Hawth's Analysis Tool in ArcGIS was used to determine home range estimates via minimum convex polygon methodology (MCP). Home range sizes ranged from 56 m² to 3,508 m² for males and 237 m² to 4,573 m² for females, and these varied by season.

RES-05 Developing methods to conserve the endangered plant Scrub Lupine. J. RYNEAR and C. PETERSON. Rare Plant Conservation Program, Bok Tower Gardens, 1151 Tower Boulevard, Lake Wales, FL 33853. Scrub Lupine (*Lupinus westianus* var. *aridorum*) is endemic to Polk, Orange, and Osceola Counties in central Florida but has been extirpated from Osceola County. Presently, this scrub species occurs on the Mt. Dora Ridge in Orange County and on the Winter Haven Ridge in Polk County. Prior to 2002, the records of the Florida Natural Areas Inventory (FNAI) documented 45 populations of Scrub Lupine. By 2009, only eight confirmed sites remained. Since 1986, the Rare Plant Conservation Program (Program) at Bok Tower Gardens has been working to: (1) conserve all remaining germplasm of this species, (2) develop and refine both *in situ* and *ex situ* propagation methods, and since 2008, (3) establish genetically diverse populations at protected sites. To achieve these objectives, the Program monitors and collects germplasm from wild and imperiled populations and stores a portion of this material in the Program's National Collection. Remaining germplasm is utilized to develop and refine *in situ* and *ex situ* propagation methods, including protocols for tissue culture micropropagation, transplantation, and acclimatization. Since 1986, advancements in techniques and products used for seed treatment prior to sowing, planting processes, and disease prevention have all contributed to higher rates of germination and seedling survival. For the past two years, germination rates between 70% and 97% were routinely attained in *ex situ* trials compared with rates of 28% to 50% in prior years. At seven weeks of age, seedling survival averages 97% in current trials compared to the highest survival rate of 78% previously achieved. Germination rates for *in situ* trials have improved from an average of 3% in trials prior to 1997 to an average of 22% in 2008/2009 trials. Propagules from *ex situ* germination trials were used in the Program's first population introductions in 2008 and 2009. Population monitoring and data collection from these introductions will continue with the availability of funding. (Project supported in part by the USFWS and the state of Florida, DPI).

RES-06 Taxonomic status of the endangered Lower Keys marsh rabbit, *Sylvilagus palustris hefneri*. R.M. TURSI (1), P. HUGHES (2), and E.A. HOFFMAN (1). (1) Department of Biology, University of Central Florida, Orlando, FL 32816, (2) National Key Deer Refuge, US Fish and Wildlife Service, Big Pine Key, FL 33043. Identification of taxonomic



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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units is vital for conservation efforts to be effective. Failure to define taxonomic units can lead to extinction of unrecognized species, hybridization of separate species, and waste of resources for protection of abundant species thought to be rare. Modern molecular tools can provide information on levels of gene flow and on time since population isolation to determine how divergent species or subspecies are from one another. In the case of marsh rabbits, morphological differentiation has resulted in the recognition of three subspecies, *Sylvilagus palustris palustris*, *S. p. paludicola* and *S. p. hefneri*. The latter, *S. p. hefneri*, has been afforded federal protection based on its rarity and endemism to the Florida Lower Keys. Conservation of *S. p. hefneri* requires knowledge on the level of phylogenetic differentiation of this subspecies with respect to mainland subspecies. Consequently, the objective of this study was to determine levels of historical differentiation of *S. p. hefneri* using molecular data. The mitochondrial cytochrome b gene was sequenced from samples of all three subspecies throughout the range (Florida Lower Keys – Virginia) and Bayesian analysis was used for phylogenetic reconstruction of the three subspecies. Our analyses show that *S. p. hefneri* does not constitute a separate monophyletic group, indicating lack of historical differentiation. Such results suggest that the morphological differentiation of *S. p. hefneri* could be caused by more recent genetic differentiation. Hence, corroboration with fine-scale markers is required to determine levels of contemporary gene flow between *S. p. hefneri* and mainland populations before management decisions are made. In conclusion, this study highlights the importance of identifying taxonomic units to more efficiently allocate resources for conservation needs. (Funding provided by the US Fish and Wildlife Service).

TCH = SCIENCE TEACHING [|return to top|](#)

TCH-01 Redesigning a microbiology course from the microorganisms on up. T. ARNOLD, R. WOLFF, N. BLEVINS, and C. CARPENTER. South University, Tampa and West Palm Beach Campuses, Health Science Program 4401 North Himes Avenue, Tampa, FL 33614. South University, founded in Savannah Georgia in 1899, has two campuses in Florida. As part of its growth and expansion, South opened a new campus in Tampa in 2006 (under expansion); and, at the West Palm Beach location, moved to a new campus in 2010. Programs at these two campuses include health science and allied health, bachelors and masters degrees. These programs require microbiology as a foundational prerequisite. Utilizing the opening of the two new campuses, the microbiology faculty at all seven campuses nationwide worked on a list of essential organisms necessary to perform laboratory experiments with a health perspective; with a requirement of keeping all facilities at CDC level 1 (but capable to be upgraded to CDC level 2 in the future). This list was then cross referenced with a list of appropriate laboratory exercises. This produces an organism/exercise matrix from which equipment and facilities were planned. In a collaborative fashion, the faculty assembled curricula (administrative course outlines) and using a commercial publisher, a laboratory manual to match: organisms, curricula, exercises and facilities uniformly across all seven campuses. This is in place as of January 2010. Our presentation will include helpful information for those at other schools which simultaneously are planning curricula and facilities.

TCH-02 A microbiology laboratory class experiment on bacterial contamination of paper currency. R. WOLFF and A. STEWART-AKERS. South University Columbia, 9 Science Court, Columbia, SC 29203. As a project in Microbiology Laboratory classes we have had students bring in dollar bills (paper currency) and had them expose one quarter of the bill to a plate of Nutrient Agar, another quarter to Mannitol Salt Agar, and a third to Eosin Methylene Blue Agar. Numbers of bacteria, CFU's (colony forming units), ranged from several hundred per bill to thousands for those sampled during warm days in the autumn. Sampling conducted during a cold snap showed very reduced numbers. While the diversity of the bacterial flora was high, identification of *E.coli* was low while *Staphylococcus aureus* was common. Many colonies were transferred to ChromMRSA agar and MRSA was detected.

SOC = SOCIAL SCIENCES [|return to top|](#)

SOC-01 More strategic approaches to improve the management of Pension Benefit Guaranty Corporation through reframing. Y. CONG. Department of Public Administration, Florida International University, 11200 SW 8th Street, PCA 257, Miami, Florida 33199. The Pension Benefit Guaranty Corporation (PBGC) is a quasi-government corporation which insures the pension benefit in the private sector when the employers become unable to sustain their pension funds. Unfortunately, the PBGC itself is chronically underfunded, with a deficit that is currently estimated at \$33 billion and keeping increasing. Realized as the potential hazard to the promised future pension payment, the existing issues of PBGC is imperative to be studied, and the relevant solutions are urgent to be deliberated, in order to improve the governance and



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010

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management of PBGC. In this paper, four primary existing problems of PBGC are identified and described from the perspectives of four frames of organizations: structural frame, human resource frame, political frame and symbolic frame. The corresponding four approaches to solve the specific problems are clarified and the legitimacy of these strategies is illustrated based on the theory of reframing thinking of organization management.

SOC-02 Statistical relationships among national *per capita* adult alcohol consumption, *per capita* wealth, and selected measures of disease and disorder for 233 nations and territories. J.R. MONTAGUE (1), P. LIEN (1), and S. ACKBARALI (2). (1) Department of Biology, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161, (2) College of Health Sciences, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161. We analyzed World Health Organization data for adult alcohol consumption (L/adult-year), U.S. State Department data on *per capita* wealth (\$/person-year), and selected data on conditions of want (e.g., % of children underweight, % of population below poverty level, % of labor force unemployed), of excess (e.g., % of adult men and women who smoke, % of adult men and women who are obese), and of despair (e.g., death rates for cardiovascular disease, prevalence rates for HIV, tuberculosis and malaria). We found positive correlation between *per capita* adult alcohol consumption and *per capita* wealth, but negative correlations among *per capita* adult alcohol consumption and various rates for disease and disorder. This suggests excessive rates of alcohol consumption occur more frequently among the wealthier societies of the world.

SOC Posters

SOC-P31 Culture and gender differences in the use of backchannels: Hispanic vs. American vs. Hispanic-Americans. M. BARRETO and S.W. KONCSOL. Department of Psychology, Barry University, 11300 N.E. 2nd Avenue, Miami Shores, FL 33161. The purpose of this poster is to review the literature on the use of backchannels, meta linguistic utterances, e.g., “*hmm*,” within sentences, across gender and three cultural populations: Hispanics, Americans, and Hispanic-Americans. While considerable research has been done on other linguistic populations (e.g., Japanese, German, and British), little research has been done to date on Hispanic use of backchannels. It is speculated that Hispanic men and women may use backchannels with greater frequency and more intensity than other cultures. No research exists regarding the use of backchannels by bilinguals, such as those used by Hispanic-American men and women. Comparing gender and cultural populations should yield valuable insight into the linguistic nature of backchannels. Suggestions for studies to investigate gender and cross-cultural differences between Hispanics, Americans, and Hispanic-Americans in the use of backchannels will be discussed.

SOC-P32 The practice and efficacy of emotional behavioral disorders inclusion. N. BENINCASE. Department of School Psychology, Barry University 11300 NE 2nd Avenue, Miami Shores, FL 33161. Determining the best educational practices for students in the emotional behavioral disorder (EBD) population has the inherent challenges of applicability to individual needs. Inclusion of students with EBD into general education classrooms has been widely practiced and considered to be an effective method of producing appropriate behavioral responses and academic achievement. Additional interventions have been implemented for students with EBD, but none so extensively researched as the practice of inclusion. The significance of identifying the most appropriate educational services lies within the poor academic success, graduation rates, and continued social adjustment and occupational difficulties typically associated with students of this population. As inclusion continues to be practiced within the educational system, the trends of educational interventions continue to change according to the needs of students. The purpose of this literature review is to examine the challenges and efficacy of programs servicing students with emotional behavioral disorders.

SOC-P33 Neurological basis of executive functioning: an examination of teacher knowledge. C. BERNSTEIN. School of Education, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. Executive functioning is a collection of brain processes that largely influence an individual's cognitive flexibility, planning, inhibition, working memory, and abstract thinking. Research has suggested a link between effective classroom interventions and teacher knowledge pertaining to the etiology of a particular disorder. The purpose of the present literature review was to further investigate the neurological basis of executive functions, how deficiency in these areas would impede academic performance, and to examine teacher training and remediation of executive deficits. This review of literature was intended to create a greater understanding of the teacher's role in recognizing and intervening with cognitive disabilities. Teachers have daily exposure to clinically diverse children and are therefore a valuable source of diagnostic information.



**Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010**



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SOC-P34 Unusualness and eyewitness testimony accuracy. J. CLIFFGARD and L. BACHELLER. Department of Psychology, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. In the judicial system, often the judge or jurors must rely on the eyewitness to the events in question when making a final determination of guilt or innocence. Numerous factors may influence the accuracy of the eyewitness accounts. One area of research examines the relationship between eyewitness accuracy and weapons focus. Weapons focus is the tendency of eyewitnesses to focus on the weapon and not the perpetrator. Researchers have determined that weapons focus is initiated not by the threatening nature of a weapon, but rather the novelty of the weapon in the situation (Pickel, 1999). However, the issue of the perpetrator's gender in weapon's focus has been understudied. Little is known about the effect of the perpetrator's gender when a weapon is involved on eyewitness accuracy. This literature review examines weapons focus and perpetrator gender differences as measured by eyewitness accuracy in a fictional crime.

SOC-P35 An examination of college students' upbringing and social-problem solving skills. S.P. DESIR and K. LAURENCE. Department of Psychology, Barry University 11300 NE 2nd Avenue, Miami Shores, FL 33161. In America, we are facing a critical situation where many of us report significant decreases in the number of confidants we have in our lives (Lynn Smith-Lovin et al., 2006). At the same time, record numbers of people are reporting personal and professional problems that they are not able to solve (Brammer, 1990). These two factors are present in the college population; therefore the main purpose of this study is to investigate whether one's upbringing has an impact on one's problem solving skills. We were also interested in investigating whether participants would demonstrate differences between face to face interaction and online responses. The participants will be randomly assigned to two groups, the open-ended interview group and the online survey group. Each participant will be given an open-ended interview for problem-solving or a social problem-solving scenario question; the short-EMBU questionnaire, and a demographic questionnaire. Findings are expected to demonstrate a positive correlation between more nurturing memories of upbringing with relation to having well-developed problem-solving skills. The results are also expected to show participants being more inclined to discuss solving a social problem in detail, when they are in the face-to-face group. However, key to this study is the finding that we are, in general, less social; therefore, it may be just as likely that college aged participants are more comfortable with an online questionnaire.

SOC-P36 Parenting styles and academic self-efficacy. I. GONZALEZ and L. BACHELLER. Department of Psychology, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL, 33161. Parenting styles have significant influence throughout the development of adolescence. The way parents interact with their children can have either negative or positive effects on the development of the child during and beyond adolescence. At the present time, the most socially accepted theory is that there are four categories of parenting styles: authoritarian, authoritative, permissive and neglectful (Baumrind, 1991). Underlying these categories of parenting styles are two broad dimensions of control/demanding, and warmth/caring. It is the combination of these two dimensions that define a specific parenting style. Research indicates that the type of parenting style may influence the child's perception of their academic abilities. Academic self-efficacy is defined as "belief in one's capabilities to organize and execute courses of action required to produce given attainments" (Bandura, 1997, p. 3). This literature review addresses the link between parenting styles and academic self-efficacy in emerging adults. (Supported by NIH-NIGMS MARC T34 GM08021-25, Barry University).

SOC-P37 Flexibility of sexual orientation in heterosexual men and women. J. GONZALEZ and F. MUSCARELLA. Department of Psychology, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. One inquiry that arises as the result of the study of human sexuality is the intrinsic mechanisms that drive and shape flexibility of sexual orientation. A broad range of studies have found that women tend to be more flexible in regards to sexual fantasy, romantic attraction, and sexual behavior. However, there are some studies suggesting this might not be entirely accurate, and that men may actually display more flexibility. The current study explores the flexibility of sexuality in heterosexual men (n = 80) and women (n = 300) in an effort to extend the research. A one-way between-subjects MANOVA will be performed on seven measures of sexual attitudes and behaviors. It is hypothesized women will show more sexual flexibility than men.

SOC-P38 Academic achievement and adolescent romantic involvement. A. HERTZ. Barry University School of Education, 11300 NE 2nd Ave, Miami Shores, FL 33161. The purpose of this literature review was to analyze previous research regarding the impact of social factors such as parental involvement, family structure, peer relationships, and romantic involvement on academic achievement. Additionally, the effect of sex differences on academic achievement was also explored. This review of literature was intended to help to create a greater understanding of the relationship between academic achievement and adolescent romantic involvement, specifically, to determine if gender could predict the outcome.



**Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010**



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SOC-P39 Statistical relationships among body size, years of experience, and annual base salary for professional athletes in the National Football League. S. HIPSON and J.R. MONTAGUE. Department of Biology, Barry University, 11300 NE 2nd Ave, Miami Shores, FL 33161. We analyzed internet data for 1,980 National League Football players reporting to their 2009 summer training. Body mass index values (kg/m^2) were highest for offensive guards (mean BMI = 37.8 ± 1.4 , $n = 127$) and defensive nose tackles (mean BMI = 40.7 ± 2.5 , $n = 22$), and lowest for offensive wide receivers (mean BMI = 26.9 ± 1.3 , $n = 204$) and defensive corner backs (mean BMI = 26.7 ± 1.1 , $n = 156$). For years of experience, the longest tenures belonged to offensive place-kickers (mean years = 7.3 ± 1.7 , $n = 38$) and defensive nose tackles (mean years = 7.3 ± 3.8 , $n = 22$) and the shortest tenures belonged to offensive running backs (mean years = 3.5 ± 3.0 , $n = 140$) and generic defensive linebackers (excluding inside, outside and middle linebackers: mean years = 2.7 ± 3.3 , $n = 103$). Annual base salaries were highest for offensive quarterbacks (mean = $\$3,869,325 \pm \$4,562,697$, $n = 80$) and defensive ends (mean = $\$2,642,520 \pm \$3,186,299$, $n = 126$), and lowest for offensive fullbacks (mean = $\$871,988 \pm \$778,347$, $n = 36$) and generic defensive linebackers (excluding inside, outside and middle linebackers: mean = $\$760,502 \pm \$650,476$, $n = 58$). We found the distributions for annual salary and for years of experience to be highly non-gaussian (highly skewed), but we found the distribution for BMI to be roughly gaussian. There was a significantly positive correlation between years of experience and annual base salary.

SOC-P40 Associations among fear of injury, self-efficacy, and anxiety in adolescent gymnasts. K. LAGO and K. LAURENCE. Department of Psychology, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. Studies have shown support for both the benefits and disadvantages of gymnastics (Lally & Kerr, 2008). This study investigated associations among fear of injury, competitive anxiety, self-efficacy, and state-trait anxiety. Participants were optional level female gymnasts ($n = 25$, age 9-15 years) drawn from a metropolitan gymnastics center. Structured individual interviews comprised of questions about demographics and gymnastics involvement were conducted. In addition, participants completed the Gymnastics Fear Inventory, the Sport Competition Anxiety Test for children, the Self-efficacy for Physical Abilities Scale, and the State-Trait Anxiety Inventory for children. Quantitative and qualitative analyses were conducted. Fear of injury was positively correlated with state anxiety and trait anxiety. State anxiety was positively correlated with trait anxiety. Fear of injury and physical self-efficacy were negatively correlated. These findings and implications will be discussed and additional qualitative analyses will be highlighted. (Supported by NIH-NIGMS MARC T34 GM008021-25).

SOC-P41 The effects of rap music's visual imagery vs. rap music's lyrical content on youth in America. B. MCNEIL and P. HALL. Department of Psychology, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. During the short span of time that rap music has existed, there has been limited empirical evidence demonstrating its impact on America's youth. Most of the research has been geared towards examining the affects of rap music's lyrical content on youth. In Hall's 1998 study on rap music and memory, children were told to listen to some rap songs and then explain what the songs were about. The results suggested that young children did not have a firm idea of what the lyrics meant. Hall's research challenges the motive of previous rap music bans - one of which was delegated by the U.S. District Court Judgment in Fort Lauderdale, Florida. It makes one wonder why ban the music when it may not be the lyrics that is causing the problem. Could it be that it is the visual images and not the lyrics that should be of concern to parents, educators, psychiatrists, judges and/or policy makers? It is clear that the modern visual imagery displayed in rap music videos have become more violent, obscene and explicit. Therefore, it is vital to understand the effects of both the lyrical content of this music as well as its visual images. This idea has begun to receive empirical attention and is the primary aim of this literature review. The following literature review will focus on studies that have examined the impact that the visual images in rap videos have children and adolescents. Studies conducted by researchers such as Villani, S., 2001; Rudman, L.A. & Lee, M.R., 2002; Ward, M. L., Hansbrough, E., & Walker, E., 2005 will be highlighted. After reviewing the literature, a study will be proposed to compare the impact of rap music lyrics versus visual images on children and youth to address the following question: Is it the clothing, dance moves, violence, sex, or racial scenes that are most arousing to our youth?

SOC-P42 Students' perceptions regarding the importance of minority faculty at majority universities. K. RIVERA-TORRES (1), and P. HALL (2). Department of Psychology, Barry University 11300 NE 2nd Avenue, Miami Shores, FL 33161. The underrepresentation of Black and Hispanic scholars on the faculties of the nation's colleges and universities remains a serious problem in the United States. Even those who are at these colleges and universities may not always be perceived in a positive manner. Research has shown that the many students are prejudiced against professors from minority groups, such as African-American and Hispanics (Ho, A.K., Thomsen L., & Sidanius, J., 2009). Their research also shows that majority group professors have often been described as being more intelligent than their counterparts. Not only has research shown that many students negatively evaluate the intellectual competence of minority professors but it has also



**Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010**



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shown that they question their credibility. Students at predominately white institutions regularly question the credibility of Black professors and hold them to more stringent standards than they do White professors (Hendrix, 1997). Other research has shown that individuals believe that majority groups are smarter than minority groups due to biological factors. Anderson, K.J. & Smith, G., 2005 found that students rely on this information to formulate preconceptions of their professors. The interesting twist to these findings is that students from represented and underrepresented groups believe that they can benefit from African American and Hispanic professors while still questioning the intellectual competence of these professors. If many students feel this way, then how and why do they believe they can benefit from African American and Hispanic professors? The purpose of this literature review is to examine research that has been conducted on the benefits of having minority professors at predominately white institutions (Allen, W.R., Epps, E., Guillory, E.A., & Bonous-Hammarth, M. 2000; Alexander, R., & Moore, S.E., 2007; Smith, D., & Wolf-Wendel, L.E., 2005; Weems, R.E., 2003). The limitations of this research will also be discussed and a study will be proposed which will expand the field of knowledge on the benefits of minority professors at predominately white institutions.

SOC-P43 The role of physical attractiveness or race on jury decision making and sentencing. E. ROMERO and P. HALL. Department of Psychology, Barry University 11300 NE 2nd Avenue, Miami Shores, FL 33161. Over the past decade there has been a great deal of controversy regarding the biases which may affect a jury's verdict and sentencing determinations. This controversy in many ways was due to research done by psychologists regarding eyewitness testimony and jury decision making. Elizabeth Loftus' research (1974, 1979) showed that eyewitnesses may not always be accurate in identifying assailants. Gary Wells (1979, 1980) went further to show how the guilty verdict a jury gave increased from 27% to 73% when there was an eyewitness present versus when there was no eyewitness present. This increase was found even if the eyewitness was not accurate (69%). Loftus' and Wells' studies generated a long line of research examining factors which might influence jury decision making. The purpose of this literature review is to explore two factors which might cause jurors to be biased in their decision making: a) race and b) attractiveness. With regards to race, research will be reviewed that examines the impact Afro-centric facial features has on the sentencing length of the defendant or the guilt/innocence of the defendant (Mitchell, T.L., Haw, R.M., Pfeifer, J.E., and Meissner, C.A; & Blair, Judd and Chapleau, 2004 & Jones and Kaplan, 2003). Further, research on the physical attractiveness of the defendant will be reviewed to determine how this variable affects the sentencing length of the defendant and the guilt or innocence of the defendant (Izzett and Fishman, 1976). At the end of this literature review, the limitations and implications of these two areas of research will be explained. Lastly, a study will be proposed to address the following research question: Will similar findings be obtained if the defendant is Hispanic rather than White?

SOC-P44 Do all adults reach formal operational thought? A literature review. K.M. SIEBKEN and K.H. LAURENCE. Department of Psychology, Barry University 11300 NE 2nd Avenue, Miami Shores, FL 33161. Over the past several decades, educators, businessmen and psychologists alike have questioned whether American students are keeping up intellectually with the rest of the world. Many reports have indicated that along different measures of intelligence and achievement, American students are lacking (*e.g.*, Ravitch, 1995). However, not everyone in the field of education has agreed on the definition of intelligence, nor how it should be measured. Piaget's simple definition revolved around the idea of adaptation (the highest level being termed 'formal operational thought'), and many are considering whether Piaget was right and whether his methods and conclusions would be useful today when assessing the intelligence of American students (*e.g.*, Kuhn, 2008). It must be pointed out that Piaget's work has attracted several critics who have questioned how he defined and measured formal operations, as well as many of the tenets of his theory, especially post adolescent development (*i.e.*, Lourenc & Machado, 1996). Thus, the purpose of the present literature review was to review relevant articles concerning how many people reach formal operational thought as defined by Piaget. Age, education, gender and other patterns found in the literature will be discussed.

SOC-P45 Analyzing drought impacts and assessing mitigation strategies. R.K. SNOW and M.M. SNOW. Applied Aviation Sciences, Embry-Riddle Aeronautical University, 600 S. Clyde Morris Blvd, Daytona Beach, FL 32114. The U.N. Committee on Economic, Social and Cultural Rights now regards access to safe freshwater as a universal human right. However, weather and water related disasters are growing rapidly. Prolonged drought currently affects 40 percent of the planet and could rise to 70 percent by 2025 unless appropriate measures are taken to curb climate change. The interaction between the physical environment and anthropogenic activities are the cause for the socio-economic impacts of droughts, which include death, malnutrition, and disease. Susceptibility to drought depends on location as well as the age, income, and education level of a particular population. Other factors include level of disaster preparedness, health sector responses, and environmental degradation. In areas already suffering from desertification, drought events are associated with dust storms



**Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010**

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and respiratory health effects. Overall food consumption is reduced as a result of drought, which can lead to micronutrient deficiencies. Diets in drought stricken areas have been found to be lacking in adequate vitamins and minerals. The probability of acquiring and of possibly dying from an infectious disease is increased due to malnutrition in drought prone areas. Other factors related to drought that may result in an increased risk for infectious disease outbreaks include the contamination of drainage canals, lakes, and rivers due to standing water and stagnation. In the developing world, drought and the associated inability to earn a living often cause mass migrations of poor farmers from the rural countryside to already crowded urban centers. These population shifts subsequently lead to a rise in communicable diseases and death due to shortages of clean water, food, and shelter. This research examines the physical and socio-economic impacts of drought and assesses the means of mitigating and managing these negative effects.

SOC-P46 The causes, consequences, and alleviation of desertification. M.M. SNOW and R.K. SNOW. Applied Aviation Sciences, Embry-Riddle Aeronautical University, 600 S. Clyde Morris Blvd, Daytona Beach, FL 32114. Desertification is the unwanted expansion of desert that typically occurs along the margins of arid, semi-arid, and dry sub-humid areas. This land degradation involves a loss of the biological or economical complexity and productivity of rain-fed cropland, range, pasture, woodlands, or forest from climate change or other anthropogenic forces. Contributing factors include drought, soil erosion, over-grazing, deforestation, warming temperatures, and changing precipitation patterns. Agriculture is a critical component of local livelihoods and national GDP in many countries in Africa. This sector is particularly sensitive to land degradation which results in the loss of productivity. Areas undergoing desertification are ranked such that a moderate hazard area has an average of 10%-25% drop in agricultural productivity; a high hazard area has a 25%-50% drop; and a very high hazard area has a >50% decline in agricultural output. Other natural resource challenges such as pests, crop diseases, poor soil fertility, and a lack of access to infrastructure providing water are usually aggravated by periods of prolonged droughts and desertification. Currently, almost half (46%) of Africa's land area is vulnerable to desertification. Other countries experiencing desertification include Asia, Australia, as well as North and South America. As land for agriculture becomes further degraded, the need for more food could likely be met by increasing yields per unit of land area, water, energy and time. Increasing variability in hydrological characteristics will likely continue to affect grain supplies and food security in many nations. Intensification of agriculture and precision farming will be the most likely means of meeting the food requirements. However, the interactions of the many natural and socio-economic variables are complex. This study investigates the impacts of desertification and ways to reduce the damage.

SOC-P47 Exploring changes in the play patterns of children over time. S.R. SPAULDING and K. LAURENCE. Department of Psychology, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. The way in which children play has changed over the years. In this age of technology, children now have more opportunities to utilize various forms of electronic entertainment. According to Foehr, Rideout, and Roberts (2005), our society is not just "media rich" anymore- it has now become "media saturated." This term means that children's environments not only have one TV, one computer, or one video game system, but instead offer multiple examples of each. It appears that children now spend less time engaging in imaginative and creative free play with other children as compared to the time before electronic entertainment was readily available. According to the Kaiser Family Foundation (2005), "the total amount of media content young people are exposed to each day has increased by more than an hour over the past five years." In the present literature review, we will discuss a variety of studies on the topic of play from the 1970's until the present. We expect to find a pattern suggesting that childhood development has been negatively affected by electronic forms of entertainment.

SOC-P48 Procrastination as a domain-specific behavior or trait affecting academic achievement. A. VALLE-ZAYAS and L.T. SZUCHMAN. Department of Psychology, Barry University, 11300 N.E 2nd Ave, Miami Shores, FL 33161. Procrastination is an important phenomenon because of its effects on academic, as well as the health and overall lives of chronic procrastinators. Procrastination has been analyzed in two major ways, as a domain-specific behavior related to unpleasant tasks, or as a trait-characteristic that is developed early on in life. This review demonstrates that research has examined the causes of procrastination in college students in terms of its relationship to boring or unrewarding assignments, as well as to difficulty of particular tasks. Another view is that procrastination is a trait (chronic procrastination). Researchers have studied other personality traits that are related to procrastination and found that neuroticism and conscientiousness have strong relationships to trait procrastination. Many researchers agree that future experiments should not focus on only one of the two approaches to procrastination, but instead integrate them in order to understand the phenomenon better.



**Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010**



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SOC-P49 An examination of the effects of U.S. climate change policy on the environment and society. K. VUILLE-KOWING and R. SNOW. Embry-Riddle Aeronautical University, 600 S. Clyde Morris Blvd, Daytona Beach, FL 32114. Developing an effective U.S. climate change policy is essential to the continued health of the planet. Whereas scientists and politicians can debate whether or not global warming is occurring, it is important to realize that climatology is a nonlinear science, and long-term climate change is therefore difficult to predict. Unlike linear theories, in which initial data extrapolates reliably to predict future phenomena, a nonlinear theory can veer unexpectedly into an unforeseen direction. Considering the rapid rise of carbon dioxide as a percent of the atmosphere, humanity's impact on the global environment cannot be questioned. With an exponentially increasing human population, failure to enact a comprehensive climate change policy will inflict severe and potentially irreversible damage to the environment. Effective climate change policy must consider the potential effects on industries such as agriculture and transportation, as well as examining the impact on individuals and society as a whole. A transition to a clean energy economy can mitigate the negative impacts of anthropogenic climate change. A framework that addresses energy efficiency has the potential to create significant economic and social advantages for the United States. Education is needed to help citizens understand the potential consequences of climate change. Furthermore, given the global implications of the issue, a robust policy must consider the impact of climate change on relationships with other nations, particularly those in the developing world. Establishing a policy will provide standards for monitoring and further research of factors contributing to climate change. In this way, the policy will enhance efforts to understand the origins of climate change and the steps needed to avoid the worst effects. This research examines the effects that a comprehensive U.S. climate change policy would have on the environment and society.

SOC-P50 Learned helplessness and bullying: At risk for cyberbullying. J. ZUCCHI and L. BACHELLER. Department of Psychology, Barry University, 11300 NE 2nd Avenue, Miami Shores, FL 33161. Social groups, including friends, family, and school peer groups, are an important part of forming one's identity. Bullying effects this development and has become a nationwide epidemic. The purpose of this poster is to review the literature in the area of bullying and cyberbullying. It has been shown that the psychological effects associated with being bullied have lasting effects that cause disruption even continuing into adulthood. Short-term and long-term psychological effects have been associated with traditional forms of bullying and are implied to occur with cyberbullying, including depression, anxiety, loneliness, low self-image, nervousness, and even increased risk for suicide. Research among adolescents showed that the individual's internal explanatory style of a bad event was related to depression and decreased self-esteem. In addition, if the individual's internal explanatory style is coupled with stable and global explanations, learned helplessness is likely to occur. Comparisons between traditional bullying and cyberbullying reveal the literature related to cyberbullying is not as developed as traditional bullying. This being so, with the popularity of technology and the numerous positive and negative uses, more research in the area is needed. As a result, there is currently no research regarding the role explanatory style plays on the accumulation of these psychological effects and the possibility of greater risk for future victimization.

URB = URBAN AND REGIONAL PLANNING [return to top](#)

URB-01 Foreclosure 911: Effect of mortgage foreclosures on property values in Wellington, Florida. J. BARNES. Village of Wellington, 14000 Greenbriar Boulevard, Wellington, FL 33414. Today, one in eight home loans are either delinquent or in foreclosure. Based on some projections, nine million more foreclosures are expected between 2009 and 2012. Employing a database that combines data on foreclosures during 2007 and 2008 with data on neighborhood characteristics and single-family property transactions in the Village of Wellington in 2009, we measure the impact of nearby foreclosures on property values. After controlling for various characteristics of properties and their respective neighborhoods, we find that foreclosures have a significant impact on nearby property values which in turn impacts local government revenue in the form of reduced taxable property value.

URB-02 Suburbanization, urban decline, and government policy in Manatee County, Florida. R. BRIGHTBILL. University of South Florida, Department of Geography 4202 E. Fowler Avenue, NES 107, Tampa, FL 33620. In the late 19th and early 20th Centuries, many cities became overcrowded and plagued with problems of inadequate housing, poor health and sanitation, and rising crime due to masses of people in confined places. Decentralization of cities and metropolitan regions was in many ways a necessary response to urban overcrowding, but the sprawl pattern and ensuing center city decline, racial and economic inequity, and racial and economic segregation was not. Fragmented policies at the federal, state, and local levels benefited suburban regions and their residents at the expense of urban regions and their residents. Research in Manatee County, Florida reveals the influence of fragmented planning and policy on suburban and urban outcomes.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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Inadequate and inappropriate federal, state and local policies have created an environment that makes the county's cities less attractive and its outlying areas more hospitable to suburbanization. The establishment of creative, coordinated, regional and metropolitan policies is recommended to remedy the unbalanced development and create structures that allow for equitably planned communities.

URB-03 Assessing sustainability: Experience to date. J.N. LEVINE. PlanWise, 7980-1 S Aragon Blvd, Sunrise, FL 33322. Sustainability assessment (SA) is a new planning tool that originated in the European Union as strategic environmental assessment and in the United Kingdom as sustainability appraisal. Unlike more traditional environmental assessment, SA strives not only to reduce or eliminate the negative impacts of public activities but to produce and enhance positive contributions to sustainable communities. Moreover, it operates not at the project level but at the planning and policy level. An overview of SA is provided, followed by case studies of locales that are using aspects of SA to improve broad-based community outcomes. The potential for expanded use in the United States, and particularly in Florida, is highlighted.

URB-04 Local responses to the foreclosure crisis: Lessons from the Tampa Bay region. E. STROM. University of South Florida, Department of Geography, 4202 E. Fowler Avenue, NES 107, Tampa, FL 33624. The foreclosure crisis in recent years has had a dramatic effect on Florida's regions. This research studies responses to high foreclosure rates and the neighborhood, municipal and county level in the Tampa Bay region. Qualitative research (interviews and document review) is used to understand how neighborhood groups and municipal governments have reacted to the crisis. In particular, this research studies the efforts of local governments to attract federal funds through the Neighborhood Stabilization Program.

URB Posters

URB-P51 Correlation between foreclosures and minority race in Hillsborough County, Florida. D. OPPENHEIM. Department of Geography, University of South Florida 4204 E. Fowler Ave. NES 107, Tampa, FL 33620. Foreclosures of residential properties nationwide have surged in recent years. This trend can be traced to the rise in high-risk subprime mortgage loans, which are tailored for home buyers with low income or bad credit who do not qualify for traditional loans. Due to the enactment of fair lending laws such as the Home Mortgage Disclosure Act of 1975, many of these loans were targeted at minorities who were considered new customers eager to buy a piece of the "American Dream." While this increase in both foreclosures and subprime mortgage loans occurred nationwide, a high concentration has occurred in the Sunbelt region, the Southeast and Southwest areas of the United States. Considering all these facts, this study sought to examine if there is a correlation between a high foreclosure rate and a high minority population in Hillsborough County, which contains the city of Tampa, Florida. Using data on 2008 foreclosures along with 2000 Census data on Black and Hispanic populations by block groups, this study determined that high foreclosure rates are associated with high minority populations. However, the amount and spatial distribution of this correlation varied between the two minority groups, presenting many opportunities for future research.

URB-P52 Mapping Florida's water resource sustainability institutions. E.A. ZINCK. Department of Urban and Regional Planning, Florida State University, Tallahassee, FL 32303. Water sustainability, or more pressingly, water unsustainability is a critical management issue facing planners throughout Florida. Among other initiatives, the state's policy program for Surface Water Improvement Management (SWIM), non-governmental civil society involvement, the necessitation of inter-basin transfers, and the use of costly and energy intensive desalination technologies are a testament to this critical concern. Fortunately, many of Florida's governmental and non-governmental organizations are helping move Florida towards water resource sustainability by addressing many of these concerns through various sustainability interventions. In order to assess the current water sustainability initiatives across the state, I broadly reviewed and analyzed the following: the literature on water sustainability, water management district reports, water policy, and non-governmental involvement prevalent at the state and water management district scale. Using Geographic Information Systems (GIS), Florida's water resource institutions were located, both governmental and non-governmental, in relation to their appropriate scale of influence. By doing so, I quantified institutional involvement and the types of interventions initiated among Florida's water resource institutions in order to illustrate where and which institutions are currently helping move Florida towards water sustainability. This study provides further insight into the interrelated geographies of civil society, state government, and water sustainability.



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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Acknowledgments | [return to top](#)

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Authors Index | [return to top](#)

Abelson, J. 14, 14
Abercrombie, M. 39
Ackbarali, S. 35, 44
Alkhenazi, K. 35
Ancha, A. 38
Anderson, P. 20
Arnold, T. 43
Aronson, R. 1
Avery, P. 2, 3
Bacheller, L. 45, 45, 49
Baggett, R. 9
Barnes, J. 49
Barreto, M. 44
Baum, J. 25
Becker, N. 15
Benincase, N. 44
Bernstein, C. 44
Berzins, I. 20
Bextine, B. 4
Bleasdale, C. 31
Blevins, N. 43
Botja, A. 18
Borrero, J. 24
Brackin, M. 40
Brightbill, R. 49
Brill, R. 20
Brooks-Walter, A. 32, 33
Brown, A. 28
Brown, B. 2, 3
Brown, C. 25, 34
Brown, E. 6
Browne, J. 31
Brunson, J. 25
Burguet, D. 22
Burke, B. 18
Burmeister, W. 37
Campbell, T. 13
Carey, H. 13
Carpenter, C. 43
Cassill, D. 27
Chang, W. 25
Chiao, S. 7, 9, 10, 10
Chiappone, M. 16, 16
Citati, A. 41
Clayborn, J. 27
Cliffgard, J. 45
Cobb, J. 15
Cohen, L. 2, 4
Cohen, P. 26
Coldren, G. 12, 12
Compton, B. 22
Cong, Y. 43
Coogan, J. 10
Croce, H. 15
Cross, C. 21
Culver, M. 6
Czyzyk, S. 7
Da Silva, H. 19
Davis, K. 30, 31
De La Luz, T. 38
Dean, B. 6
Desir, S. 45
Devlin, D. 11, 12, 12
Dewitt, D. 34
Doromal, J. 33
Dribin, L. 35, 36
Du, Y. 39, 40
Duffy, I. 11
Edwards, K. 27
Ellis, W. 17
Englehardt, D. 34
Evans, S. 26
Fagan, M. 34
Fang, Y. 39, 40
Fave, X. 41
Fischer, J. 41
Flanary, C. 6
Ford, P. 41
Frederiksen, A. 40
Gann, S. 42
Gardner, C. 2
Garrison, L. 21
Gaylor, T. 40
Geiger, S. 8
Gifford, K. 7
Giroux, A. 5
Glinton, C. 35
Gnanvo, K. 40
Goldova, M. 37
Gonzalez, I. 45
Gonzalez, J. 45
Grant, C. 28, 29
Grigsby, T. 4
Guinne, H. 36
Gunasekara, S. 27
Guo, R. 33
Hagerthey, S. 29, 31
Haggerty, M. 38
Hail, D. 4
Hall, D. 2, 3
Hall, P. 46, 46, 47
Hanisak, M. 30, 31, 32
Hannon, A. 22
Hargraves, P. 11
Harris, L. 6
Harro, C. 34
Harwell, M. 29
Haynie, D. 33
Hearin, J. 24
Hedgepeth, M. 12
Hemphill, J. 7
Herman, T. 23
Herren, L. 2, 4
Hertz, A. 45
Hetzl, R. 27, 32
Hinkle, R. 33
Hipson, S. 46
Hirady, S. 36
Hirons, A. 17, 20, 22
Ho, A. 19
Hoare, A. 27
Hoffman, E. 42
Hohlmann, M. 39, 40, 41, 41
Hollander, C. 35
Hrabec, D. 37
Huber, D. 17, 20, 20
Hughes, E. 9
Hughes, P. 42
Hunter, W. 2, 3, 3, 4, 4
Irlandi, E. 6
Jagnandan, K. 20
Jennings, L. 32
Jnbaptiste, C. 33
Johnson, K. 7, 8, 8, 8, 9
Jones, M. 18



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



Copyright © 2010 Florida Academy of Sciences. All rights reserved

- Jones, R. 25
Jordan, A. 34, 35
Kalinowski, M. 20
Kalkvik, H. 41
Kenyon, J. 23
Kerfoot, J. 14
Kerstetter, D. 19, 21, 21
Khabou, M. 23
Klausmeyer, P. 26
Koncsol, S. 44
Lab, J. 33
Lago, K. 46
Lane, B. 40
Lannon, C. 26
Latimer, H. 33
Laubach, H. 21
Laurence, K., 45, 46, 47, 48
Lawrence, J. 15, 15
Levine, J. 50
Li, J. 33
Lien, P. 44
Lin, J. 18, 19
Lin, Y. 27
Linder, J. 6
Lingo, R. 13
Littnan, C. 22
Locke, J. 40
Losos, J. 13
Louda, W. 28, 28, 29, 29, 29, 30,
31
Lovering, A. 38
Lovingood, D. 22
Luesch, H. 27
MacBeth, J. 13
Machado, K. 37
Macy, A. 28
Maliao, B. 19
Maliao, R. 19
Manning, T. 25, 26, 27, 32, 34, 40
Mariassy, A. 35, 36, 36, 36, 37, 37,
37, 38
Martin, D. 25, 26, 26
Mattox, T. 13
Maul, G. 6
McGinnis, D. 25
McKenzie, C. 2
McMonagle, K. 25
McNeil, B. 46
McRae, M. 17
Mead, S. 24
Meickle, T. 27
Menendez, A. 39
Merritt, C. 34
Miller, S. 16, 16
Mitchell, T. 13
Mongkhonsri, P. 29
Montague, J. 44, 46
Moore, J. 41, 42
Moss, R. 32
Muscarella, F. 45
Mussari, F. 25
Naja, G. 29
Nemcova, R. 35, 36
Nesnas, N. 26, 33
Newman, D. 26
Neyland, A. 9
Nienow, J. 26, 32
Noaker, D. 20
Noonburg, E. 31
Novak, L. 5
Nys, L. 21
O'Brien, S. 29
Oddy, D. 42
Onokpise, O. 3
Oppenheim, D. 50
Orr, E. 38, 39
Osborne, L. 2
Parkinson, C. 41
Parks, S. 15
Pattantus, A. 7
Paul, V. 27
Perlman, E.
Perry, D. 39
Peterson, C. 42
Philips, T. 36
Phillips, D. 26, 32
Pick, D. 3
Pokrajac, D. 30
Potter, C. 22
Potter, T. 26
Powell, C. 2, 3
Prize-Bolter, K. 30
Proffitt, C. 11, 11, 12, 12, 18
Queeley, G. 2
Quintero, A. 39
Ralston, E. 6
Rauf, H. 37
Reid, L. 3
Reigel, C. 38
Reiter, M. 30, 31, 32, 33
Ribeiro, E. 25
Richardson, S. 42
Ridge, J. 8
Rivera-Torres, K. 46
Roberts, R. 12
Rodriguez, L. 37
Rogers, M. 2
Romero, E. 47
Romero, M. 17
Rutten, L. 16, 16
Rynear, J. 42
Saintil, M. 30
Salewski, E. 18
Santos, A. 37
Schreiber, H. 4
Schulman, E. 26
Seaman, W. 23
Sesodia, S. 35
Shenker, J. 17
Shipman, C. 27
Shkempi, A. 23
Sidhu, P. 37
Siebken, K. 47
Singh, B. 37
Siu, N. 17
Small, M. 25, 26
Smith A.A. 38, 39
Smith, A.K. 34
Snow, M. 47, 48
Snow, R. 47, 48, 49
Spaulding, S. 48
Spitery, A. 23
Spooner-Zahn, N. 37
Stadel, M. 8
Stephenson, S. 8
Stewart-Akers, A. 43
Stout, I. 14, 14, 41
Strom, E. 50
Stuart, Y. 13
Surratt, D. 29
Swain, G. 6, 8, 10, 25
Sweat, L. 8
Szuchman, L. 48
Talbot-Oliver, T. 15
Taylor, M. 21
Teisberg, M. 39
Thatcher, K. 26
Thompson, N. 22
Tiling, K. 11, 12
Toth, C. 13
Travis, S. 12
Tribou, M. 24
Tunberg, B. 18
Turingan, R. 14, 19, 22, 22, 23
Turner, R. 15, 15
Tursi, R. 42
Ulrich, W. 10
Valdizan, S. 38
Valle-Zayas, A. 48
van Maurik, L. 17
Virgilio, M. 2, 4
Vuille-Kowing, K. 49



Abstracts of the 74th Annual Meeting of the Florida Academy of Sciences
Indian River State College, Fort Pierce, Florida
19-20 March 2010



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Washington, T. 10
Weishampel, J. 33
Wekesa, V. 2
Welsh, P. 34
West, M. 28
Westman, W. 8
White, J. 23
White, S. 23
Whitenack, L. 17
Widder, E. 1
Wilson, P. 27
Windsor, J. 6, 7
Wisniewski, G. 17
Wittenrich, M. 23
Wolff, R. 43, 43
Woolnine, A. 13
Wortham, J. 17
Wu, J. 27
Wu, N. 39, 40
Wynn, J. 34
Yang, Z. 30
Yen, K. 39, 40
Yori, C. 38
Yu, M. 37
Zargiel, K. 8, 10
Zinck, E. 50
Zucchi, J. 49