



Schedule of Events

Keynote address: Dr. Eric Pianka.....	12:30-1:30
Poster presentations.....	1:30-2:00
Oral presentations.....	2:00-3:30
Poster presentations.....	3:30-4:00
Oral presentations.....	4:00-5:15
Reception..... (Ira Nelson Horticulture Center)	6:00-9:00

About the Speaker

Dr. Eric Pianka is a world renowned herpetologist and evolutionary biologist. He has been a full-time professor at the University of Texas at Austin since 1968, where he has an active teaching and research program. He graduated from Carlton College in 1960 with a B.A. in Biology, and attended the University of Washington to earn a Ph.D in Zoology in 1965. He did a postdoc with Robert MacArthur at Princeton University. He was also awarded a D.Sc. at the University of Western Australia in 1990.

Dr. Pianka's research interests are wide-ranging and include topics such as: foraging theory, metapopulations, resource partitioning, biogeography, species diversity, phylogenetics, landscape ecology, and evolutionary ecology. He has been referred to as the "Lizard Man" because he has studied the ecology and evolution of desert lizards extensively throughout Australia. His list of achievements is evidence of a lifetime of dedication to the progression of biology and ecology. They include such honors as: Guggenheim fellow (1978); American Association for the Advancement of Science fellow (1981); Denton A. Cooley Centennial Professorship in Zoology (1986—life); Fulbright Senior Research Scholar in Australia (1990); Distinguished Herpetologist, Herpetologists' League (2004); and Distinguished Scientist, Texas Academy of Science (2006). Dr. Pianka has served on the editorial boards of *American Naturalist*, *BioScience*, *National Geographic Research*, and the *Encyclopedia of Environmental Biology*. He has published over 200 peer-reviewed articles and books, including the textbook *Evolutionary Ecology* (2000).

Dr. Pianka is an advocate of sustainability. He enjoys raising bison, falconry, fixing cars, playing chess, and being self-reliant by using renewable resource technologies. It is truly an honor to have Dr. Pianka as our keynote speaker at the 10th Graduate Student Symposium.

Keynote address

"Towards a periodic table of lizard niches"

Oral Presentations

- Luzan, T.:** Stable Isotope probing of microbial communities found in a French Guiana fluidized mud ecosystem.....**2:00**
- DeLay, C.:** Reproductive Success of Native and Invasive Iris in the Presence of Artificial Crab Spiders.....**2:15**
- Quinn, R.A.:** When the Levees Break: Isolation of a Novel Fish Pathogen in Post Hurricane Katrina Sediments.....**2:30**
- John, S.P.:** Mechanostimulation Affects Gravitropism and Signal Persistence in Flax Roots.....**2:45**
- Windsor, A.:** Evaluating the validity of the family Inachoididae Dana, 1851 (Brachyura: Majoidea).....**3:00**
- Morales, A.A.:** Phylogenetic Analysis of the Nominal Tribe Heterandriini (Teleostei: Cyprinodontiformes: Poeciliidae) Using Morphological and Molecular Data.....**3:15**
- Carvalho, T.:** Osteology and relationships of the monotypic *Iracema caiana* (Gymnotiformes: Rhamphichthyidae) using high resolution X-ray computed tomography.....**3:30**
- Viricel, A.:** Genetic structure in pygmy and dwarf sperm whales (*Kogia* spp.) from the northwestern Atlantic and northern Gulf of Mexico.....**4:00**
- Conner, S.L.:** Reproductive biology of a bopyrid isopod, *Probopyrus pandalicola*, and its hyperparasite, *Cabirops* sp., parasitic on the river shrimp, *Machrobrachium ohione*.....**4:15**
- Walter, S.T.:** Hurricane Impact on Brown Pelican Nesting Colonies.....**4:30**
- Chen, M.:** Solid phase gene extraction isolates mRNA at high spatial and temporal resolution.....**4:45**
- Pante, E.:** Insights into the evolution and biogeography of chrysogorgiid corals.....**5:00**

Poster Presentations

Maganti, N.: Development of biomimetic chitosan-nanohydroxyapatite scaffolds for bone tissue engineering

Jones, L.R.: Geometric Morphometric Analysis of Bill Shape in Four Falcon Species: Evidence for Niche Partitioning and Speciation

Tang, J.: Aquatic biodiversity in the Amazon: Fish faunas of headwaters in the adjacent Ucayali and Jurua drainages.

Thigpen, T.F.: The Effects of Atrazine on Bronze Frogs in the Atchafalaya River Basin, Louisiana

Mai, A.: The Impacts of Competition and Salinity in *I. hexagona* and *I. pseudacorus* Populations

Broussard, A.: The Effect of Manipulated Snail Radulations, Gibberellic Acid and Drought on *Spartina alterniflora*: A Potential Mechanism for Sudden Salt Marsh Dieback?

Oral Presentations

2:00 p.m.

Stable isotope probing of carbon dioxide fixing microbial communities in the fluidized mud ecosystem off French Guiana

Luzan, T. (1) and Chistoserdov, A. (1)
(1) University of Louisiana at Lafayette

The Amazon River sediment migrating along the shore generates a fluidized mud ecosystem, characterized by the suboxic regime, periodical mixing and predominantly prokaryotic community. Despite of a constant input of the allochthonous organic matter, the fluidized mud ecosystem demonstrates high rates of dark carbon dioxide fixation. Stable isotope probing was used to elucidate microbial community members actively metabolizing ^{13}C carbon dioxide. ^{13}C -enriched DNA was isolated and used for amplification of a small-subunit rRNA gene fragment using universal bacterial primers. The amplified fragments were analyzed by DGGE. DGGE analyses revealed four main sequences corresponding to the prominent community members fixing carbon dioxide, three of which were successfully sequenced. One of these sequences belongs to a close relative of *Thioalkalispira microaerophyla* (98% identity), an obligate microaerophilic sulfide-oxidizing chemolithoautotroph. The second sequence belonged to a bacterium distantly related (90% identity) to sulfur-oxidizing prokaryotic symbionts of mollusks and polychaetes. The third sequence was from a bacterium which closest cultured relative is *Thiomicrospira crunogena* (98% identity), an obligate microaerophilic sulfide-oxidizing chemolithoautotroph. Thus, the active carbon-fixing chemolithoautotrophic microbial community in a fluidized mud ecosystem was, for the most part, homogeneous throughout the first meter of the sediment column depth and dominated by few bacteria microaerophilic sulfur bacteria. These finding confirm coupling of carbon and sulfur iron cycles in fluidized muds. Sulfide and carbon dioxide are generated by decomposition of allochthonous and autochthonous organic matter by sulfite-reducing bacteria. In turn, sulfide is oxidized either abiotically by Fe(III) or by sulfur bacteria, which also chemolithotrophically fix carbon dioxide.

2:15 p.m.

Reproductive Success of Native and Invasive Iris in the Presence of Artificial Crab Spiders

DeLay, C. (1) and S. Mopper (1)
University of Louisiana at Lafayette

Past studies have demonstrated a negative link between the reproductive success of flowering plants in the presence of native insect predators. However, relatively few studies have investigated whether artificial predators could cause the same negative occurrence. For my research, I observed the effects of artificial crab spiders on reproductive success of native *Iris hexagona* and invasive *Iris pseudacorus*. My initial

hypothesis was that artificial predators would decrease seed number and weight, which could play a part in competition between native and invasive iris. With my preliminary experimental data, I examine potential correlations between artificial predators and reproductive success by native flora. I also report observations of preferences that pollinators exhibit for the two iris species.

2:30 p.m.

**When the Levees Break: Isolation of a Novel Fish Pathogen
in Post Hurricane Katrina Sediments**

Quinn, R.A. (1), G.T. Fedeli (1), A.L. Liebl (2), H.E. Ennis (1), B. B. Rees (2), V. Madrid (1), A.Mallik (1), K.Shriefer (1), A. Chistoserdov (1), and D.G. Ennis (1).

(1) University of Louisiana at Lafayette, Lafayette, Louisiana, (2) University of New Orleans, New Orleans, Louisiana

On August 28th, 2005 Hurricane Katrina hit the city of New Orleans causing widespread flooding. After the storm, there were health and safety concerns about the drinking water and the toxicity levels of the deposited sediments. Toxicity experiments on Japanese medaka (*Oryzias latipes*) embryos, revealed relatively low levels of contamination, however, sediment from one site killed the embryos after turning them bright red in color. The embryo contents were plated on microbiological media and red pigmented bacterial colonies were observed. Lipid profiling, 16S rDNA sequencing and 16S-23S rRNA intergenic spacer RFLP analysis determined that this bacterium (New Orleans Red bacterium, or NORB) was closely related to, and likely a member of, the genus *Hahella*. NORB's red color was due to the pigment prodigiosin, also produced by other members of *Hahella* and the common bacterium *Serratia marcescens*. Infection experiments with NORB were originally inconsistent, producing variable dose responses and sometimes a complete lack of infection. For NORB to consistently infect the embryos it must be grown under truly aerobic conditions at 24°C. The pathology of the medaka embryos was variable and quite dramatic, at one extreme the embryos would quickly turn red and either burst, or possibly bleb oil droplets, always aborting development, at the other extreme, some embryos never turned red, but had developmental abnormalities. NORB represents a novel fish pathogen capable of infecting Japanese medaka embryos and native fish species. Other species of *Hahella* have not previously been reported in US waters indicating NORB may have been introduced from Asia. Further study with NORB may reveal potential impacts on natural fish stocks.

2:45 p.m.

**Mechanostimulation Affects Gravitropism and Signal Persistence in Flax
Roots**

John, S.P. (1) and K.H. Hasenstein (1)
(1) University of Louisiana at Lafayette

In higher plants, root gravitropism results from displacement of amyloplasts but the persistence of stimulus is unknown. Clinorotation is commonly used to negate the effect of gravity and has been used to determine the time necessary to induce curvature. However, constant rotation represents a form of mechanostimulation that interferes with root development. Especially sensitive are cells in the columella and entire layers have been shown to undergo programmed cell death upon clinorotation. It is unknown to what extent this response depends on the speed or the duration of clinorotation. To determine the susceptibility of the graviresponse on clinorotation, we studied the effects of the rate (0.5 to 5rpm) of rotation after roots were placed horizontally for 5 to 15 min. Clinorotation was performed either parallel or perpendicular to the root axis and roots were imaged after each rotation by an infrared video camera. Horizontal clinorotation did not affect root growth rate (0.78 ± 0.05 mm/ h) but vertical clinorotation reduced growth rate by 10%. The rate of clinorotation did not affect growth for either condition. However maximal curvature for vertical clinorotation decreased with increasing rate of rotation and produced straight roots at 5 rpm. Horizontal clinorotation increased curvature with increasing reorientation time and resulted in curvature that increased with the rotation rate. Thus, clinorotation reduces gravity effects but introduces secondary effects that depend on rate and direction of rotation. Thus any type of randomization affects graviresponse and stimulation of weightlessness.

3:00 p.m.

Evaluating the validity of the family Inachoididae Dana, 1851 (Brachyura: Majoidea)

Windsor, A. (1) and D. Felder (1)
(1) University of Louisiana at Lafayette

Members of the majoid family Inachoididae are found throughout the western Atlantic, Gulf of Mexico, and eastern Pacific. The family is closely allied with Inachidae, and has only recently been fully recognized as a distinct family. Debate remains regarding its familial status, particularly because larval morphology does not support its separation from Inachidae. We sequenced mitochondrial (16S) and nuclear (18S) DNA for 9 of the 10 currently recognized genera within Inachoididae as well as 9 genera of Inachidae collected from North and Central American waters. Our results indicate that Inachoididae is paraphyletic, with representative genera grouping closely with accepted members of the Inachidae. This can be interpreted as support for merging the family Inachoididae into the family Inachidae, but also suggests that reexamination and possible revision of constituent subfamilies of the Inachidae is warranted. [supported by U.S. National Science Foundation BS&I grant DEB-0315995 & DEB/AToL grant EF-0531603]

3:15 p.m.

Phylogenetic Analysis of the Nominal Tribe Heterandriini (Teleostei: Cyprinodontiformes: Poeciliidae) Using Morphological and Molecular Data

Morales, A.A. (1)

(1) University of Louisiana at Lafayette

The subfamily Poeciliinae (Cyprinodontiformes: Teleostei) is an important component of the ichthyofauna of Central America, ranging from southern North America to Rio de la Plata, Argentina, with species richness reaching a zenith in Middle America and the West Indies. This subfamily comprises about 22 genera with more than 200 species, and has been divided into eight tribes using gonopodial characters. This group has attracted a lot of attention from geneticists, aquarists, behavioral biologists, and ecologists, due to their small size, genetic diversity, and rapid rates of evolution. Nevertheless, numerous descriptions of new species and reviews had been published since the last revision of the subfamily in 1963, and the monophyly and interrelationships of the tribes remain uncertain.

For my doctoral dissertation, I propose to use osteological, morphometric, meristics, and molecular data to study the species diversity, morphological disparity, phylogenetics and historical biogeography of the nominal tribe Heterandriini. This work will improve the phylogenetic understanding of the group, and generate information for use in the conservation and management of freshwater fish biodiversity.

3:30 p.m.

Osteology and relationships of the monotypic *Iracema caiana* (Gymnotiformes: Rhamphichthyidae) using high resolution X-ray computed tomography.

Carvalho, T. P. (1)

(1) University of Louisiana at Lafayette

Iracema caiana is a member of Rhamphichthyidae, a clade of Neotropical electric fishes with 14 valid species in three genera. The species was described from a tributary of the Rio Negro (Amazon basin) in Brazil based on characters of external morphology alone. *Iracema* is currently differentiated from other rhamphichthyid genera by the presence of a series of round pigment blotches on the lateral body surface, and an intermediate number of anal-fin rays between the values observed in the other genera. In the original description the genus was hypothesized as the sister group to the genus *Gymnorhamphichthys* based on shared loss of scales on the anterior portion of the body. Most osteological data on *Iracema* are not available due to a lack of available specimens for clearing and staining; the genus remains known from only four specimens in the type species. In order to access osteological information on *Iracema*, high resolution computed tomography (HRXCT) was performed using a Feinfocus microfocal X-ray source at the University of Texas at Austin. 3-D models of the bony

skeleton were reconstructed using the program VG Studio Max. Osteological information arising from this study suggests several shared characters of *Iracema* and *Rhamphichthys*. Derived features on the branchial basket and suspensorium suggest *Iracema* as the sister group of *Rhamphichthys*, refuting the hypothesis of previous studies. The relationships of Rhamphichthyoidea are still under study, and the inclusion of more taxa using characters of internal morphology is crucial to interpret the phylogeny and evolution of this group.

4:00 p.m.

**Genetic structure in pygmy and dwarf sperm whales (*Kogia* spp.)
from the northwestern Atlantic and northern Gulf of Mexico**

Viricel, A. (1) and P.E. Rosel (2)

(1) University of Louisiana at Lafayette, Department of Biology, Lafayette, LA, (2)
NOAA Fisheries Service, Southeast Fisheries Science Center, Lafayette, LA

Pygmy (*Kogia breviceps*) and dwarf (*K. sima*) sperm whales are deep-diving cetaceans with a global distribution. Little is known of their natural history because they inhabit offshore waters, often dive to avoid approaching ships rendering population studies challenging, and the two species are virtually indistinguishable in the field. As a result, abundance data generally combine both species and most available biological information is based on examination of stranded specimens. Both species are present in the northwestern Atlantic (NWA) and Gulf of Mexico (GOMx) and are the most commonly stranded cetacean species after bottlenose dolphins. Animals in the GOMx are designated as a separate stock from the rest of U.S. Atlantic waters for both species. However, studies of population structure have not yet been done. Using mitochondrial DNA control region sequences and microsatellite loci analyzed from stranded specimens, we provide the first investigation of genetic differentiation between the NWA and GOMx and within the NWA for each species. Preliminary results obtained from analyses of molecular variance using sequences and microsatellite loci suggest significant differentiation between *K. breviceps* from the GOMx and from the NWA. No significant population structure was detected using both types of markers for *K. sima*. This could be the result of low statistical power due to smaller sample sizes for this species. Our results suggest that for at least *K. breviceps*, gene flow is limited to some extent between the NWA and the GOMx, which would support the current stock definition.

4:15 p.m.

**Reproductive biology of a bopyrid isopod, *Probopyrus pandalicola*, and
its hyperparasite, *Cabirops* sp., parasitic on the river shrimp,
*Macrobrachium ohione***

Conner, S.L. (1) and R.T. Bauer (1)

(1) University of Louisiana at Lafayette

Macrobrachium ohione is a freshwater caridean shrimp that migrates to brackish-water estuaries to release its larvae, which require development in salt water. Postlarvae then migrate upstream to the adult freshwater habitat. *Probopyrus pandalicola* is a bopyrid isopod parasite in the gill chamber of *M. ohione*. Although both species require saline water for larval development, the bopyrid releases larvae both upriver and in the estuary. The typical positive correlation between parasite and host body size was not found in this study. Shrimps can become infected either as juveniles or as reproductive adults when in the estuary. *Probopyrus pandalicola* was itself found to be parasitized by another isopod, the hyperparasite *Cabirops* sp. Collection data indicate that the hyperparasite distribution is more limited to saline waters, unlike its bopyrid host. Light and SEM microscopy, as well as observations of live specimens indicate that the seven thoracic segments of the female hyperparasite develop into bilobed pouches used for incubating embryos and brooding epicaridium larvae. However, the developmental origin of the pouches, e.g. from oostegites, is still uncertain. The female vigorously contracts, possibly to circulate water among the embryos/larvae. After larval release, the female dies and its body is removed by the host shrimp. The female is often accompanied by multiple cryptoniscus larvae (presumptive males) which may metamorphose into adult females when the resident female dies.

4:30 p.m.

Hurricane Impact on Brown Pelican Nesting Colonies

Walter, S.T. (1), M. Carloss (2), T. Hess (2), P. Leberg (1)

(1) University of Louisiana at Lafayette, (2) Louisiana Dept. of Wildlife and Fisheries
Since the 1963 extirpation of the brown pelican (*Pelecanus occidentalis*) in Louisiana, and successful restoration, maintaining a viable population of the endangered species has been of concern. Given hurricane threats to barrier island habitat, we are currently attempting to initiate new nesting colonies via translocations of chicks to uncolonized islands and by using decoys to attract nesting adults. For future selection of target islands for new colonies, a better understanding of how fine-scale habitat conditions impact nest selection and success could provide critical information to facilitate colonization. To address these questions, we tracked 603 nests on Raccoon and Wine Islands, LA in 2008-09 to assess relationships between nest success and nest-site characteristics. We also measured habitat characteristics in 289 random plots for comparison to nest sites. Between field seasons hurricanes Gustav and Ike heavily affected our study sites, which allowed for pre- and post-hurricane assessments of habitat use and availability. We found that when available, brown pelicans select woody vegetation as nesting platforms at a greater proportion than its availability. However, the hurricanes reduced woody species and other lower-lying vegetation coverage, while proportions of dead woody vegetation and bare ground increased; these changes in habitat composition lead to a shift in nest platform selection. Finally, an average of 1.1m /wk shoreline loss on Wine Island from May-July 2009 has further reduced nesting habitat. Understanding how hurricanes and vegetation availability affect brown pelican nesting can provide useful information for future coastal conservation efforts in Louisiana.

4:45 p.m.

Solid phase gene extraction isolates mRNA at high spatial and temporal resolution

Chen, M. (1)
University of Louisiana at Lafayette

Rapid, localized changes in gene expression require mRNA extraction at high temporal and spatial resolution. Current mRNA extraction methods, depend on removal of the tissue from an organism, and are destructive to the cell or tissue. Solid Phase Gene Extraction (SPGE), a new technique developed in our lab, extracts mRNA from tissue or single cell on a high spatial and temporal scale and greatly minimizes contamination by DNA or other cellular compounds. SPGE uses needles that are surface-coated with oligo dT or gene- specific oligo-nucleotide sequences. mRNA is extracted by inserting the needle tip to desired location of the cell, tissue or liquid sample and hybridization to the oligo dT coating on the needle. After reverse transcription and real-time PCR, the extracted mRNA can be quantified with high sensitivity. Actin 1 mRNA levels at 3-day germinated flax seedling root cap and root proper were compares using SPGE. The root proper shows higher transcription level of Actin 1 gene than the root cap.

5:00 p.m.

Insights into the evolution and biogeography of chrysogorgiid corals

Pante, E. (1) and S. C. France (1)
(1) University of Louisiana at Lafayette

As currently described, the octocoral family Chrysogorgiidae is found in all oceans and at all latitudes, between 10 and 4492 m depth (although >75% of species are deep-water). Chrysogorgiids are also characterized by strong taxonomic asymmetry: while 12 of 13 genera comprise less than 10 species, one (Chrysogorgia) is one of the most speciose alcyonacean (soft corals and gorgonians) genera. These characteristics (distribution and taxonomy) make chrysogorgiids noteworthy as a model system to study radiation and diversification in the deep-sea. To better understand the evolution and biogeography of this group, we inferred phylogenetic relationships based on taxa from 11 genera, using both nuclear (18S) and mitochondrial (cox1 and msh1) markers. Genetic data were compared to geographic and bathymetric distributions, based on our collections and museum records. All shallow-water genera, and two of eight deep-water genera appear more closely related to other octocoral families than to the rest of the monophyletic, deep-water chrysogorgiid genera. These six genera appear as monophyletic units, within which weak geographic differentiation was observed. Individual haplotypes were found in both the Atlantic and Pacific oceans, and on multiple instances, sister haplotypes were sampled from different oceans. These results suggest that the monophyletic chrysogorgiid genera form a typically deep-water group

that diversified in situ. However, multiple examples of widely distributed haplotypes suggest that dispersion is much less limited by latitude and longitude than by depth, a pattern consistent with data from other benthic taxa.

Poster Presentations

Development of biomimetic chitosan-nanohydroxyapatite scaffolds for bone tissue engineering.

Nagini Maganti (1), WahWah Thein-Han (2), Devesh. K. Misra (2), Thomas C. Pesacreta (1)

Department of Biology (1), Center for Structural and Functional Materials and Department of Chemical Engineering (2)

University of Louisiana at Lafayette, Lafayette, LA 70504, USA.

Three dimensional chitosan and chitosan-nanohydroxyapatite composite scaffolds were synthesized and investigated for their physico-chemical and biological properties. Two sets of scaffolds were investigated. The first set of scaffolds relate to 85% and 95% degree of deacetylation (%DD) pure chitosan but with the same molecular weight while the second set of scaffolds consisted of 95% DD with different weight fraction of nHA (1%, 3%, 5%). Both sets of scaffolds were prepared by freezing and lyophilization and their biological response studied in vitro with pre-osteoblast (MC3T3-E1) cells. Pure chitosan and nanocomposites were characterized by open porous structure with interconnecting pores as viewed under scanning electron microscopy (SEM). The analysis of physico-chemical properties of 95% DD chitosan scaffolds indicated lower water uptake ability, slower biodegradation rate but similar water retention ability as compared to 85% DD chitosan scaffolds. The water uptake ability of composite scaffolds decreased with increase in the content of nHA from 1-5% but the water retention ability was similar to 95% DD chitosan scaffolds. However, the biodegradation profile of chitosan-nHA composite scaffolds was slower than of pure chitosan scaffolds. The growth of preosteoblasts on different scaffolds increased with time, indicating the cytocompatibility of both pure and composite scaffolds. Cell proliferation was higher on the composites in relation to pure chitosan scaffolds as determined by fluorescence microscopy and quantitative analysis with MTT assay. The study suggests that both highly deacetylated chitosan scaffolds and chitosan-nHA composite scaffolds are promising materials for future bone tissue engineering applications.

Geometric Morphometric Analysis of Bill Shape in Four Falcon Species: Evidence for Niche Partitioning and Speciation.

Jones, L.R.(1) and M.C. Belk (2)

(1) University of Louisiana Lafayette and (2) Brigham Young University

Ecological and evolutionary pressures exerted on bill shape have likely led to niche partitioning and speciation in many avian taxa. Prey type and size may be the most influential pressures on bill shape leading to these changes. We applied geometric morphometric methods to analyze museum specimens of four falcon species (*Falconidae*) to determine if bill shape related to prey type and falcon size. Falcon

species differed by size (large and small) and prey type (birds or mammals). Falcon size explained 33% of the variation in bill shape, while prey type explained 26% of the variation in bill shape. Falcons that prey on birds tended to have a shorter bill with a larger tomial tooth compared to falcons that prey on mammals. Larger falcons tended to have a longer bill and a shorter tomial tooth than smaller falcons. These results suggest that falcons may partition habitat by prey type and falcon size where their ranges overlap. These differences may have eventually led to speciation events. Additionally, geometric morphometrics seems a powerful but underutilized tool in avian research.

Aquatic biodiversity in the Amazon: Fish faunas of headwaters in the adjacent Ucayali and Jurua drainages.

Tang, J. (1), Fredieu, J. (1), Carvalho, T. (1), and Albert, J. (1)
(1) UL Lafayette, Dept. Biology

With more than 5,600 species, Neotropical fishes represent the most diverse continental aquatic ecosystem on Earth, including about 10% of all vertebrate species. However, the nature of the evolutionary and ecological forces underlying the formation and maintenance of this diversity remains poorly known. Here, we report the results of two expeditions to headwater tributaries of the Amazon river in southeastern Peru: to the Breu region of the Upper Jurua River in 2008, and to the Sepahua region in the Upper Ucayali in 2009. These regions are matched approximately for general landscape physiognomy, elevation, water type and other ecological factors. They differ mainly in hydrogeography, each draining to a different Amazonian affluent. Despite these ecological similarities and physical proximity (c. 180 km), the species composition of these two rivers differs by about 70%; of the 117 from Breu and 97 species from Sepahua, 37 species were shared. This can also be due to the fact that certain species only occur in the Andean regions of the Amazon, where Sepahua is situated. Further, as expected by ecological theory, most of the shared species are common and most of the species unique to each river are rare. These results are consistent with an emerging perspective on the biogeography of lowland Amazonian fishes, implicating the importance of drainage basin boundaries as semipermeable barriers to dispersal, and the role of geological history on the formation of regional assemblages in lowland Amazonia.

The Effects of Atrazine on Bronze Frogs in the Atchafalaya River Basin, Louisiana

Thigpen, T. F. (1), Jenkins, J. A. (2), Waddle, J. H. (2), Demcheck, D. K. (3), and Moon, B. R. (1)
(1) University of Louisiana at Lafayette, (2) U.S. Geological Survey, National Wetlands Research Center
(3) U.S. Geological Survey, Louisiana Water Science Center

The Atchafalaya River Basin (ARB) in Louisiana is the largest contiguous bottomland hardwood forest in North America and is a source of water for drinking, agriculture, aquaculture, and recreation. As a distributary of the Mississippi River, the ARB receives

pollutants in runoff from distant and local sources. Testing for potentially harmful contaminants is useful for commercial, recreational, environmental, and public health in the ARB. This project addresses how the agricultural herbicide, atrazine, affects amphibians along an environmental gradient of atrazine concentrations. Monitoring biomarkers in amphibians is an efficient way to detect environmental and potential health effects of contaminants. Although known consequences of exposure to atrazine in aquatic animals include sublethal (nonfatal) and lethal effects, no data exist on the effects of environmental atrazine on amphibians and other terrestrial and semi-terrestrial animals in the ARB. In May and August 2009, water samples from 24 sites in the ARB showed a gradient of almost no atrazine (0.022 µg/L) to high concentrations (0.68 µg/L). In summer 2010, 15 male bronze frogs will be collected from each of the selected sites and assayed for liver decontamination enzymes, DNA fragmentation, and sperm motility and apoptosis. Potential associations will be investigated among biomarkers and atrazine concentrations. The ARB experiences atrazine spikes each spring, and this is the first study of how atrazine may affect tetrapod animals in this region. Land managers and researchers can use these data to understand population demographics and ecosystem health in the ARB.

The Impacts of Competition and Salinity in *I. hexagona* and *I. pseudacorus* Populations

Mai, A. (1), Demourelle, A. (1), Goudeau, G. (1), Guilbeau, J. (1)

CO-AUTHORS

Pathikonda, S. (2), Ackleh, A. (1), and Mopper, S. (1)

(1) University of Louisiana at Lafayette, (2) University of Wyoming

Many factors contribute to the dynamics of the iris plant population. They compete with one another for space to grow, and they are affected by the incoming salinity intrusions along the coast. By varying salinity and competition in a common garden experiment, we were able to replicate and get conclusive information regarding the two species of irises. By using MATLAB simulations, we effectively created a mathematical model that predicted population equilibrium and competitive exclusion. We deduced that ramet numbers of *Iris hexagona* and *Iris pseudacorus* were certainly impacted by competition and salinity, given by the experimental data. Furthermore with that notion, we were able to make predictions that the invasive (*I. pseudacorus*) populations would have an upper hand against the populations of the native (*I. hexagona*) species. The yellow irises are able to clonally replicate at an astounding rate, and it is this factor that allows them to become rampant, to the point of taking over their habitat. Currently, *I. hexagona* may be the abundant species, but this may not be the case in the near future, as the megaflorea *I. pseudacorus* is able to propagate wherever it is introduced.

The Effect of Manipulated Snail Radulations, Gibberillic Acid and Drought on *Spartina alterniflora*: A potential Mechanism for Sudden Salt Marsh Dieback?

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The coastal wetlands of Louisiana have been devastated in recent years by a rapid die-back phenomenon, sudden salt marsh dieback, which is commonly called brown marsh. Brown marsh describes the sudden die-back of thousands of hectares of *Spartina alterniflora* in Louisiana and, more recently, along the Atlantic seaboard. The cause of brown marsh is not yet well understood, but seems to ultimately be triggered by drought and may include a pre-drought physiological change, followed by a post-drought cascade of biogeochemical events. The purpose of this experiment is to investigate one potential cause by examining the effect of the marsh periwinkle (*Littoraria irrorata*) on *S. alterniflora*. It is known that the periwinkle snail uses its radula to scrape the *S. alterniflora* leaves, which allows a fungus to infect the plant. The snail then 'harvests' the fungus that establish in radulated areas. We hypothesize that the fungus infecting the radulations created by periwinkle snails may recently include colonization by an introduced species, *Gibberella fujikuroi*, that produces a growth hormone, gibberellic acid (GBA). We hypothesize that the increase in GBA may cause *S. alterniflora* to over expend belowground stored energy reserves for aboveground growth, thereby making it more vulnerable to drought and subsequent stressors because of a lack of sufficient energy for stress tolerance (maintenance allocation) that ultimately result in rapid browning and death of aboveground tissues. To test this hypothesis, we established a factorial experiment of 24 experimental units (sods collected from the field) divided into four treatment combinations: radulated leaves with GBA, radulated leaves without GBA, radulated leaves only, and a non-manipulated control group. Stem density and heights are measured bimonthly as a non-destructive indicator of aboveground growth and biomass. The drought stressor has recently been applied to one-half of the replicates of each treatment combination. Although the experiment is still ongoing, results to date do indicate the possibility of increased energy allocation to growth in the GBA treatments, with the effect of radulations not being consistent. Studying the complex relationship between drought, snail radulation, and an exotic fungal-produced plant growth hormone may offer an additional pre-drought explanation to the recent occurrences sudden salt marsh die-back.

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Notes