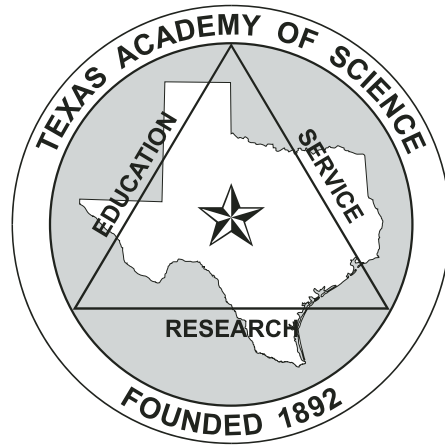
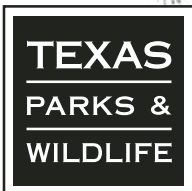
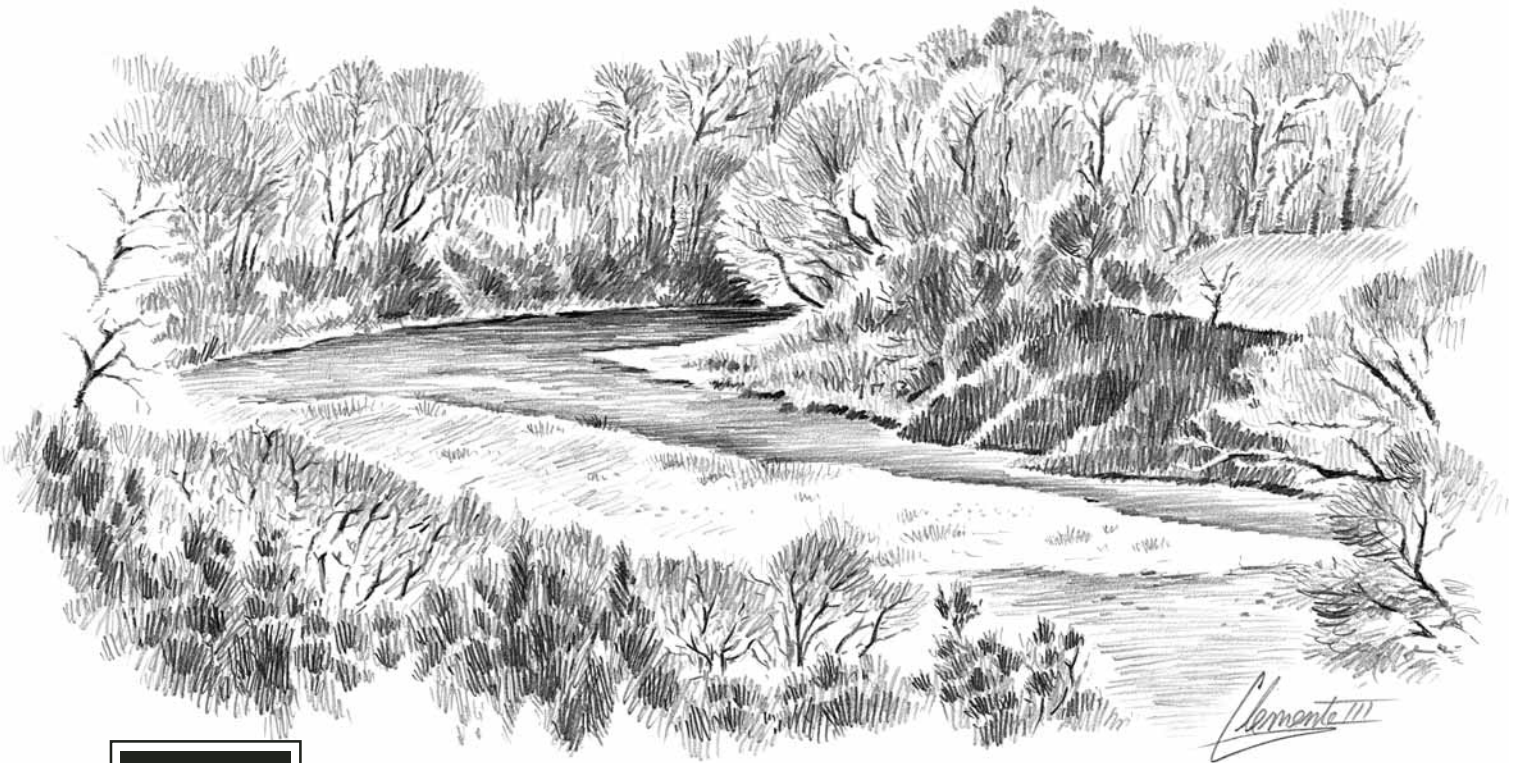


110th Annual Meeting of the Texas Academy of Science



PROGRAM and ABSTRACTS



March 1-3, 2007
Baylor University • Waco, Texas

2007 PROGRAM CHAIR

Hudson DeYoe

PROGRAM EDITOR

Bob Murphy

PROGRAM SPONSOR

Texas Parks and Wildlife Department

SCHEDULE OF EVENTS

TIME	EVENT	LOCATION
THURSDAY – MARCH 1, 2007		
2:00 – 5:00 pm	Board Meeting	Waco Hilton
5:00 – 9:00 pm	Registration	Waco Hilton
6:00 – 9:00 pm	Social	Waco Convention Center
FRIDAY – MARCH 2, 2007		
7:00 am – 5:00 pm	Registration	BSB atrium
7:00 am – 8:30 am	Continental Breakfast	BSB atrium
8:00 am – 5:00 pm	Exhibits	BSB
8:00 am – 5:00 pm	Poster Sessions	BSB 1st hallway
8:00 am – 10:00 am	Paper Sessions	BSB 1st and 2nd floors
10:00 am – 10:30 am	Break	BSB atrium
11:00 am – 11:50 am	2007 Outstanding Texas Educator (OTE)	BSB D110
10:30 am – 11:50 am	Paper Sessions	BSB 1st and 2nd floors
11:50 am – 12:00 pm	Sectional Business Meetings	BSB B110
12:00 pm – 1:15 pm	Lunch	Cashion Center, 5th floor Business School
1:15 pm – 1:45 pm	TAS Business Meeting	BSB B110
1:50 pm – 4:10 pm	Paper Sessions	BSB 1st and 2nd floors
4:10 pm – 5:00 pm	2007 Distinguished Texas Scientist (DTS)	BSB B110
5:00 pm – 5:20 pm	All Section Chairs Meeting	BSB B110
5:30 pm – 6:00 pm	Meet the OTE & DTS (students only)	Waco Convention Center
6:00 pm – 7:00 pm	Social with Cash Bar	Waco Convention Center
7:00 pm – 9:00 pm	Banquet	Waco Convention Center
9:00 pm – 11:00 pm	Social with Cash Bar	Waco Convention Center
SATURDAY – MARCH 3, 2007		
8:00 am	Field Trips All trips are on Saturday March 3, 2007, 8:00 am.	BUSB south parking lot

BSB – Baylor University Sciences Building

Waco Hilton and Convention Center are adjacent to each other

THE MUSEUM AND THE MAN

An Exhibit of Papers and Specimens of John K. Strecker

John Kern Strecker was one of a new breed of naturalist emerging at the turn of the 20th Century. In 1903, Strecker became Director of the Baylor University Museum, bringing a new level of professionalism and expertise to the management of a small collection of historical artifacts and natural history specimens. A self-educated inquirer and conservationist, he contributed profound and frequent observations to science until his death in January, 1933.

Not simply satisfied with field and lab work, this son of a Philadelphia stone cutter and herpetologist, led an active community life. Strecker was President of the Texas Academy of Science in 1931, and President of the Texas Folklore Society in 1929-1930 and 1932-1933. With leadership positions and memberships in many organizations, he became widely known as a humorous and genuine man. Several species and subspecies were named after him by friends, and in turn, he named species after others for whom he had deep respect and admiration. During his tenure at Baylor University, the museum came to be known as "John Strecker's Place."

For the purpose of building a useful collection for the enjoyment and education of students, colleagues and the public, Strecker sent out petitions for donations of specimens from his friends and fellow professionals across the globe. His personal "collecting jaunts" took him to each of the diverse eco-regions of the state, from the Chisos Mountains of Big Bend National Park and the plains of South Texas to the springs of the Hill Country and bayous of East Texas. He collected and preserved thousands of specimens of plants, birds, mammals, mollusks, and his principal interests, reptiles and amphibians.

TAS posthumously published the entire works of John K. Strecker in 1933, and in 1940, Baylor University honored his memory by renaming the museum after him. Today, the Strecker Museum is an integral part of the Mayborn Museum Complex.

**The Exhibit will be located in the Atrium of the
Baylor Sciences Building for the duration of the conference.**

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FUTURE ACADEMY MEETINGS

2008 111th annual meeting	Texas A&M – Corpus Christi, Corpus Christi, Texas
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ACKNOWLEDGEMENTS FROM THE PROGRAM CHAIR

This year TAS has used the MyReview system for abstract submittal and management. Despite some glitches this year, it is clear that this system has some significant advantages over the old system. The move to the new system was due almost entirely to Pati Milligan, the TAS webmaster. Pati also was critical in modifying the system to better meet the

needs of TAS. Further refinements will be implemented before fall 2007 so it is expected that the system will work even better. Besides Pati, I have relied upon the advice and assistance of other members of the TAS Board of Directors and Bob Baldrige, the local host chair at Baylor University. Lastly, I thank all the TAS members that submitted

papers and posters. This year there were 162 presentations and 68 posters submitted with 79% of the submittals coming from undergraduate and graduate students. Thank you for having the patience to deal with the new submittal system.

Hudson DeYoe,
110th TAS Program Chair

ACKNOWLEDGEMENTS FROM THE LOCAL HOST

Successful hosting of the 110th annual Texas Academy of Science Meeting depended on the efforts of many in the Baylor and Waco community. The Waco Convention and Visitors Bureau, the Office of the Associate University Host and management of the Hilton-Waco (headquarters hotel) have provided timely and unselfish assistance in securing meeting sites, services and amenities required to successfully host this meeting. The Office of the Dean of the College of Arts and Sciences was instrumental in making the Baylor Biological Sciences Building available for the duration of the meeting. The Sciences and Mathematics faculty aided this effort by canceling their classes during the meeting. The assistance of the TAS Webmaster and the Baylor University Information Technology Systems, especially persons in Internet Systems and Services, Networking Infrastructure and Electronic Library, is gratefully acknowledged for developing the TAS website and on-line registration format, Internet access, computers and AV services provided for the meeting. The chairs and faculty of the Biology Department and the Geology Department are acknowledged for providing field trip opportunities. We are thankful to the Director of the Mayborn Museum Complex for providing complimentary passes to registrants and to the Director of The Texas Ranger Hall of Fame and Museum for providing discounted tickets. The hosting committee is grateful to the Manager of Baylor Parking Services for coordinating parking during the meeting. We gratefully acknowledge the Director and Office Manager, Baylor Sciences Facility, for expediting the scheduling of the session rooms, and securing sites for displaying the posters, the rooms for AV support personnel and sites for meals. The many and varied services of the science graduate students and undergraduate members of the science honor/service societies are gratefully acknowledged.

Local Host Committee:

Chair: Bob Baldrige
Rhonda Bailey
Bryan Brooks
Dennis Campbell
Sharon Conry
Robert Doyle
Maggie Forbes

Bob Hartland
Bernice Helpert
Susie Johnston
Sharon Johnson
James Karban
Ryan King
Owen Lind

Rene Massengale
Pati Milligan
Melissa Mullins
Ann Rushing
Joseph White
Ken Wilkins

LETTER OF WELCOME FROM THE TAS PRESIDENT

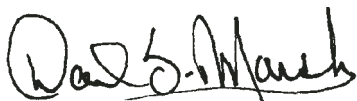
Welcome to the 110th annual meeting of the Texas Academy of Science. It is indeed a momentous meeting. First, this is the 110th meeting!!! Few professional societies can claim such longevity. The myriad of individuals who have selflessly expended their time and energies to maintain this organization over the years should be commended. For the current meeting, there are numerous individuals who should be thanked – of course Bob Baldrige and the Local Host Committee. In lieu of trying to list everyone involved and run the risk of neglecting someone – you know who you are, the entire membership, I and the rest of the Board of Directors thank you for a job well done. Second, the meeting is taking place in the new Baylor Science Building. Completed as a multi-disciplinary facility in September 2004, it incorporates 508,000 square feet of floor space and cost \$103.3 million to build! It is truly an exceptional building.

It has truly been an honor serving as the TAS President for the past year. We have accomplished much, and in all, the Academy has strengthened its mission of supporting scientific research and science education in the state of Texas. We have continued our support of undergraduate and graduate research through monetary grants and awards. Our support also extends into the middle- and high school levels through our support of the Texas Science Olympiad and testimony to the State Board of Education regarding strengthening the science requirements for graduation from high school. There have also been trials and tribulations over the past year that have opened my eyes to the varied views of others and have tested the resolve of the Academy to maintain its stance on Academic freedom and the pursuit of truth. I think the Academy has emerged stronger.

The termination of this year will see several changes in the composition of the Board of Directors. As tradition requires, I will pass the executive gavel and official seal of the Academy to the incoming president, Hudson DeYoe. There will also be a turnover in the position of Treasurer. Jim Westgate, who has served as Treasurer for nearly seven years will relinquish his position to John Ward. I, and the rest of the Board, give our whole-hearted thanks to Jim for his service and support to John Ward.

Where will the Academy be in the next year? – obviously impossible to foresee. I have great faith in the membership and the Board of Directors that the Academy will continue to adapt, grow and evolve. In the years to come, I hope all members will find some way to support the Texas Academy of Science. I know I will.

Sincerely,



David S. Marsh, PhD
President, Texas Academy of Science



Office of the Mayor
Virginia DuPuy
601 Lake Air Drive
Waco, Texas 76710
254 / 741-1117
Fax: 254 / 741-1147
www.waco-texas.com

March 1, 2007

Greetings Members of the Texas Academy of Science!

On behalf of the faculty, students of Baylor University, the Waco City Council, and the great citizens of Waco, Texas, it is my pleasure and honor to welcome you to our fair city.

Waco is the most centrally located city in the State of Texas, making this a great destination to host your event. We have a downtown entertainment district, dozens of museums, various attractions and the friendliest people in the state. The city of Waco is a great place to visit, shop, and explore history and we hope you find time to see what we have to offer.

While you are here you are certain to see and hear our recently released "Waco We Do" slogan. The new campaign takes the words "Waco We Do" and applies them to our can-do spirit. Local radio and TV ads feature original music performed by country recording star Wade Bowen.

In September Waco hosted the *Science in the School Day* program in conjunction with the U.S. Conference of Mayors and DuPont. Our goal was to establish citywide recognition regarding the importance of math and science, specifically as it relates to Waco's present and future growth. We are hopeful we sparked an interest in the minds of children to consider a career in math and science.

Another achievement worthy of notation is students enjoying distance learning with NASA aquanauts as their guides. The next generation of explorers at Lake Air and University middle schools have discovered a different world miles off the coast of Key Largo, Florida and 62 feet below the surface. The distance learning experience was made possible through NASA's Digital Learning Network. The program ties in with NASA's major education goal of attracting and retaining students in science, technology, and engineering.

We hope you enjoy your stay and invite you to come back and visit again soon. Invest in your dreams and you can achieve them, in Waco We Do!

Thank you,

Virginia DuPuy
Mayor

VCD/sp



BAYLOR

U N I V E R S I T Y

John M. Lilley
President

Welcome to Baylor University!

March 1, 2007

Dear Members of the Texas Academy of Science,

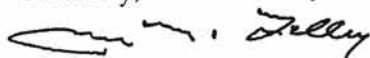
On behalf of our faculty, staff and students, I would like to welcome you to Baylor campus. My colleagues and I are excited to be the host of the 2007 annual meeting of the Texas Academy of Science. We are grateful for TAS' role in the promotion of science education and research in Texas, and hope that your conference is an enriching experience.

Baylor University is an historic institution. At one hundred sixty-one years old, we are the oldest institution of higher learning in the state of Texas. Baylor is steeped in tradition, memory, and a sense of community. With over 14,000 students, we are the largest Baptist university in the world.

I am especially delighted that you will be holding your sessions in the new Baylor Science Building. This 508,000 square foot building, completed at a cost of over \$103,000,000, opened in the fall of 2004. It is equipped with state-of-the-art classrooms and laboratories, and is designed to create a connection between the traditional science departments, to encourage an interactive science community and to support multidisciplinary collaborations in research and teaching. I encourage you to take some time between sessions to become better acquainted with this outstanding facility.

Again, I welcome you to Baylor and hope that you enjoy your time on our campus.

Sincerely,



John M. Lilley

2007 DISTINGUISHED SCIENTIST



Dr. Robert J. Baker
Texas Tech University

Robert J. Baker has been a faculty member at Texas Tech University for 40 years. His research interests have been diverse, but he frequently is referred to as a mammalogist or a molecular geneticist. With John Bickham he has described several phenomena associated with chromosomal evolution and speciation, including a model of speciation involving monobrachial centric fusions, canalization model of chromosomal evolution.

Throughout his career he has worked on systematics of the bat family Phyllostomidae, first with chromosomes and more recently with DNA sequence data. Several papers define and address the significance of hybrid zones in a variety of mammals.

He has directed to graduation the dissertations for 36 Ph.D. and the theses for 43 Master's students.

The title of Dr. Baker's talk is "Speciation and the Genetic Species Concept: Why are there so many unrecognized species?"

2007 OUTSTANDING TEXAS EDUCATOR



Lynn Seman
City View Elementary, Wichita Falls, Texas

Lynn Seman is currently a fifth grade science teacher at City View Elementary in Wichita Falls, Texas. She began teaching in February 1985, at the middle school in Dimmitt, Texas, with an emphasis on mathematics education. After relocating to the Wichita Falls area, Lynn continued teaching math, but was also assigned science classes. After noticing Lynn's enthusiasm for science, the principal of her school asked her to teach science to 6th graders. During these years, Mrs. Seman organized the City View Elementary Recycling and Leadership Team to spread conservation education and to instill community service in her students. She also coordinates annual science fairs, rocket launch days, and other school-wide events. Under Mrs. Seman's guidance, students at City View Elementary have qualified to attend the Texas State Science Fair for the past five years.

Lynn is a member of the Texas Regional Collaborative for Excellence in Science Teaching, is active with the Rolling Plains Chapter of the Texas Master Naturalists, and is a member of River Bend Nature Center where she has served as the director of River Bend Nature Camp in Wichita Falls. This past May, she was awarded the 2006 Walmart Teacher of the Year for the Wichita Falls area.

After discovering her "niche" for teaching science in the latter part of her teaching career, she has spent numerous hours in training sessions, workshops, and classes to become a better-qualified science teacher so that she can inspire another generation of students to develop a life long love of science and nature.

The title of Mrs. Seman's talk is "Elementary Science Education – Past, Present, and Future."

2007 TAS FELLOWS

Dr. Timothy Brush

Dr. Timothy Brush of the University of Texas – Pan American Biology Department was nominated for his contributions to ornithology. Since coming to UTPA in 1991, he has 25 publications on Texas birds, chief among them is a 2005 book titled “Breeding Birdlife of a Tropical Frontier, the Lower Rio Grande Valley of Texas.” He is now widely regarded as one of the leading ornithologists in the State and his reputation is firmly established both regionally and nationally. He has been a TAS member for several years, presented papers at annual meetings, and has four publications in the TJS.

Dr. Robert Holloway

Dr. Robert Holloway of Schreiner University Chemistry Department was nominated for his contributions to chemistry and service to the Academy as the Chemistry Section Chair in 2005-06. He and his students have presented three posters at TAS Annual Meetings. He heads up the undergraduate research program at Schreiner University, and continues his own research efforts with his chemistry students in the Welch undergraduate research program. His research interests include capillary electrophoresis and liquid separation methods. He has nine U.S. patents and about 25 publications.

Ms. Flo Oxley

Ms. Flo Oxley, Director of Conservation and Education at the Lady Bird Johnson Wildflower Center was nominated for her service to the Academy, having served as Chair of the TOES Section in 2000 (now a part of the Resource Conservation Section) and more recently as Non-Academic Director of the TAS Board. In addition, Flo has made a substantial contribution to the scientific community by galvanizing support for rare and endangered plants species throughout the state and beyond. Examples of her contributions include organizing and hosting the Texas Plant Conservation Conference, launching a statewide seed banking program as part of the Millennium Seed Bank project, and service as public outreach chair for the Plant Conservation Alliance.

Ms. Cindy Contreras

Ms. Cindy Contreras is a Biologist with the Water Resources Branch at Texas Parks and Wildlife Department and was nominated for her service to the Academy. She is currently serving as Corresponding Secretary of the TAS, prepares the TAS Newsletter, has one publication in the TJS (Vol. 51/2:199-200) and has been very active in her participation and support of the Freshwater & Marine Science Section (served as Section Chair in 2002-03 and again in 2005-06).

2007 OUTSTANDING SERVICE AWARD

Dr. Bob Edwards

We are pleased to bestow this award to Dr. Bob Edwards of the University of Texas – Pan American for his many contributions to the Academy, including (1) service as Manuscript Editor for the Texas Journal of Science for the past four years, (2) active participant of the Board of Directors, (3) member of the Local Host committee and was instrumental in the success of the 108th Annual Meeting held at the University of Texas – Pan American, (4) he has routinely published in the Texas Journal of Science – TJS, (5) he was instrumental in compilation of the Fish Key distributed by the Academy, (6) he was one of the organizers of the Rio Grande symposium at the Laredo Annual Meeting, (7) he has been an active manuscript reviewer for the TJS, and (8) he has presented research at Academy Annual Meetings for over 20 years in the TOES, Freshwater and Marine Science, and Conservation Sections, and served as chair of all of those sections.

2006-2007 TEXAS ACADEMY OF SCIENCE Board of Directors

President

David S. Marsh
Department of Biology
Angelo State University
San Angelo, TX 76909
Phone: (325) 942-2189, Ext. 244
Fax: (325) 942-2184
david.marsh@angelo.edu

President Elect

Hudson DeYoe
Dept. Biology and
Center for Subtropical Studies
University of Texas - Pan American
1201 West University Dr
Edinburg, TX 78541
Phone: (956) 381-3538
Fax: (956) 381-3657
hdeyoe@panam.edu

Vice President

Raymond C. Mathews, Jr.
Texas Water Development Board
OPFCA/Federal Programs
Environmental Section
1700 N. Congress Avenue
Austin, TX 78711-3231
Phone: (512) 936-0822
Fax: (512) 463-9980
ray.mathews@twdb.state.tx.us

Immediate Past President

Damon Waitt
Lady Bird Johnson Wildflower Center
4801 La Crosse Ave.
Austin, TX 78739
Phone: (512) 292-4200
dwaitt@wildflower.org

Treasurer

James Westgate
Earth & Space Sciences
P.O. Box 10031
Lamar University
Beaumont, TX 77710
Phone: (409) 880-7970
Fax: (409) 880-8246
James.Westgate@lamar.edu

Managing Editor of *TJS*

Ned Strenth
Department of Biology
Angelo State University
San Angelo, TX 76909
Phone: (325) 942-2189, Ext. 247
Fax: (325) 942-2184
ned.strenth@angelo.edu

Manuscript Editor of *TJS*

Frederick Stangl
Department of Biology
Midwestern State University
Wichita Falls TX 76308
Phone: (940) 397-4408
frederick.stangl@mwsu.edu

Executive Secretary

Fred Stevens
Schreiner University, CMB 6252
Kerrville, TX 78028
Phone: (830) 792-7248
Fax: (830) 792-7439
fstevens@schreiner.edu

Corresponding Secretary

Cindy Contreras
Texas Parks and Wildlife Department
Water Resources Branch
4200 Smith School Road
Austin, TX 78744
Phone: (512) 912-7095
Fax: (512) 707-1358
cindy.contreras@tpwd.state.tx.us

Chair, Board of Development

John T. Sieben
Texas Lutheran University
Dean of Natural Science & Mathematics
1000 W. Court Street
Seguin, TX 78155
Phone: (830) 372-6005
Fax: (830) 372-6095
jsieben@tlu.edu

Board of Development

Larry McKinney
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744
Phone: (512) 389-4636
Fax: (512) 389-4394
larry.mckinney@tpwd.state.tx.us

AAAS Representative

Sandra West
Texas State University –San Marcos
Department of Biology
San Marcos, TX 78666 4616
Phone: (512) 245-3360
Fax: (512) 245- 8713
sw04@txstate.edu

Collegiate Academy Counselor

William J. Quinn
3001 S. Congress Ave.
St. Edward's University
Austin, TX 78704
Phone: (512) 448-8457
Fax: (512) 448-8764
Quinn@acad.stedwards.edu

Collegiate Academy Associate Counselor

Lynn McCutchen
Biology Department
Kilgore College
1100 Broadway
Kilgore, TX 75662
Phone: (903) 983-8649
lmccutch@kilgore.edu

Junior Academy Counselor

Vince Schielack
Department of Mathematics
Texas A&M University
College Station, TX 77843
Phone: (979-845-2831
Fax: (979) 845-6028
vincs@math.tamu.edu

Junior Academy Associate Counselor

Nancy Magnussen, Ph.D.
Dean's Office, College of Science
Texas A&M University
College Station, TX 77843-3257
Phone: (979) 845-5587
Fax: (979) 845-6077
nancy@science.tamu.edu

TAS Web Master

Pati Milligan
Information Systems Department
Baylor University
One Bear Place 98005
Waco, TX 76798
Phone: (254) 710-4755
Fax: (254) 710-1091
Pati_Milligan@Baylor.edu

International Program Coordinator

Felipe Chavez-Ramirez, Ph.D.
Executive Director
Platte River Whooping Crane Trust
6611 W. Whooping Crane Dr.
Wood River, NE 68883
Phone: (308) 384-4633
Fax: (308) 384-7209
fchavez@whoopingcrane.org

2004 Academic Director

Ben Pierce
 Department of Biology
 Southwestern University
 Georgetown, TX 78626
 Phone: (512) 863-1974
 Fax: (512) 863-1696
 pierceb@southwestern.edu

2004 Non-Academic Director

Donald L. Koehler, Ph.D.
 Balcones Canyonlands Preserve Program
 City of Austin Water Utility
 3635 Hwy 620 South
 Austin, TX 78738-6807
 Phone: (512) 263-6431
 Fax: (512) 263-1276
 don.koehler@ci.austin.tx.us

2005 Academic Director

Jerry L. Cook
 Department of Biological Sciences
 Sam Houston State University
 Huntsville, TX 77341-2116
 Phone: (936) 294-4250
 Fax: (936) 294-3940
 bio_jlc@shsu.edu

2005 Non-Academic Director

Flo Oxley
 Lady Bird Johnson Wildflower Center
 4801 LaCrosse Ave.
 Austin, TX 78739
 Phone: (512) 292-4200
 oxley@wildflower.org

2006 Academic Director

Herbert D. Grover
 Hardin-Simmons University
 Box 16165 HSU Station
 Abilene, Texas 79698
 Phone: (325) 670-1390
 Fax: (325) 670-1385
 hgrover@hsutx.edu

2006 Non-Academic Director

Gary Garrett
 HoH Fisheries Science Center
 5103 Junction Hwy.
 Texas Parks and Wildlife Department
 Ingram, TX 78025
 Phone: (830) 866-3356
 Fax: (830) 866-3549
 gary.garrett@tpwd.state.tx.us

2006 Local Host

Robert Baldrige
 Biology Department
 Baylor University
 One Bear Place 97388
 Waco, TX 76798-7388
 Phone: (254) 710-2080
 Robert_Baldrige@baylor.edu

TAS SECTION OFFICERS 2006-2007

ANTHROPOLOGY**Chair**

Roy B. Brown
 Instituto Nacional de Antropología y Historia
 748 C Espada
 El Paso, TX 79912-1945
 Phone: (915) 833-0508
 E-mail: rbbrown@utep.edu

Vice Chair

Robert Mallouf
 Big Bend Museum
 Sul Ross State University
 Alpine, TX
 Phone: (915) 837-8179

CELL AND MOLECULAR BIOLOGY**Chair**

Ana Christensen
 Biology Department
 P.O. Box 10037
 Lamar University
 Beaumont, TX 77710
 Phone: (409) 880-8260
 Fax: (409) 880.1827
 E-mail: christenab@hal.lamar.edu

Vice Chair

Jon Scales
 Biology Department
 Midwestern State University
 Wichita Falls, TX 76308
 Phone: (940) 397-4297
 Fax: (940) 397-4831
 E-mail: jon.scales@mwsu.edu

BOTANY**Chair**

Randall G. Terry
 P.O.Box 10037
 Lamar University
 Beaumont, TX 77710
 Phone: (409) 880-7975
 Fax: (409) 880-1827
 E-mail: terryrg@hal.lamar.edu

Vice Chair

Roy Lehman
 Director, Laguna Madre Field Station
 Texas A&M University - Corpus Christi
 6300 Ocean Drive, Unit 5802
 Corpus Christi, TX 78412
 Phone: (361) 825-5019
 Fax: (361) 825-3719
 E-mail: roy.lehman@tamucc.edu

CHEMISTRY AND BIOCHEMISTRY**Chair**

Alyx S. Frantzen
 Department of Chemistry
 Stephen F. Austin State University
 Box 13006 – SFA Station
 Nacogdoches, TX 75962
 Phone: (936) 468-2338
 Fax: (936) 468-7634
 E-mail: afrantzen@sfasu.edu

Vice Chair

Benny E. Arney, Jr.
 Department of Chemistry
 Sam Houston State University
 Box 2117
 Huntsville, TX 77341-2117
 E-mail: chm_bea@shsu.edu

COMPUTER SCIENCE**Chair**

John A. Ward
 P.O. Box 47131
 San Antonio, TX 78265-7131
 Phone: (210) 916-2734
 E-mail: john.ward@amedd.army.mil

Vice Chair

Laura J. Baker
 Department of Computer Science
 St. Edward's University
 3001 S. Congress Avenue – Box 910
 Austin, TX 78704
 Phone: (512) 448-8675
 Fax: (512) 448-8492
 E-mail: laurab@stedwards.edu

CONSERVATION ECOLOGY**Chair**

Diana Comuzzie
 Department of Biology
 CMB 6233 – Schreiner University
 Kerrville, TX 78028
 Phone: (830) 792-7244
 Fax: (830) 792-7439
 E-mail: comuzzie@schreiner.edu

Vice Chair

Cathy Early
 Department of Biology
 University of Mary Hardin Baylor
 Belton, TX 76513
 E-mail: cearly@umhb.edu

ENVIRONMENTAL SCIENCE**Chair**

Forrest M. Mims III
 433 Twin Oak Road
 Seguin, TX 78155
 Phone: (830) 372-0548
 E-mail: forrest.mims@ieee.org

Vice Chair

Kenneth R. Summy
 1201 West University Drive
 University of Texas-Pan American
 Edinburg, TX 78539-2999
 Phone: (956) 316-7927
 Fax: (956) 381-3657
 E-mail: krsummy@panam.edu

FRESHWATER AND MARINE SCIENCE**Chair**

Brian W. Brooks
 Center for Reservoir & Aquatic Systems
 Research
 One Bear Place - #97266
 Baylor University
 Waco, TX 76798
 Phone: (254) 710-6553
 Fax: (254) 710-3409
 E-mail: Bryan_Brooks@baylor.edu

Vice Chair

Romi Burks
 Southwestern University
 1001 East University Avenue
 Georgetown, TX 78626
 Phone: (512) 863-1280
 Fax: (512) 863-1696
 E-mail: burksr@southwestern.edu

GEOSCIENCES**Chair**

Christian O. George
 1 University Station, C-1140
 Department of Geological Sciences
 Austin, TX 78712-0254
 Phone: (512) 921-7927
 Fax: (512) 471-9425
 E-mail: cogeo@mail.utexas.edu

Vice Chair

Joe Satterfield
 Physics Department
 Angelo State University
 P.O. Box 10904, ASU Station
 San Angelo, TX 76909
 Phone: (325) 942-2577 ext. 226
 E-mail: joseph.satterfield@angelo.edu

MATHEMATICS**Chair**

William Clark
 Dept. of Mathematics and Statistics
 Stephen F. Austin State University
 Nacogdoches, TX 75962
 Phone: (936) 468-3805
 E-mail: clark@sfasu.edu

Vice Chair

Sandra Luna McCune
 Department of Elementary Education
 Box 13017 – Stephen F. Austin State
 University
 Nacogdoches, TX 75962-3017
 Phone: (409) 468-2904
 Fax: (409) 468-1701
 E-mail: smccune@sfasu.edu

PHYSICS**Chair**

David Bixler
 Physics Dept.
 Angelo State University
 San Angelo, TX 76909
 Phone: (325) 942-2524
 E-mail: David.Bixler@angelo.edu

Vice Chair

Jackie Dunn
 Department of Physics
 3410 Taft Blvd.
 Midwestern State University
 Wichita Falls, TX 76308
 Phone: (940) 397-4184
 Fax: (940) 397-4442
 E-mail: Jackie.dunn@mwsu.edu

SCIENCE EDUCATION**Chair**

Kaycee Sullivan
 P.O. Box 186
 Junction, TX 76849
 Phone: (325) 446-2301 (210) 289-1668
 Fax: (325) 446-4011
 E-mail: kaycie.sullivan@ttu.edu

Vice Chair

Song Gao
 Environmental Studies
 Baylor University
 Waco, TX
 Phone: (254) 710-6581
 E-mail: song_gao@baylor.edu

SYSTEMATICS AND EVOLUTIONARY BIOLOGY**Chair**

Allan W. Hook
 Department of Biology
 St. Edward's University
 Austin, TX 78704-6487
 Phone: (512) 448-8466
 Fax: (512) 448-8764
 E-mail: allanh@stedwards.edu

Vice Chair

John Hanson
 Department of Biology - Box 3131
 Texas Tech University
 Lubbock, TX 79409-3131
 Phone: (806) 742-2725
 Fax: (806) 742-0170
 E-mail: jdelton.hanson@ttu.edu

TERRESTRIAL ECOLOGY AND MANAGEMENT**Chair**

Caren McLemore
 128 Sherri Lane, Weatherford, TX 76085
 Phone: (817) 475-3787
 E-mail: clm0093@unt.edu

Vice Chair

Chris M. Ritzi
 Department of Biology - Box C-64
 Sul Ross State University
 Alpine, TX 79832
 Phone: (432) 837-8430
 Fax: (432) 837-8262
 E-mail: critzi@sulross.edu

2007 PROGRAM AGENDA

Codes indicate the following:

- U Undergraduate (Collegiate) student Academy member
- G Graduate student Academy member
- S Senior Academy member
- I Invited speaker
- J Student competition entry
- * Indicates presenting author

DISCLAIMER

Despite efforts of the editors, some errors and misspellings may be found in the program. Every attempt was made to correct obvious errors.

ANTHROPOLOGY
Session I
Friday, March 2 • BSB C231

- 8:40 UJ 103 RECONSTRUCTING THE EVOLUTION OF THE LINEAR B WRITING SYSTEM USING PHYLOGENETIC SYSTEMATICS.
Christina Skelton, Program in Aegean Scripts and Prehistory, Department of Classics, University of Texas at Austin, Austin, TX.
- 9:00 UJ 240 A MIDDLE PLEISTOCENE FAUNA FROM BOTSWANA: EVIDENCE FOR AN ENVIRONMENTAL SHIFT.
Alicia M. Kennedy*, Patrick J. Lewis, Monte L. Thies, Sam Houston State University, Huntsville, TX and Blythe Williams, Duke University, Durham, NC.

BOTANY
Session I
Friday, March 2 • BSB E206

- 8:20 UJ 91 APPLICATION OF IMAGE PROCESSING METHODS FOR DETERMINING STOMATAL DENSITY OF SEVERAL WOODY PLANT SPECIES.
Den Davis* and Herbert D. Grover. Department of Biology, Hardin-Simons University, Abilene, TX.
- 8:40 UJ 233 ANALYSIS OF FLORAL ATTRACTANTS IN *CALLIRHOË SCABRIUSCULA* (MALVACEAE).
Michael Martinez*, Bonnie Amos, and Nick Flynn, Department of Biology and Department of Chemistry/Biochemistry, Angelo State University, San Angelo, TX.
- 9:00 GJ 245 PATHOGEN INHIBITORY ACTIVITY OF INDIGENOUS *STREPTOMYCES* FROM LOWER RIO GRANDE VALLEY AGRICULTURAL SOILS.
Atenea A. Garza*, Christopher R. Little, Anita Davelos Baines, Department of Biology, The University of Texas–Pan American, Edinburg TX.
- 9:20 UJ 3 AMINO ACID AND CARBOHYDRATE CONTENT OF WINE CUP NECTAR AND POLLEN.
Leah Lawdermilk*, Bonnie Amos and Nick Flynn, Angelo State University, San Angelo, TX.
- 9:40 U 84 USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY TO IDENTIFY GIBBERELLIN AND GIBBERELLIN-LIKE COMPOUNDS FROM *ANEMIA MEXICANA* GAMETOPHYTE CULTURE MEDIA.
Candace Wise* and Joan E. N. Hudson, Department of Biological Sciences, Sam Houston State University, Huntsville, TX.
- 10:00 Poster Break, BSB 1st floor halls**
- 10:50 OPEN
- 11:10 U 153 PTERIDOPHYTE REPRODUCTION BY SPORES/GAMETOPHYTES AT THE CENTER FOR BIOLOGICAL FIELD STUDIES, SAM HOUSTON STATE UNIVERSITY, WALKER COUNTY, TX.
Joan E. N. Hudson, Department of Biological Sciences, Sam Houston State University, Huntsville, TX.
- 11:30 S 42 THE SYSTEMATIC AND PHYLOGENETIC POTENTIAL OF CULM ANATOMY IN *ELEOCHARIS* SUBGENUS *LIMNOCHLOA* (CYPERACEAE).
David E. Lemke*, Department of Biology, Texas State University, San Marcos, TX, and David J. Rosen, S. M. Tracy Herbarium, Department of Rangeland Ecology & Management, Texas A&M University, College Station, TX.

11:50 Sectional Business Meeting

12:00 Lunch, Cashion Center

1:15 TAS Business Meeting, BSB B110

- 1:50 S 82 THE UNDERESTIMATED BOTANICAL DIVERSITY OF THE COASTAL PRAIRIE.
David J. Rosen, U. S. Fish and Wildlife Service, Houston, TX.
- 2:10 S 89 AN UPDATED VASCULAR PLANT INVENTORY OF TAYLOR COUNTY, TEXAS.
Herbert D. Grover* and Den Davis, Department of Biology, Hardin-Simmons University, Abilene, TX.
- 2:30 S 170 EARLY PERIDERM DEVELOPMENT IN THE STEMS OF *ULMUS ALATA* MICHX.
Tiffany B. Fowler and Ann E. Rushing*, Department of Biology, Baylor University, Waco, TX.

BOTANY POSTERS

- P14 S A GUIDE TO IDENTIFICATION OF WEEDS IN SOUTH TEXAS AND NORTHERN MEXICO.
James H. Everitt*, USDA-ARS, Weslaco, TX, Robert I. Lonard, and Christopher R. Little, Department of Biology, University of Texas-Pan American, Edinburg, TX.
- P30 U PHOTOSYNTHETIC RATES IN *POPULUS TREMULOIDES* OVER A SINGLE GROWING SEASON:
DECLINING PHOTOSYNTHETIC RATES ASSOCIATED WITH LEAF AGE AND SEASONAL VARIATIONS.
R. Nicolas Ragland* and William J. Quinn, St. Edward's University, Austin, TX.
- P37 G MEASURING VEGETATIVE CHANGE: FIFTY YEAR DIFFERENCES IN BIG BEND NATIONAL PARK.
Daniel J. Leavitt*, Allison F. Leavitt, and Christopher M. Ritzi, Department of Biology, Sul Ross State University, Alpine, TX.
- P104 G BLACK MANGROVE (*AVICENNIA GERMINANS*) COMMUNITY STRUCTURE, GROWTH AND RECRUITMENT, ALONG
THE SOUTH TEXAS COAST.
Mollie K. McIver*, Roy Lehman, and Kim Withers, Texas A&M University – Corpus Christi, Texas.
- P160 UJ PERIDERM INITIATION AND EARLY DEVELOPMENT IN *PLATANUS OCCIDENTALIS* L.
Constance Cole* and Ann E. Rushing, Department of Biology, Baylor University, Waco, TX.
- P194 UJ SOIL FIDELITY IN GULF COAST *HELIANTHUS* SPECIES (NUECES COUNTY, TX).
Sean M. Thompson*, Karla L. Loya*, David J. Gris , and R. Deborah Overath, Department of Life Sciences, Texas A&M University – Corpus Christi, Corpus Christi, TX.
- P199 S GERMINATION OF TWO SUNFLOWER SPECIES ACROSS A SALT GRADIENT.
Hector Aguilar*, David J. Gris , Sean Thompson, and R. Deborah Overath, Department of Life Sciences, Texas A&M University – Corpus Christi, Corpus Christi, TX.
- P227 UJ AN ALPHA-TAXONOMIC STUDY OF THE EARLY SUMMER FLORA OF BUFFALO BAYOU.
Floribel Beiza, Robin May*, and Deanna McCullough, Department of Natural Sciences, University of Houston-Downtown, Houston, TX.

CELL AND MOLECULAR BIOLOGY

Session I

Friday, March 2 • BSB A207

- 8:00 U 90 *RICKETTSIA TYPHI* AND *RICKETTSIA FELIS* AS HUMAN PATHOGENS IN TEXAS.
Robert J. Wiggers, Department of Biology, Stephen F. Austin State University, Nacogdoches, TX.
- 8:20 U 92 APOPTOTIC EFFECTS OF *SANGUINARI CANDENSIS* (BLOOD ROOT) EXTRACT IN MA-10 LEYDIG TUMOR CELLS.
Vanessa Carey*, Marcia Peck, Matthew Wyatt, Lori Pretzer, Kristen Raines and Adam Reinhart, Wayland Baptist University, Plainview, TX.
- 8:40 UJ 94 CYTOTOXIC AND APOPTOTIC EFFECTS OF *SANGUINARIA CANDENSIS*, *ZINGIBER OFFICINALI*, AND *SERENOA REPENS* ON THE H295R ADRENAL CORTICAL TUMOR CELL LINE.
Marcia Peck*, Vanessa Carey, and Adam Reinhart, Wayland Baptist University, Plainview, TX.
- 9:00 UJ 107 DETERMINING THE ROLE OF *AMRZ* IN THE REGULATION OF PA5339 IN *PSEUDOMONAS AERUGINOSA*.
Kimberly Bandy* and Patricia J. Baynham, St. Edward's University, Austin, TX.
- 9:20 UJ 128 AGE-RELATED DEFICITS IN LEARNING: A STUDY IN *C. ELEGANS* SHOWING THE ABILITY OF THE ANTI-OXIDANT ALPHA-LIPOIC ACID TO RESTORE LEARNING ABILITY IN OLDER ORGANISMS.
Brianna Murphy*, Kenton Venhuizen, Fidelma A. O'Leary. St. Edward's University, Austin, TX.
- 9:40 UJ 229 RESISTANCE PLASMIDS MAY CONFER HEAVY METAL TOLERANCE TO BACTERIA INHABITING A RARE HYPERSALINE ESTUARY.
Tiffany L. Rubinstein*, Roshni P. Patel, Daren D. Molina, Michael W. Persans and Kristine L. Lowe. Department of Biology, University of Texas – Pan American, Edinburg, TX.
- 10:00 Poster Break, BSB 1st floor halls**
- 10:50 GJ 112 ARBUSCULAR MYCORRHIZAL FUNGI AND MICROBIAL POPULATION ANALYSIS OF NATURAL EAST TEXAS HABITAT TYPES.
Darya Fakhretdinova*, James E. Van Kley, Alexandra Martynova-Van Kley, Stephen F. Austin State University, Nacogdoches, TX.
- 11:10 GJ 156 STRATEGY FOR DETECTION AND IDENTIFICATION OF *EIMERIA* SPECIES INFECTING CHICKENS.
Andrew Syvyk *, Armen Nalian, Irina Teplova, Alexandra Martynova VanKley, Stephen F. Austin State University, Nacogdoches, TX.
- 11:30 U 100 A STUDY IN *CAENORHABDITIS ELEGANS*: THE INVOLVEMENT OF SEROTONIN AND OCTOPAMINE IN NEURAL MODULATION OF THERMOTAXIS.
Margaret Brown*, Fidelma A. O'Leary. St. Edward's University, Austin, TX.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 U 120 GENOME REARRANGEMENTS IN EXPERIMENTAL EVOLUTION OF *CHLAMYDOMONAS REINHARDTII*.
Meghan Smith, Richard N. Ragland* Bioinformatics Program, St. Edward's University, Austin, TX and Michael Siebert, National Renewable Energy Laboratory, Golden, CO and Charles Hauser, Bioinformatics Program, St. Edward's University, Austin, TX.

- 2:10 U 141 MECHANISMS OF DORMANT MYCOBACTERIA.
Rachelle J. Alderson*, Todd P. Primm, Sam Houston State University, Huntsville, TX.
- 2:30 U 149 PHYLOGENETIC ANALYSIS OF SOUTHEASTERN USA EATHWORM SPECIES USING 16S RDNA AND COI SEQUENCES.
Yulia Leontieva*, Armen Nalian, George Damoff, and Alexandra Martynova Van-Kley, Stephen F. Austin State University, Nacogdoches, TX.
- 2:50 U 154 CHARACTERIZATION OF THE EFFECTS OF BACTERIA ON *DROSOPHILA MELANOGASTER* DEVELOPMENT.
W. Ryan Williamson* and Ted Brummel, Department of Biology Sam Houston State University, Huntsville, TX.
- 3:10 U 186 GENOME-WIDE PREDICTION OF CIS NATURAL ANTISENSE TRANSCRIPTS IN *CHLAMYDOMONAS REINHARDTII*.
England Raimey*, Charles Hauser, Bioinformatics Program, St. Edward's University, Austin, TX.
- 3:30 U 221 HORMONE REFRACTORY PROSTATE CANCER: ALTERNATE PROSTATE SPECIFIC ANTIGEN PATHWAYS.
Cherice Roth, University of North Texas Health Science Center, Fort Worth, TX.
- 3:50 U 235 TRANSCRIPTONAL REGULATION OF AN E2F ASSOCIATED APOPTOTIC PATHWAY.
Analyssa C. Medina* and Jonathan H. Lieman, University of Texas – Pan American, Edinburg, TX.
- 4:10 Distinguished Texas Scientist Presentation, BSB B110**
- 5:00 All Section Chairs Meeting, BSB B110**

CELL AND MOLECULAR BIOLOGY

Session II

Friday, March 2 • BSB A236

- 8:00 S 167 THE NUCLEIC ACID AND AMINO ACID SEQUENCES OF THE HEMOGLOBINS OF THE BRITTLE STAR *HEMIPHOLIS ELONGATA SAY*.
Ana Beardsley Christensen*, Eric F. Christensen, Biology Department, Lamar University, and Maxim V. Sukhodolets, Chemistry Department, Lamar University, Beaumont, TX.

CELL AND MOLECULAR BIOLOGY POSTERS

- P49 UJ THE EFFECT OF THE DIPEPTIDE D-ALAGLY ON LEXA CLEAVAGE IN *E. COLI*.
Jason Burnham*, Frank Guziec, Lynn Guziec, and Martín Gonzalez, Southwestern University, Georgetown, TX.
- P93 UJ IDENTIFYING THE LON RECOGNITION SEQUENCE IN THE CARBOXYL-TERMINUS OF THE UMUC PROTEIN.
Julianne Stafford* and Martín Gonzalez, Southwestern University, Georgetown, TX.
- P95 UJ SCREENING FAMILIES OF BATS FOR THE SHORT INTERSPERSED DNA ELEMENT CALLED VES SINE.
Eeshita Ghosh Dastidar* and Loren K. Ammerman, Angelo State University, San Angelo, TX.
- P111 G POTENTIAL INSERTION SITES IN THE TOBACCO MOSAIC VIRAL VECTOR.
Zun Liu* and Christopher M. Kearney, Department of Biology, Baylor University, Waco, TX.
- P130 UJ CAN YOU TEACH AN OLD WORM NEW TRICKS? IN *C. ELEGANS* MEMORIES FOR ASSOCIATIVE TRAINING ARE MORE EASILY ACQUIRED BY YOUNG ORGANISMS, FOLLOWING RELATIVELY BRIEF TRAINING DURATIONS, IN CONTRAST TO OLDER ORGANISMS.
Kenton Venhuizen*, Brianna Murphy, Fidelma A. O'Leary. St. Edward's University, Austin, TX.

- P131 UJ THE ROLE OF CELLULAR FACTORS ON THE ACTIVITY OF HUMAN IMMUNODEFICIENCY VIRUS TYPE-1 (HIV-1) INTEGRASE IN *SACCHAROMYCES CEREVISIAE*.
M. Whitney*, M. Mazour, K. Sanders, and P. King, St. Edward's University, Austin, TX.
- P132 UJ NUCLEAR IMPORT OF HUMAN IMMUNODEFICIENCY VIRUS TYPE-1 (HIV-1) INTEGRASE IN *SACCHAROMYCES CEREVISIAE*.
J. Dougherty*, B. Cowsert, A. Meier, and P. King, St. Edward's University, Austin, TX.
- P134 UJ PHOTOSYNTHETIC EFFECTS OF DIFFERENT LIGHT INTENSITIES ON MUTANT AND WILD-TYPE *ARABIDOPSIS THALIANA*.
Phillip Scott* and Nathan Reyna, Howard Payne University, Brownwood, TX.
- P144 UJ *IN VITRO* EFFECTS OF 4-OH TAMOXIFEN AND 17 BETA ESTRADIOL ON THE HUMAN CERVICAL CELL LINE HeLa.
E. Navaira*, and M.E. Cuevas, Biology Department, Southwestern University.
- P146 UJ ANTI-OXIDANT EXPOSURE DURING TRAINING ONLY, IS SUFFICIENT TO SUBSTANTIALLY REVERSE MUCH OF THE LEARNING DEFICIT ACCRUED WITH AGING IN *C. ELEGANS*.
Glenda Colop*, Fidelma O'Leary, St. Edward's University, Austin, TX.
- P171 UJ REGULATION OF ADAPTATION GENES IN ANALOG MICROGRAVITY.
Jamal Plumber*, Kamaleshwar Singh, Bobby Wilson, and Alamelu Sundaresan, Texas Southern University, Houston, TX.
- P198 UJ CYTOTOXICITY OF ANTHRAPHYRAZOLES IN (AP-10 and AP-11) ON HUMAN PROSTATE CANCER (DU-145) AND TESTICULAR CANCER (NETRA-2) IN CULTURE.
K.C. Seilheimer*, F.S. Guziec, and M.E. Cuevas, Southwestern University, Georgetown, TX.
- P236 UJ PHOSPHATASE REGULATION OF E2F ASSOCIATED APOPTOSIS.
Joe M. Garza* and Jonathan H. Lieman, University of Texas – Pan American, Edinburg, TX.
- P238 S COMPARISON OF NUCLEOTIDE SEQUENCES OF HEMOGLOBIN PROTEINS FROM TWO CLOSELY RELATED SPECIES OF BRITTLE STAR.
Miriam Dark*, Ana Beardsley Christensen, and Eric Christensen, Biology Department, Lamar University, Beaumont, TX.

CHEMISTRY AND BIOCHEMISTRY

Session I

Friday, March 2 • BSB E231

- 8:00 U 21 ELECTRON EFFECTS IN THE FORMATION OF 1,3,5-TRIARYLPYRAZOLES.
Nathan C. Duncan, Charles M. Garner, and Tim Nguyen*, Baylor University, Waco, TX.
- 8:20 GJ 96 NOVEL GLUCOSE BIOSENSING AT VERY LOW POTENTIALS.
Xin Wei, Kun Tao*, Dan Mao, Tuan D. Phan, Yuanjian Deng, John B. Sapp, Renard L. Thomas, and Bobby L. Wilson Department of Chemistry, Texas Southern University, Houston, TX
- 8:40 GJ 115 SYNTHESIS AND CHARACTERIZATION OF DIRUTHENIUM COMPLEXES.
Tuan D. Phan, Nina Brinkley,* and John Sapp, Department of Chemistry, Texas Southern University, Houston, TX.
- 9:00 GJ 175 QUANTITATIVE STRUCTURE-ACTIVITY RELATIONSHIP (QSAR) OF QUORUM-SENSING INHIBITORS AS A NOVEL APPROACH FOR CONTROLLING MICRORGANISMS.
Brooke B. Woodard* and Mahmoud A. Saleh, Department of Chemistry, Texas Southern University, Houston, TX.

- 9:40 UJ 86 BEST QUALITY TRYPTIC PEPTIDE MAPS BY CAPILLARY ELECTROPHORESIS.
Aaron Lehnhoff* and Robert Holloway, Schreiner University, Kerrville, TX.
- 10:00 Poster Break**
- 10:50 UJ 126 TiO₂ DEPOSITION ON ACRYLIC SUPPORT MATERIAL FOR PHOTOCATALYTIC DEGRADATION OF NO₃- IONS.
Philip J. Carlson*, Lori A. Pretzer, Joel E. Boyd, Wayland Baptist University, Department of Chemistry, Plainview, TX.
- 11:10 UJ 127 PHOTOCATALYTIC DEGRADATION OF AMMONIA OVER PLATINIZED TITANIUM (IV) OXIDE.
Lori A. Pretzer*, Philip J. Carlson, Joel E. Boyd, Wayland Baptist University, Department of Chemistry, Plainview, TX.
- 11:30 UJ 155 COPPER AND ZINC UPTAKE IN CRAYFISH VENTRAL NERVE CORD.
Tyler Miller, Howard Payne University, Brownwood, TX.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 UJ 161 THERMOISOMERIZATION OF CANOLA OIL.
Kyle Kinser, Howard Payne University, Brownwood, TX.
- 2:10 UJ 173 COMPARATIVE CHEMICAL AND ANTIMICROBIAL PROPERTIES OF THE CHINESE STAR ANISE AND ANISE ESSENTIAL OILS.
Kristina R. Casmire*, Brooke Woodard, Ezekeil Hudson II, Fawzia Abdel-Rahman, Wenlou Zhang, and Mahmoud A. Saleh. Department of Chemistry, Texas Southern University, Houston, TX.
- 2:30 U 47 IDENTIFICATION AND PURIFICATION OF ANTIMICROBIAL PEPTIDES IN THE SKIN OF THE CRICKET FROG, *ACRIS CREPITANS*.
Lisa A. Chaney* and Jon B. Scales, Midwestern State University, Wichita Falls, TX.
- 2:50 U 99 A MICROWAVE ASSISTED METHOD FOR THE SYNTHESIS OF 1,4-DIPHENYL-1,3-BUTADIENE.
Jason Perrin* and Wayne C. Boring, Stephen F. Austin State University, Nacogdoches, TX.
- 3:10 U 158 THE PREPARTATION, DECOMPOSITION, AND VOLTAMMETRIC BEHAVIOR OF SODIUM FERRATE (IRON VI) IN AQUEOUS ALKALINE SOLUTIONS.
James Fowler*, Stephen F. Austin State University, and Wayne C. Boring, Stephen F. Austin State University, Nacogdoches, TX.
- 3:30 U 182 ANALYZING SPACE SHUTTLE FOOD FOR NUTRITIONAL CONTENT.
Chelsea L. Harris, Space and Environmental Science, Internship Program, National Aeronautics and Space Administration, Houston, TX.
- 3:50 S 9 ASSIGNMENT OF THE UVVIS SPECTRA OF NITROANILINES USING ELECTRON DENSITY DIFFERENCE MAPS.
Darren L. Williams*, and Bassam Alnasleh, Chemistry Department, Sam Houston State University, Huntsville, TX.

CHEMISTRY AND BIOCHEMISTRY

Session II

Friday, March 2 • BSB E206

- 2:50 S 20 PHOTOCHEMISTRY OF 2,2-DIMETHYL-1,2-DIHYDRONAPHTHALENE OXIDE.
Benny E. Arney, Jr.*, Tiffani Thompson, William Donaldson, and Rick C. White, Department of Chemistry, Sam Houston State University, Huntsville, TX.
- 3:10 S 29 AUTHENTIC SAMPLE PREPARATIONS ASSOCIATED WITH THE PHOTOCHEMISTRY OF INDENE OXIDES AND DIHYDRONAPHTHALENE OXIDES.
Benny E. Arney*, Jr., Tiffani Thompson, William Donaldson, Department of Chemistry, Sam Houston State University, Huntsville, TX and Irisa D. Arney, Anthropology and Forensic Science, Baylor University, Waco, TX.
- 3:30 S 119 TETRAALKYLAMMONIUM EXCHANGED CLAYS – CALORIMETRY AND X-RAY DIFFRACTION.
Alyx S. Frantzen, Stephen F. Austin State University, Nacogdoches, TX.
- 3:50 S 129 BOTULINUM TOXIN: CLINICAL AND BIOWARFARE AGENT! COMPUTER-AIDED DRUG DESIGN.
James M. Briggs*, Tarek M. Mahfouz, Wei Fu, Jerry O. Ebalunode, Department of Biology and Biochemistry, University of Houston, Houston, TX.
- 4:10 Distinguished Texas Scientist Presentation, BSB B110**
- 5:00 All Section Chairs Meeting, BSB B110**

CHEMISTRY POSTERS

- P53 UJ DIFFERENTIATION OF MEZCALS USING GAS CHROMATOGRAPHY AND HIERARCHICAL CLUSTER ANALYSIS.
Michael M. Looney and Luke Whitmire*, Chemistry Department, Schreiner University, Kerrville, TX.
- P62 U SOIL ANALYSIS OF KERR WILDLIFE MANAGEMENT AREA.
Thomas Cable*, Miguel Puga, and Kiley Millar, Schreiner University, Kerrville, TX.
- P87 UJ ENZYMATIC PEPTIDE TAGGING.
Scott Kneese* and Robert Holloway, Schreiner University, Kerrville, TX.
- P114 UJ THERMAL ANALYSIS OF IONIC LIQUIDS.
Nicolle Patterson* and Maria Benavides, University of Houston-Downtown, Houston, TX.
- P121 UJ THE ENERGY OF DELAMINATION OF SMECTITE CLAYS.
Kristen M. Baugh* and Alyx S. Frantzen, Stephen F. Austin State University, Nacogdoches, TX.
- P122 UJ THE SEPARATION OF R- AND S-IBUPROFEN.
Katie Clark*, LaTisha West*, Michele R. Harris, and Alyx S. Frantzen, Stephen F. Austin State University, Nacogdoches, TX.
- P201 UJ A METABOLIC MECHANISM FOR SCFA- INDUCED ACID RESISTANCE IN ENTERIC BACTERIA.
Erica Frugé* and John W. Hawes, Department of Chemistry and Biochemistry, Miami University, Oxford Ohio and Texas Southern University, Houston, TX.
- P202 UJ DISSOLUTION OF A SIMULATED HIGH-LEVEL BOROSILICATE WASTE GLASS: EFFECT OF TEMPERATURE AND PH.
LaQuanti J. Calligan*, Texas Southern University, Houston, TX, and Eric. M. Pierce, Pacific Northwest National Laboratory, Richland, WA.

- P208 UJ NICKEL SALT BASED SENSORS FOR DETERMINATION OF SMALL ORGANIC COMPOUNDS.
Binh Nguyen*, Mian Jiang, Larry G. Spears, Department of Natural Sciences, University of Houston – Downtown, Houston, TX.
- P209 UJ NEW NANOTUBE-BASED FUNCTIONAL MATERIAL BY UV-TRIGGERED POLYMERIZATION.
Shajeer Noorudeen*, Mian Jiang, Byron K. Christmas, Larry G. Spears, Department of Natural Sciences, University of Houston – Downtown, Houston, TX.
- P241 UJ THE SPECIFIC HEAT OF SUGAR POPS.
Phillip Lang, Howard Payne University, Brownwood, TX.
- P242 UJ THERMODYNAMICS OF THE DYES ON M&M'S.
Derek A. Hagy*, Howard Payne University, Brownwood, TX.

COMPUTER SCIENCE

Session I

Friday, March 2 • BSB A108

- 8:20 U 36 PREDICTION OF MYOCARDIAL INFARCTION BASED ON THE COMPARISONS OF FUSION IMAGING WITH INTRAVASCULAR ULTRASOUND.
E. Obot*, Texas Southern University, Texas Medical Center-The Methodist Hospital Research Institute, Houston, TX, Juan Granada, Greg Kaluza, Armando Tellez, Darelle Schultz, David Bradley and Carlos Alviar, Institute for Research in Cardiovascular Interventions, Methodist DeBakey Heart Center Houston, TX.
- 8:40 S 80 SAMPLE SIZE EFFECTS IN KAPLAN-MEIER SURVIVAL ANALYSIS.
John A. Ward, Department of Clinical Investigation, Brooke Army Medical Center, Fort Sam Houston, TX.
- 9:00 U 170 ANALYZING EMERGENCY ROOM (ER) UNIT AND INTENSIVE CARE UNIT (ICU) RECORDS IN ORDER TO POTENTIALLY REDUCE MEDICAL ERRORS AND IMPROVE HEALTHCARE FACILITY PERFORMANCE.
LaKeisha Melton*, Texas Southern University, Houston, TX and Jonathan Young, Pacific Northwest National Laboratory, Richland, WA.
- 9:20 U 177 GRAPHIC USER INTERFACE FOR THE NIMROD SILICON DETECTORS.
Christopher Crane*, Texas Southern University, Houston, Texas, Sherry Yennello and Sara Wuenschel, Texas A&M University, College Station, TX.
- 9:40 U 183 VISUALIZING QUANTUM DOTS IN A VIRTUAL ENVIRONMENT.
Nathanael Pierce*, Texas Southern University, Houston, TX, David Ebert and Ross Maciejewski, School of Electrical and Computer Engineering Purdue University, Purdue University, IN.

COMPUTER SCIENCE POSTERS

- P138 UJ MARS ADVANCED RADIATION ACQUISITION DATA CONVERSION UTILITY (MARA-DCU).
Shelley Smith, Texas Southern University, Houston, TX.
- P142 UJ ULTRASONIC WIRELESS INSTRUMENTATION SYSTEM (ULTRA-WIS): AUTONOMOUS IMPACT AND LEAK DETECTION.
Shelley Smith*, Texas Southern University, Houston, TX and Jacob Fuch, Oklahoma State University, Stillwater, OK.

CONSERVATION ECOLOGY

Session I

Friday, March 2 • BSB A108

- 11:30 UJ 102 SMALL SNAILS, BIG APPETITES: CONTRASTING RESOURCE CONSUMPTION BETWEEN TWO SPECIES OF APPLESNAIL.
Brandon B. Boland*, Abigail K. Youens, and Romi L. Burks, Southwestern University, Georgetown, TX, Mariana Meerhoff, Claudia Fosalba, and Néstor Mazzeo, Departamento de Ecología, Facultad de Ciencias, Uruguay.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 GJ 66 RESTORING AQUATIC PLANT COMMUNITIES: THE SAN MARCOS EXPERIENCE.
Melissa L. Mullins* and Robert D. Doyle, Baylor University, Waco, TX.
- 2:10 GJ 163 URBANIZATION AND THE FRESHWATER TURTLE BASKING COMMUNITY IN CENTRAL TEXAS.
Shannon Hill* and Dr. Darrell Vodopich, Baylor University, Waco, TX.
- 2:30 U 98 CONSERVATION OF THE OUACHITA CREEKSHELL *VILLOSA ARKANSASENSIS* (LEA 1852): REPRODUCTION AND HOST FISH SUITABILITY.
Sara E. Seagraves*, Arkansas State University Department of Biological Sciences, State University, AR, Jerry L. Farris, Arkansas State University Department of Biological Sciences, State University, AR, and Arkansas State University Environmental Sciences Program, State University, AR, John L. Harris, Arkansas State University Department of Biological Sciences, State University, AR, and Alan D. Christian, Arkansas State University Department of Biological Sciences and Environmental Sciences Program, State University, AR.
- 2:50 U 162 LEAF CHARACTERISTIC RELATIONSHIPS TO LIGHT ENVIRONMENT.
J.A. Thomas* and J.D. White, Baylor University, Waco, TX.
- 3:10 G 56 VALIDATION OF A GIS-BASED HABITAT MODEL FOR MEXICAN SPOTTED OWLS IN THE GUADALUPE MOUNTAIN RANGE OF WEST TEXAS.
Timothy C. Mullet* and Christopher M. Ritzi, Sul Ross State University, Department of Biology, Alpine, TX.
- 3:30 G 108 LANDSCAPE CHANGE NEAR WHITE-WINGED DOVE NESTING COLONIES IN NORTHEASTERN MÉXICO.
Yara Sánchez*, Fidel Hernández, David G. Hewitt, Eric J. Redeker, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, Kingsville, TX, Jay Roberson, Texas Parks and Wildlife Department, Austin, TX, and T. Wayne Schwertner, Texas Parks and Wildlife Department, Mason, TX.
- 3:50 S 181 COMPARATIVE PLANT POPULATION AND COMMUNITY DYNAMICS IN A SOUTH TEXAS SALT MARSH RECEIVING TREATED WASTEWATER.
M.G. Forbes*, Baylor University, Waco, TX, Dunton, K. H., University of Texas Marine Science Institute, Port Aransas, TX, Doyle, Robert, Baylor University, Waco, TX.
- 4:10 Distinguished Texas Scientist Presentation, BSB B110**
- 5:00 All Section Chairs Meeting, BSB B110**

CONSERVATION ECOLOGY POSTERS

- P168 S ANALYSIS OF BAT CALLS FROM EXURBAN ASPEN AND GAMBEL OAK-DOMINATED HABITATS IN UTAH.
Tommy Pettit* and Kenneth T. Wilkins, Department of Biology, Baylor University, Waco, TX.
- P247 G AGE ANALYSIS OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) STRANDED ALONG THE TEXAS GULF COAST.
Christopher Marshall and Rachel Neuenhoff*, Texas A&M University at Galveston, Galveston, TX.
- P259 S EVALUATION OF POTENTIAL HABITAT FOR DESERT BIGHORN SHEEP IN COAHUILA, MEXICO.
Alejandro Espinosa-T*, Desert Bighorn Sheep Restoration Program, CEMEX-Sustainability Vice-Presidency, Monterrey, NL, MX, Andrew V. Sandoval, Borrego Cimarron Wildlife Consulting, Chacon, NM, Mario Garcia-A., Facultad de Ciencias Forestales, Universidad Autonoma de Nuevo León, NL, MX, Armando J. Contreras-B., Laboratorio de Ornitología Facultad de Ciencias Biológicas, Universidad Autonoma de Nuevo Leon, San Nicolas de los Garza, NL, MX.
- P260 S SITE-SPECIFIC HABITAT ANALYSIS OF SIERRA MADERAS DEL CARMEN AND SIERRA SAN MARCOS Y DEL PINO FOR THE INITIAL RESTORATION OF DESERT BIGHORN SHEEP (*OVIS CANADENSIS*) IN COAHUILA, MEXICO.
Alejandro Espinosa-T*, Desert Bighorn Sheep Restoration Program, CEMEX, Sustainability Vice-presidency, Monterrey, NL, MX, Armando J. Contreras-B., Laboratorio de Ornitología Facultad de Ciencias Biológicas, Universidad Autonoma de Nuevo Leon, San Nicolas de los Garza, NL, MX, Andrew V. Sandoval, Borrego Cimarron Wildlife Consulting, Chacon, NM, Mario Garcia-A., Facultad de Ciencias Forestales, Universidad Autonoma de Nuevo Leon, San Nicolas de los Garza, NL, MX.

ENVIRONMENTAL SCIENCE

Session I

Friday, March 2 • BSB A236

- 8:40 GJ 83 URANIUM-INDUCED OXIDATIVE STRESS ACTIVATES APOPTOTIC SIGNALING PATHWAY IN RAT LUNG EPITHELIAL CELLS.
Adaikkappan Periyakaruppan*, Chidananda S. Sharma, Shubhashish Sarkar, Renard Thomas, Bobby L. Wilson and Govindarajan T. Ramesh. Molecular Neurotoxicology Laboratory/Proteomics Core, Department of Biology, Texas Southern University, Houston, TX.
- 9:00 GJ 169 HUMAN HAIR AS AN INDICATOR OF EXPOSURE TO ENVIRONMENTAL TOXICANTS.
Charlotte A. Smith-Baker*, Fawzia Abdel-Rahman, James H. Nance and Mahmoud A. Saleh, Department of Chemistry, Texas Southern University, Houston, TX.
- 9:20 GJ 197 BIOLOGICAL ACTIVITY OF ROSES.
Wenluo Zhang*, Florence Doziel, Fawzia H. Abdel-Rahman and Mahmoud A. Saleh, Department of Chemistry, Texas Southern University, Houston, TX.
- 9:40 U 4 EFFECT OF TEMPERATURE ON TOXICITY OF A PYRETHRIN INSECTICIDE TO MOUNTAIN SPINY LIZARDS (*SCELOPORUS JARROVII*).
Fred Punzo*, Dept. of Biology, University of Tampa, Tampa, FL.

10:00

Poster Break, BSB 1st floor halls

- 10:50 U 79 RISK ASSESSMENT OF VOLATILE ORGANIC COMPOUNDS (VOCs) EXPOSURES IN INDOOR PARKING FACILITIES.
Gabriel A. Kristanto*, Felicia L. Conley, Renard L. Thomas, and Bobby L. Wilson., Environmental Toxicology Program, Department of Chemistry, Texas Southern University, Houston, TX.
- 11:10 U 81 GEOLOGIC CONTROL OF STREAM WATER COMPOSITION IN CHEROKEE, SMITH AND RUSK COUNTIES, TEXAS.
Melinda G. Shaw *, Alyx S. Frantzen and Ernest B. Ledger, Department of Geology and Department of Chemistry, Stephen F. Austin State University, Nacogdoches, TX.
- 11:30 U 190 ANTIFUNGAL PROPERTIES OF ESSENTIAL OILS OF SELECTED SEEDS OF THE FAMILY APIACEAE.
Torrye D. Hooper*, Fawzia H. Abdel-Rahman and Mahmoud A. Saleh. Biology Department. Texas Southern University. Houston, TX.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 U 231 GENETIC DIVERSITY OF *XYLELLA FASTIDIOSA* STRAINS IN AND AROUND TEXAS VINEYARDS.
Dennis Garcia*, Shermel Maddox* and Lisa Morano*, University of Houston – Downtown, Houston, TX.
- 2:10 G 19 THE PRELIMINARY ANALYSIS AND CHARACTERIZATION OF ENDOCRINE DISRUPTING COMPOUNDS IN AQUATIC ENVIRONMENTS UTILIZING LIQUID CHROMATOGRAPHY – DIODE ARRAY DETECTION – MASS SPECTROMETRY (LC – DAD – MS).
Katoria Tatum-Gibbs*, Renard L. Thomas, and Bobby L. Wilson, NASA University Research Center for Biotechnology & Environmental Health, Texas Southern University, Houston, TX.
- 2:30 G 25 COMPARISON OF VARIOUS METALS ON THE EFFECTS OF OXIDATIVE STRESS USING 8-HYDROXY,2-DEOXYGUANOSINE AS A BIOMARKER.
Eugene A. Gibbs-Flournoy*, Renard L. Thomas, Bobby L. Wilson, NASA University Research Center for Biotechnology & Environmental Health, Texas Southern University, Houston, TX.
- 2:50 G 164 WATER/SEDIMENT ANALYSIS OF THE HOUSTON SHIP CHANNEL.
Adedotun Adebowale*, Adetoun Aboaba, Herb Nance and Mohmoud A. Saleh Department of Chemistry, Texas Southern University, Houston, TX.
- 3:10 S 28 TRANSPORT OF ARSENIC IN AYISH BAYOU STREAM SEDIMENT, SAN AUGUSTINE COUNTY, TEXAS.
Walter F. Killion III, University of Arkansas and Ernest Ledger*, Stephen F. Austin State University, Nacogdoches, TX.
- 3:30 S 74 FISH ASSEMBLAGES IN AN URBAN AQUATIC SYSTEM WITH TWO CONTRASTING WATER SOURCES.
Robert J. Edwards, Department of Biology, University of Texas-Pan American, Edinburg, TX.
- 3:50 S 210 PHYSICAL AND HYDROLOGICAL FACTORS ASSOCIATED WITH ELEVATED INDICATOR BACTERIA WITHIN LAKE MADELINE, GALVESTON, TEXAS.
Kelli Haskett*, George Guillen, Heather Biggs, Susan Moore, University of Houston – Clear Lake, Clear Lake, TX.

4:10 Distinguished Texas Scientist Presentation, BSB B110

5:00 All Section Chairs Meeting, BSB B110

ENVIRONMENTAL SCIENCE POSTERS

- P2 G EVALUATION OF NICKEL(II) CATION IN THE AMMONIA RECOVERY PROCESS.
Mahesh Paladugu and Paul Loeffler*, Sam Houston State University, Huntsville, TX.
- P43 UJ THE EFFECTS OF RADIATION & CULTIVAR ON SOY-FOODS.
Apollonia McMillan*, SESIP Program-Texas Southern University Houston, TX, Lester Wilson, Faculty Fellows Program – Iowa State University, Ames, IA and Steve French, NASA Johnson Space Center Food Laboratory Houston, TX.
- P45 UJ A COMPARISON OF VOLATILE ORGANIC COMPOUNDS IN NEW HOMES, OLDER HOMES AND THEIR OUTSIDE ENVIRONMENT.
Alicia Newman*, Corina McIntosh and Felicia L. Conley. Texas Southern University, Houston, TX.
- P58 G TOLUENE AND XYLENE INDUCED EXPRESSION OF STRESS PROTEIN DETERMINED BY GENE ARRAY ANALYSIS IN KIDNEY CELLS.
Kahkashan Malik*, Gabriel Kristanto, Felicia Conley, Renard L. Thomas, Bobby L. Wilson, Texas Southern University. Houston, TX.
- P76 UJ PREFERENTIAL BIODEGRADATION OF DIESEL FUEL HYDROCARBON COMPONENTS.
Josh Crowell, Meagan Johnson*, Gary Stanlake, Justin Gates, Richard Garner, Hardin-Simmons University, Abilene, TX.
- P78 UJ USE OF FLUOROMETRY IN KINETIC STUDIES OF HYDROCARBON BIODEGRADATION.
Josh Crowell*, Tracie King, Gary Stanlake, and Richard Garner. Hardin-Simmons University, Abilene, TX.
- P83 G URANIUM-INDUCED OXIDATIVE STRESS ACTIVATES APOPTOTIC SIGNALING PATHWAY IN RAT LUNG EPITHELIAL CELLS.
Adaikkappan Periyakaruppan*, Chidananda S. Sharma, Shubhashish Sarkar, Renard Thomas, Bobby L. Wilson and Govindarajan T. Ramesh. Molecular Neurotoxicology Laboratory/Proteomics Core, Department of Biology, Texas Southern University, Houston, TX.
- P85 G ASSESSMENT OF AQUATIC ENVIRONMENTAL ESTROGENS IN THE LOWER GALVESTON BAY WATERSHED.
Bita Maki*, Renard Thomas and Bobby Wilson, Department of Chemistry, Texas Southern University, Houston, TX.
- P196 S NANO ANALYSIS OF HERBAL SEEDS OF THE APIACEAE FAMILY.
Fawzia Abdel-Rahman*, Torrye Hooper, Jennifer Walker, Brooke Woodard, Wenlou Zhang, Kristina Casmire, Ezekeil Hudson II, Herb Nance and Mahmoud Saleh. NASA University Research Center for Biotechnology and Environmental Health, Texas Southern University, Houston, TX.
- P220 UJ A PENCIL-BASED SENSOR FOR ENVIRONMENTAL MONITORING AND REMEDIATION.
Cynthia Garza*, Ambar Cancino, Mian Jiang, and Larry G. Spears, Department of Natural Sciences, University of Houston – Downtown, Houston, TX.
- P232 UJ EVALUATION OF MICROBIAL COMMUNITIES WITHIN POTATOES WITH AND WITHOUT ZEBRA CHIP SYMPTOMS TO DETERMINE CAUSAL DISEASE ORGANISM.
Jonathan Barchas*, Mike Carolan* and Lisa Morano, University of Houston – Downtown, Houston, TX.

FRESHWATER AND MARINE SCIENCE

Session I

Friday, March 2 • BSB B110

- 8:20 UJ 63 A GROSS MORPHOLOGICAL AND HISTOCYTOLOGICAL ANALYSIS OF GASTROINTESTINAL FUNCTION IN PYGMY AND DWARF SPERM WHALES (*KOGIA BREVICEPS* AND *K. SIMA*).
A.L. Moss* and C.D. Marshall, Texas A&M University Galveston, TX.
- 8:40 UJ 68 FATTY ACID COMPOSITION IN MAYFLY (*HEXAGENIA LIMBATA*) NAIADS AND ADULTS FROM LAKE ARROWHEAD, TEXAS.
Kristen M. Wellington*, Roy C. Vogtsberger, and Michael M. Shipley, Department of Biology, Midwestern State University, Wichita Falls, TX.
- 9:00 UJ 97 GRASS SHRIMP DETECTION AND RESPONSE TO PREDATORY AND NON-PREDATORY FISHES.
Jason A. Mills*, Richard L. Pollock and Andrew C. Kasner, Department of Biology, Center for Coastal and Marine Studies, Lamar University, Beaumont, TX.
- 9:20 UJ 118 GROWING AT A SNAIL'S PACE: NEGATIVE IMPACTS OF SALINITY AND HIGH DENSITY ON GROWTH MEASURES OF *P. INSULARUM*.
Abigail K. Youens*, Brandon B. Boland, and Romi L. Burks, Southwestern University, Georgetown, TX.
- 9:40 GJ 124 SPATIAL AND TEMPORAL FOOD WEB ANALYSIS OF POTENTIAL, ESSENTIAL FISH HABITAT TYPES IN LAVACA BAY, TEXAS.
Jenny L. Wrast*, Texas A&M University-Corpus Christi, Corpus Christi, TX., James Simons, Texas Parks and Wildlife Department, Corpus Christi, TX., Gregory W. Stunz, Texas A&M University – Corpus Christi, Corpus Christi, TX.
- 10:00 Poster Break, BSB 1st floor halls**
- 10:50 GJ 143 PHOSPHORUS LIMITATION OF GROWTH VARIES ACROSS DEVELOPMENTAL CLASSES OF THE MAYFLY *CAENIS* SPP.
Jason M. Taylor*, Kari Fallert, and Ryan S. King, Dept. of Biology, Center for Reservoir And Aquatic Systems Research, Baylor University, Waco, TX.
- 11:10 GJ 185 IN TOO DEEP: EGG CLUTCH WATER EXPOSURE MAY SUPPRESS HATCHING AND INCREASE CONSPECIFIC PREDATION OF EGGS IN THE POTENTIALLY INVASIVE APPLESNAIL *POMACEA INSULARUM*.
Matthew A. Barnes*, Abigail K. Youens, Sarah A. Hensley, and Romi L. Burks, Southwestern University, Georgetown, TX.
- 11:30 GJ 203 ESTIMATING THE EFFECTS OF NUTRIENT ENRICHMENT ON ALKALINE PHOSPHATASE ACTIVITY (APA) AND NITROGEN (N₂) FIXATION USING A NOVEL NUTRIENT DIFFUSING SUBSTRATE.
David A. Lang*, J. Thad Scott, and Ryan S. King. Center for Reservoir and Aquatic Systems Research, Department of Biology, Baylor University, Waco, TX.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 GJ 214 SEASONAL ABUNDANCE AND DISTRIBUTION OF MYSIS AND POSTLARVAL WHITE AND BROWN SHRIMP IN KEITH LAKE ESTUARINE SYSTEM.
Richard Pollock* and Andrew Kasner, Lamar University, Beaumont, TX.
- 2:10 GJ 244 CHARACTERIZATION OF METAL-REDUCING BACTERIAL POPULATIONS FROM DIFFERENT SUBTROPICAL

AND TROPICAL AQUATIC ECOSYSTEMS.

Omar R. Elizondo*, Domingo Molina and Kristine L. Lowe. University of Texas – Pan American, Edinburg, TX.

2:30 GJ 251 CHEMICAL TOXICITY DISTRIBUTIONS AS AN APPROACH TO ASSESS THE SENSITIVITIES OF COMMON IN VITRO AND IN VIVO ASSAYS OF ENVIRONMENTAL ESTROGENICITY.

Laura L. Dobbins*, Richard A. Brain and Bryan W. Brooks, Baylor University, Waco, TX.

2:50 U 148 ABUNDANCE AND DIVERSITY OF DRAGONFLIES SURROUNDING MCLENNAN COUNTY RESERVOIRS.

Isis Dominguez* and Darrell Vodopich, Biology Dept., Baylor University, Waco, TX.

3:10 U 195 CARBON-SOURCE UTILIZATION PROFILES OF *ESCHERICHIA COLI* ISOLATES FROM VARIOUS MAMMALIAN SPECIES.

R. Bryn Cooper, Baylor University, Waco, TX.

3:30 U 243 SHELL FORMATION IN A FRESHWATER CLAM.

Francis Horne, Biology Department, Texas State University, San Marcos, TX.

3:50 G 24 AN ANALYSIS OF AQUATIC MACRO-INVERTEBRATE COMMUNITIES IN WEST TEXAS SPRINGS.

Jaimie Maher* and Glenn Longley. Texas State University, San Marcos, TX.

4:10 Distinguished Texas Scientist Presentation, BSB B110

5:00 All Section Chairs Meeting, BSB B110

FRESHWATER AND MARINE SCIENCE

Session II

Friday, March 2 • BSB C105

9:00 G 176 THE DISTRIBUTION AND EXPANSION OF *ARUNDO DONAX* (GIANT REED), AN INVASIVE RIPARIAN PLANT SPECIES, ALONG THE LAKE BRAZOS CORRIDOR.

Sharon Conry*, Melissa Mullins, and Robert Doyle, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX.

9:20 G 191 GROUNDWATER MONITORING OF MILL SPRING IN TOM GREEN COUNTY OF WEST CENTRAL TEXAS.

David A. Ballard* and Ned E. Strenth, Department of Biology, Angelo State University, San Angelo, TX, Dan Brown, Christoval, TX.

9:40 G 252 SEDIMENT CONTAMINATION BY URBAN-USE INSECTICIDES IN WATERSHEDS NEAR RESIDENTIAL AREAS IN CENTRAL TEXAS, USA.

Emily P. Hintzen* and Jason B. Belden, Department of Environmental Studies, Baylor University, Waco, TX.

10:00 Poster Break, BSB 1st floor halls

10:50 OPEN

11:10 OPEN

11:30 OPEN

11:50 Sectional Business Meeting

12:00 Lunch, Cashion Center

1:15 TAS Business Meeting, BSB B110

- 1:50 G 253 WATER QUALITY AND LIMNOLOGICAL GRADIENTS IN AN EFFLUENT-DEPENDENT CHAIN OF URBAN RESERVOIRS.
Barry Fulton*, J. Thad Scott, Theodore Valenti, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX, Michael Hooper, Texas Tech University, Lubbock, TX, Bryan W. Brooks,, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX.
- 2:10 G 254 RISK ASSESSMENT OF IONIZABLE COMPOUNDS: DOES IONIZATION STATE MATTER?
Theodore W. Valenti*, Bryan W. Brooks. Baylor University, Waco, TX.
- 2:30 U 133 A COMPARISON OF CARBON, NITROGEN, AND PHOSPHORUS STOICHIOMETRY AMONG DEVELOPMENTAL CLASSES OF THE MAYFLY *CAENIS* SPP.
Jeffrey A. Back*, Emily Hintzen, and Ryan S. King, Center for Reservoir and Aquatic Systems Research, Department of Biology, Baylor University, Waco, TX.
- 2:50 S 150 WATER QUALITY IN THE BAHIA GRANDE FOLLOWING RESTORATION OF TIDAL FLOW.
Hudson DeYoe*, Reuben Trevino, Erin Bieberbach and Antonio Villarreal. Center for Subtropical Studies and Biology Dept. University of Texas – Pan American, Edinburg, TX.
- 3:10 S 16 RE-DISCOVERY OF THE TROPICAL GREEN MACROALGA, *PENICILLUS CAPITATUS* LAMARCK (CHLOROPHYTA: BRYOPSIDALES), IN LOWER LAGUNA MADRE, TEXAS.
Joseph L. Kowalski* Department of Biology and the Center for Subtropical Studies, The University of Texas - Pan American, Edinburg, TX, Donald L. Hockaday and Gilbert H. Boza, Jr., Coastal Studies Laboratory and the Center for Subtropical Studies, The University of Texas - Pan American, South Padre Island, TX and Hudson R. DeYoe, Department of Biology and the Center for Subtropical Studies, The University of Texas - Pan American, Edinburg, TX.
- 3:30 S 32 OXBOW LAKES HYDROLOGIC AND BIOTIC CONNECTIVITY WITH THE LOWER BRAZOS RIVER.
Ray Mathews*, Jordan Furnans, Texas Water Development Board; Kirk Winemiller, Steve Zeug, Texas A&M University; Tim Bonner, Casey Williams, Texas State University; Tim Osting, Espey Consultants Inc.
- 3:50 S 6 SPHAERIACEAN CLAM DISTRIBUTION IN TEXAS.
Jesse Todd, MA Consulting/AR Consultants, Inc., Carrollton, TX.
- 4:10 Distinguished Texas Scientist Presentation, BSB B110**
- 5:00 All Section Chairs Meeting, BSB B110**

FRESHWATER AND MARINE SCIENCE POSTERS

- P147 UJ GRAZING EFFICIENCIES OF THREE MARINE SNAILS, *LITTORINA IRRORATA*, *ANACHIS AVARA*, *BULLA STRIATA* FROM THE LOWER LAGUNA MADRE, TEXAS.
Antonio Villarreal* and Hudson DeYoe, Biology Dept and Center for Subtropical Studies, University of Texas – Pan American, Edinburg, TX.
- P218 G CHARACTERIZATION OF A HIGH ENERGY MACROALGAL COMMUNITY IN QUINTANA ROO, MEXICO USING DIGITAL IMAGE ANALYSIS.
Ryan L. Fikes*, Leslie C. Smith, and Roy L. Lehman. Center for Coastal Studies, Texas A&M University-Corpus Christi, Corpus Christi, TX.

BLANCO RIVER SYMPOSIUM

Session I

Friday, March 2 • BSB D109

- 9:20 S 230 BLANCO RIVER SYMPOSIUM: STATE OF RIVERS IN TEXAS: THE BLANCO RIVER PROJECT.
Andy Sansom, River Systems Institute, Texas State University-San Marcos, San Marcos, TX.
- 9:40 G 50 BLANCO RIVER SYMPOSIUM: REPRODUCTIVE ECOLOGY AND DIET OF THE GRAY REDHORSE.
Preston T. Bean* and Timothy H. Bonner, Department of Biology, Texas State University – San Marcos, TX.
- 10:00 Poster Break, BSB 1st floor halls**
- 10:50 GJ 180 BLANCO RIVER SYMPOSIUM: MACROINVERTEBRATE STRUCTURE AND DRIFT IN THE BLANCO RIVER: A KARST TEXAS STREAM SUBJECT TO HYDROLOGIC VARIABILITY.
David R. Pendergrass* , Department of Biology, Texas State University, San Marcos, TX, and Thomas L. Arsuffi, Field Research Station, Texas Tech University, Junction, TX.
- 11:10 GJ 237 BLANCO RIVER SYMPOSIUM: HYDROLOGY AND BIOLOGY OF CYPRESS CREEK.
John E. Dedden* and G. Longley, Aquatic Biology and Edwards Aquifer Research Center, Texas State University, San Marcos, TX.
- 11:30 U 212 BLANCO RIVER SYMPOSIUM: CAN INVASIVENESS OF NATIVE CYPRINIDS BE PREDICTED FROM LIFE HISTORY TRAITS? A COMPARISON BETWEEN TWO CYPRINIDS IN THE BLANCO RIVER, TEXAS.
Bradley M. Littrell*, and Timothy H. Bonner, Texas State University – San Marcos, San Marcos, TX.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 U 123 BLANCO RIVER SYMPOSIUM: DISTRIBUTION OF CAGLE'S MAP (*GRAPTEMYS CAGLEI*) TURTLE IN THE BLANCO AND SAN MARCOS RIVERS.
Francis L. Rose*, Department of Biology, Texas State University – San Marcos, San Marcos, TX, and Thomas R. Simpson, Wildlife Ecology Program, Department of Biology, Texas State University – San Marcos, San Marcos, TX.
- 2:10 U 246 BLANCO RIVER SYMPOSIUM: INTERACTION OF CLIMATE AND WATER IN THE BLANCO RIVER, TEXAS.
A.W. Groeger and M.S. Cave*, Dept. of Biology, Texas State University – San Marcos, San Marcos, TX.
- 2:30 G 75 BLANCO RIVER SYMPOSIUM: SURFACE AND GROUNDWATER INTERACTIONS IN A SUBTROPICAL KARST STREAM.
Michael Cave* and Alan Groeger, Texas State University, San Marcos, TX.
- 2:50 S 51 BLANCO RIVER SYMPOSIUM: SPATIAL AND TEMPORAL PATTERNS IN THE BLANCO RIVER FISH ASSEMBLAGE.
Timothy H. Bonner*, Preston T. Bean, and Bradley M. Littrell, Department of Biology, Texas State University, San Marcos, TX.
- 3:10 S 159 BLANCO RIVER SYMPOSIUM: CONSERVATION PLANNING AND MANAGEMENT OF RIPARIAN HABITATS IN THE BLANCO RIVER WATERSHED.
Steve Jester, The Nature Conservancy, Wimberley, TX, Lacey Halstead, and Ryan Smith*, The Nature Conservancy, San Antonio, TX.

- 3:30 S 187 BLANCO RIVER SYMPOSIUM: MODELING FUTURE FLOWS IN THE BLANCO RIVER UNDER VARIOUS DEVELOPMENT AND RAINFALL SCENARIOS.
Joanna C. Curran, Department of Geography, Texas State University – San Marcos, San Marcos, TX.
- 3:50 U 239 BLANCO RIVER SYMPOSIUM: A MULTI-PARTNERSHIP AND MULTI-DISCIPLINARY APPROACH TO THE CONSERVATION AND ECOLOGICAL STUDY OF THE BLANCO RIVER WATERSHED IN TEXAS.
T.L. Arsuffi*, Llano River Field Station, Texas Tech University, Junction, TX, Jim Bergan, The Nature Conservancy, San Antonio, TX, A.W. Groeger and T. Bonner, Aquatic Station, Texas State University, San Marcos, TX.
- 4:10 Distinguished Texas Scientist Presentation, BSB B110**
- 5:00 All Section Chairs Meeting, BSB B110**

GEOSCIENCES

Session I

Friday, March 2 • BSB C231

- 9:40 GJ 67 STATISTICAL ANALYSIS OF PHYSICAL CHARACTERISTICS OF LOWER PERMIAN SPIRALED HETEROPOLAR BROMALITES FROM ARCHER COUNTY TEXAS.
Christen Shelton*, Michael M. Shipley, Chris Hansen, and Pamela Buzas-Stephens, Midwestern State University, Wichita Falls, TX.
- 10:00 Poster Break, BSB 1st floor halls**
- 10:50 GJ 226 INVERTEBRATES IN VERTEBRATES: A STUDY IN VERTEBRATE TAPHONOMY UTILIZING COMPUTED TOMOGRAPHY (CT).
Eric G. Ekdale*, Matthew W. Colbert, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, and Allan A. Ekdale, Department of Geology and Geophysics, University of Utah.
- 11:10 UJ 217 THE *CORBULA* BED AND *SALENIA TEXANA* ZONE: DEFINING AN INTERVAL BETWEEN THE LOWER AND UPPER GLEN ROSE FORMATION BASED ON FAUNAL ANALYSIS AND DIGITAL DATA FROM CANYON LAKE, TEXAS.
Rebecca Comeaux*, Elizabeth Dunn, Christian George, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, Austin, TX, Ann Molineux, Texas Natural Science Center, Austin, TX, and William Ward, University of New Orleans, New Orleans, LA.
- 11:30 G 139 PALEONTOLOGIC RECOGNITION OF THE OS CORDIS.
Jeri Rodgers, University of Texas at Austin, Austin, TX.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 G 222 DIGITAL METHODS IN FIELD GEOLOGY: A CASE STUDY AT CANYON LAKE SPILLWAY, COMAL COUNTY, TEXAS.
Christian O. George*, Rebecca Comeaux, Elizabeth Dunn, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, and Ann Molineux, Texas Natural Science Center, The University of Texas at Austin, Austin, TX..

- 2:10 U 109 WEATHERING AND SLOPE STABILITY OF GRAVE MARKERS IN FIVE CEMETERIES IN CENTRAL TEXAS.
R. LaRell Nielson*, Chris A. Barker, Patricia S. Sharp, Melinda Shaw, and Wesley A. Brown, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX.
- 2:30 U 178 CONTRIBUTION OF CADMIUM FROM LIGNITE IN THE YEGUA FORMATION, ANGELINA COUNTY, TEXAS.
Marcy Stonecipher*, Stephen F. Austin State University, Nacogdoches, TX, Glen Collier, Hydrex Environmental, Inc., and Ernest and R. LaRell Nielson, Stephen F. Austin State University, TX.
- 2:50 S 46 DIFFERENTIATING PEDOGENESIS FROM DIAGENESIS IN EARLY TERRESTRIAL PALEOWEATHERING SURFACES FORMED ON GRANITIC COMPOSITION PARENT MATERIALS.
Steven G. Driese*, Baylor University, Waco, TX; L. Gordon Medaris, University of Wisconsin, Madison, WI; Anthony C. Runkel, Minnesota Geological Survey, Minneapolis, MN; Minghua Ren and Richard P. Langford, University of Texas, El Paso, TX.
- 3:10 U 48 LACCOLITHS OF THE MUSQUIZ CANYON AREA, DAVIS MOUNTAINS, TEXAS.
Don F. Parker, Department of Geology, Baylor University, Waco, TX.
- 3:30 U 106 MACRO- AND MICROTECTONIC FEATURES IN THE BURRO MOUNTAINS, SW NEW MEXICO, AND THEIR IMPLICATION FOR EVOLUTION OF SOUTHERN LAURENTIA: PRELIMINARY RESULTS.
Manetta Dillingham* and C. A. Barker, Stephen F. Austin State University, Nacogdoches, TX.
- 3:50 S 174 UNUSUAL PATTERNS OF FAULTING IN THE EASTERN MARGIN OF THE TEXAS LINEAMENT, BIG BEND NATIONAL PARK.
Joseph I. Satterfield* and Jonathan E. Dyess, Angelo State University, San Angelo, TX.

4:10 Distinguished Texas Scientist Presentation, BSB B110

5:00 All Section Chairs Meeting, BSB B110

GEOSCIENCES POSTERS

- P59 U EFFECTS OF ENGINEERING STRUCTURES ON A NATURAL LONGSHORE-CURRENT SYSTEM, BOLIVAR PENINSULA, TEXAS.
Angelique M. Forgas*, Donald E. Owen, Lamar University, Beaumont, TX.
- P113 S REVIVING THE TRADITION OF SOUTHWESTERN ASSOCIATION OF STUDENT GEOLOGICAL SOCIETIES (SASGS) FIELD TRIPS.
James Westgate, Richard Ashmore, Donald Owen, Lamar University, Beaumont, TX.
- P165 UJ CAUSES OF TWO PHASES OF FOLDS IN THE DEVILS DEN AREA, BIG BEND NATIONAL PARK.
Jonathan E. Dyess* and Joseph I. Satterfield, Angelo State University, San Angelo, TX.
- P184 UJ THE GEOCHEMISTRY OF BERYL AND ITS IMPLICATION FOR THE CLASSIFICATION OF GRANITIC PEGMATITES.
Ana Collins*, Jackson School of Geosciences, University of Texas at Austin, Austin, TX, and Michael Wise, Department of Mineral Sciences, Smithsonian Institution, Washington, DC.

MATHEMATICS

Session I

Friday, March 2 • BSB D109

8:20	U	41	GENERALIZATION OF THE PASCAL MATRICES TO RECTANGULAR MATRICES. Johanna Ramirez, Texas Lutheran University, Seguin, TX.
8:40	U	57	ANALYTIC APPROACH TO POLYGONAL AREA. Elsie M. Campbell* and Dionne T. Bailey*, Angelo State University, San Angelo, TX.
9:00	S	54	DENSITY FUNCTION ESTIMATION USING A KERNEL ESTIMATOR BASED ON TRANSFORMED DATA. E. D. McCune*, Department of Mathematics and Statistics, Stephen F. Austin State University, Nacogdoches, TX, and Sandra L. McCune, Department of Elementary Education, Stephen F. Austin State University, Nacogdoches, TX.

SCIENCE EDUCATION

Session I

Friday, March 2 • BSB D110

8:40	S	7	MEASURING ATTITUDES TOWARD STATISTICS IN BUSINESS STUDENTS. Yeong Nain Chi, Rafael Otero, and Robert Rivera*, The University of Texas at Brownsville, Brownsville, TX.
9:00	S	12	INTERNET-BASED ASTERIOD SEARCH PROJECT FOR HIGH SCHOOL & COLLEGE STUDENTS. J. Patrick Miller, Department of Mathematics, Hardin-Simmons University, Abilene, TX; Jeffrey W. Davis*, Honors Program, Hardin-Simmons University, Abilene, TX; Carlton R. Pennypacker, Hands-On Universe, Lawrence Berkeley National Laboratory; and Graeme L. White, Centre for Astronomy, James Cook University, Townsville, Australia.
9:20	S	116	THE PCHEM PROJECTS: PART 1 – RESEARCH OPPORTUNITIES IN THE PHYSICAL CHEMISTRY LABORATORY. Alyx S. Frantzen*, Stephen F. Austin State University, Nacogdoches, TX.
9:40	U	125	THE PCHEM PROJECTS: PART 2 – SLUMMING WITH THE BIOCHEMISTS. Michele R. Harris* and Alyx S. Frantzen. Stephen F. Austin State University, Nacogdoches, TX.
10:00			Poster Break, BSB 1st floor halls
10:50	S	250	EXEMPLARY SCIENCE TEACHING IN TAKS-TESTED SCIENCE CLASSROOMS. Cherie A. McCollough, Texas A&M University – Corpus Christi, Corpus Christi, TX.
11:10-11:50			2007 Outstanding Texas Educator Presentation Lynn Seman: Elementary Science Education – Past, Present, and Future
11:50			Sectional Business Meeting
12:00			Lunch, Cashion Center
1:15			TAS Business Meeting, BSB B110
1:50			OPEN
2:10			OPEN

2:30			OPEN
2:50	I	255	TEXAS SCIENCE EDUCATION SYMPOSIUM: THE T-STEM INITIATIVE: PREPARING STUDENTS FOR THE 21ST CENTURY WORKFORCE. Kelvey Oeser, Texas High School Project.
3:10	I	256	TEXAS SCIENCE EDUCATION SYMPOSIUM: STAT SCIENCE TEKS REVISION COMMITTEE. Kaycie Sullivan*, Texas Tech University Junction Outdoor School, Junction, TX and Kenn Heydrick, Science Teachers Association of Texas, Austin, TX.
3:30	I	257	TEXAS SCIENCE EDUCATION SYMPOSIUM: SYNERGIZING P-16 SCIENCE EDUCATION PARTNERSHIPS. Carol Fletcher, Texas Regional Collaboratives for Excellence in Science Education, University of Texas at Austin, Austin, TX.
3:50	I	258	TEXAS SCIENCE EDUCATION SYMPOSIUM: SCIENCE EDUCATION IN THE STATE OF TEXAS; UPCOMING CHANGES. Irene Pickhardt, Texas Education Agency, Austin, TX.
4:10			Distinguished Texas Scientist Presentation, BSB B110
5:00			All Section Chairs Meeting, BSB B110

SCIENCE EDUCATION POSTERS

P26	S		CHEMISTRY CONNECTIONS: A NON-SCIENCE MAJORS COURSE UTILIZING A MODULAR APPROACH. Kerry Bruns and Willis Weigand*, Southwestern University, Georgetown, TX.
P65	G		MARSH MADNESS: A SCIENCE EDUCATION ADVENTURE FOCUSED ON WETLAND ENVIRONMENTS. Robert D. Doyle, Melissa L. Mullins*, Baylor University, Waco, TX and Nora Y. Schell, City of Waco, Waco, TX.

SYSTEMATICS AND EVOLUTIONARY BIOLOGY

Session I

Friday, March 2 • BSB E125

9:00	GJ	224	MOLECULAR IDENTIFICATION AND PHYLOGENY OF CRYPTIC AFRICAN SHREWS INFERRED FROM CYTOCHROME-B SEQUENCES. Adam W. Ferguson* and Loren K. Ammerman, Angelo State University, San Angelo, TX.
9:20	GJ	35	LIGHT TRAP SURVEY OF THE FAMILY PSYCHODIDAE (DIPTERA) IN WICHITA FALLS, TEXAS. James R. Todd*, Roy C. Vogtsberger, and Michael M. Shipley, Midwestern State University, Wichita Falls, TX.
9:40	GJ	248	THE PREVALENCE OF CESTODES IN RACCOONS (<i>PROCYON LOTOR</i>) FROM ARCHER AND WICHITA COUNTIES OF NORTH-CENTRAL TEXAS. Samuel W. Kelly* and Norman Horner, Biology Department, Midwestern State University, Wichita Falls, TX.
10:00			Poster Break, BSB 1st floor halls
10:50	GJ	73	DETAILS OF THE SKULL AND BRAINCASE OF UROPELTIS WOODMASONI (ALETHINOPHIDIA: UROPELTIDAE) AS REVEALED BY HIGH RESOLUTION COMPUTED TOMOGRAPHY. Jennifer C. Olori, The University of Texas at Austin, Austin, TX.

- 11:10 GJ 205 USE OF NUCLEAR INTRONS TO DETECT CONGRUENCE AMONG MITOCHONDRIAL AND MORPHOLOGICAL DATA SETS IN THE BONNETED BATS *EUMOPS GLAUCINUS* AND *EUMOPS FLORIDANUS* (CHIROPTERA: MOLOSSIDAE).
Molly M. McDonough* and Loren Ammerman, Angelo State University, San Angelo, TX.
- 11:30 S 219 ZOOGEOGRAPHICAL IMPLICATIONS OF RECENT RECORDS OF LAND SNAILS FROM NORTHERN COAHUILA, MEXICO.
Ned E. Strenth*, Department of Biology, Angelo State University, San Angelo, TX and Alfonso Correo-Sandoval, Laboratorio de Zoologia, Instituto Tecnológico de Cd. Victoria, Tamaulipas, Mexico.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 S 18 OBSERVATIONS ON *PARATEMNOIDES NIDIFICATOR*, A SOCIAL PSEUDOSCORPION IN TRINIDAD, WEST INDIES.
Allan Hook, St. Edward's University, Austin, TX.
- 2:10 U 8 OBSERVATIONS ON *EXOPROSOPA ALBICOLLARIS* (DIPTERA: BOMBYLIIDAE): EMERGENCE AND BEHAVIOR IN A NEST AGGREGATION OF THE SAND WASP, *BEMBECINUS NEGLECTUS* (HYMENOPTERA: CRABRONIDAE).
Michelle Richardson, St. Edward's University, Austin, TX.
- 2:30 G 31 TALES FROM A UNIQUE MATING BEHAVIOR IN BUTTERFLIES.
Catalina Estrada* and Lawrence E. Gilbert. University of Texas at Austin, Austin, TX.
- 2:50 S 34 TRADEOFFS ASSOCIATED WITH LEG REGENERATION IN STICK INSECTS (INSECTA: PHASMIDAE).
Tara L. Maginnis, St. Edward's University, 3001 South Congress Avenue, Austin, TX.
- 3:10 U 188 MORPHOLOGICAL VARIATION AND PHYLOGENETIC RELATIONSHIPS IN THE *CAIMAN CROCODILUS* COMPLEX (REPTILIA: ALLIGATORIDAE).
Jonathan R. Wagner, The University of Texas at Austin, Geol Science Dept. Austin, TX.
- 3:30 S 39 AUDITORY MORPHOLOGY OF THE HISPID COTTON RAT, *SIGMODON HISPIDUS*.
Craig I. White*, The Geneva School, Winter Park, FL, and Kenneth T. Wilkins, Department of Biology, Baylor University, Waco, TX.
- 3:50 U 61 EFFECTS OF ACUTE AND CHRONIC YOHIMBINE ON PACED MATING.
Lawrence Wampler*, Debra Hines, Julie Smith, Ricardo Castaneda, Margaret Wichman, Russell Frohardt, Fay Guarraci, St. Edward's University, Austin, TX.
- 4:10 Distinguished Texas Scientist Presentation, BSB B110**
- 5:00 All Section Chairs Meeting, BSB B110**

SYSTEMATICS AND EVOLUTIONARY BIOLOGY POSTER

- P22 G OCCURRENCE AND DISTRIBUTION OF GREGARINE PARASITES IN CENTRAL TEXAS DRAGONFLIES.
Jason L. Locklin* and Darrell S. Vodopich, Baylor University, Waco, TX.

TERRESTRIAL ECOLOGY AND MANAGEMENT

Session I

Friday, March 2 • BSB C206

- 8:00 S 249 ECOLOGICAL CHARACTERISTICS OF A COLONIZING POPULATION OF EASTERN SCREECH OWLS (*OTUS ASIO*) IN SUBURBAN TEMPLE, TEXAS.
Cherie McCollough, Texas A&M University - Corpus Christi, Corpus Christi, TX.
- 8:20 GJ 38 REASSESSING A LIZARD SURVEY IN BIG BEND NATIONAL PARK.
Daniel J. Leavitt* and Christopher M. Ritzi, Department of Biology, Sul Ross State University, Alpine, TX.
- 8:40 GJ 152 SEXUAL SEGREGATION AND COMMUNITY COMPOSITION: A SEASONAL PERSPECTIVE ON THE BATS OF THE CHISOS MOUNTAINS, BIG BEND NATIONAL PARK.
Carson M. Brown* and Loren K. Ammerman, Angelo State University, San Angelo, TX
- 9:00 GJ 204 RESPONSES OF CAROLINA WREN NESTLINGS TO PARENTAL ALARM CALLS.
Guadalupe Quiroz* and Diane L. H. Neudorf. Sam Houston State University, Huntsville, TX.
- 9:20 GJ 207 PRELIMINARY ANALYSIS OF THE TASTY CHICK HYPOTHESIS AS IT APPLIES TO BROODS OF THE AMERICAN BARN SWALLOW (*HIRUNDO RUSTICA ERYTHROGASTER*).
Beverly L. Cochran*, Jeffrey G. Kopachena, and Frank Miskevich, Texas A&M University-Commerce, Commerce, TX.
- 9:40 GJ 223 NEW COUNTY RECORDS OF OKLAHOMA SMALL MAMMALS BASED ON REMAINS IDENTIFIED IN OWL PELLETS.
Brandon K. McDonald*, Biology Department, Midwestern State University, Wichita Falls, TX, Paul W. Wilson, 10004 E., Collinsville, OK, William Caire, Biology Department, University of Central Oklahoma, Edmond, OK.
- 10:00 Poster Break, BSB 1st floor halls**
- 10:50 UJ 136 EFFECT OF THREE SOIL TYPES ON SEEDLING GROWTH OF *ZEA MAYS*.
Lauren Field*, Erika Muzljakovich, Matt Kerns and Herbert D. Grover. Department of Biology, Hardin-Simmons University, Abilene, TX.
- 11:10 UJ 137 EFFECT OF SOIL STERILIZATION ON *ZEA MAYS* SEEDLINGS GROWN IN THREE SOIL TYPES.
Matt Kerns*, Erika Muzljakovich, Lauren Field and Herbert Grover. Department of Biology, Hardin-Simmons University, Abilene, TX.
- 11:30 U 101 DOMINANCE AND FLOCKING BEHAVIOR IN WINTERING NORTHERN CARDINALS (*CARDINALIS CARDINALIS*).
Sheena K. Humbird* and Diane L.H. Neudorf, Sam Houston State University, Huntsville, TX.
- 11:50 Sectional Business Meeting**
- 12:00 Lunch, Cashion Center**
- 1:15 TAS Business Meeting, BSB B110**
- 1:50 U 151 A FIELD TRIAL OF MORNING VERSUS EVENING DISTANCE SAMPLING OF WHITE-WINGED DOVES IN TEXAS.
Michael F. Small*, Brian L. Pierce, John T. Baccus, Department of Biology, Wildlife Ecology Program, Texas State University – San Marcos, San Marcos, Texas and T. Wayne Schwertner, Texas Parks and Wildlife Department, Upland Game Bird Program, Mason, TX.
- 2:10 U 193 POSSIBLE HISTORIC CHANGES IN RELATIVE USE OF NATURAL AND ANTHROPOGENIC ROOSTS BY THE MEXICAN FREE-TAILED BAT (*TADARIDA BRASILIENSIS*).
Anne E. Merchant* and Kenneth T. Wilkins, Baylor University, Waco, TX.

- 2:30 U 215 DISTRIBUTION, ABUNDANCE, AND HABITAT AFFINITIES OF OKLAHOMA MUSKRATS (*ONDATRA ZIBETHICUS*): NEW INSIGHT FROM TRAPPER REPORTS.
Brandon McDonald, Department of Biology, Midwestern State University, Wichita Falls, TX.
- 2:50 G 52 ASSESSMENT OF WOODLAND BOUNDARY SHIFTS WITHIN BALCONES CANYONLANDS NATIONAL WILDLIFE REFUGE.
Darrel B. Murray* and Joseph D. White, Baylor University, Waco, TX.
- 3:10 G 105 MODELING CENTRAL TEXAS FORESTS FOR FIRE HAZARD PREDICTION.
Mary A. Sides* and Joseph D. White, Department of Biology, Baylor University, Waco, TX.
- 3:30 S 166 ECTOPARASITES AND OTHER ECTOSYMBIOTIC ARTHROPODS OF SMALL MAMMALS IN WESTERN IOWA.
Jonathan J. Storm and Christopher M. Ritzi*, Department of Ecology and Organismal Biology, Indiana State University, Terre Haute, IN and Department of Biology, Sul Ross State University, Alpine, TX.
- 3:50 S 228 SEASONAL VARIATION IN DUNE VEGETATION ON SOUTH PADRE ISLAND, TEXAS.
Frank W. Judd*, Robert I. Lonard, K. Rod Summy, Department of Biology, University of Texas – Pan American, Edinburg, TX and Ruben Mazariegos, Department of Physics and Geology, University of Texas – Pan American, Edinburg, TX.
- 4:10 Distinguished Texas Scientist Presentation, BSB B110**
- 5:00 All Section Chairs Meeting, BSB B110**

TERRESTRIAL ECOLOGY AND MANAGEMENT POSTERS

- P17 U PARENTAL PROVISIONING RATES TO NESTLINGS IN THE GENETICALLY MONOGAMOUS CAROLINA WREN.
Mallory J. Brodrick-Christian* & Diane L.H. Neudorf, Department Biological Sciences, Sam Houston State University, Huntsville, TX.
- P27 U A META-ANALYSIS OF THE EFFECTS OF RISING CO₂ LEVELS ON THE NUTRITIONAL CONTENT OF STAPLE CROPS.
Brian Miller*, Holly Allen and Daniel Taub, Southwestern University, Georgetown TX.
- P33 U THE EFFECTS OF SURFACE TEMPERATURE ON THE ACTIVITY PATTERNS OF *BEMBECINUS NEGLECTUS* (HYMENOPTERA: CRABRONIDAE: BEMBECINAE).
Cameron Siddens, St. Edward's University, Austin, TX.
- P70 UJ EFFECT OF DISTURBANCE, POSITION OF OBSERVER, AND MOONLIGHT ON ANURAN CALL SURVEY EFFICIENCY.
Jose R. Granda* Benjamin A. Pierce and Jessica Hua, Southwestern University, Georgetown, TX.
- P71 UJ SALINITY TOLERANCE OF TADPOLES FROM CENTRAL TEXAS.
Jessica Hua,* Benjamin A. Pierce, and Jose R. Granda, Southwestern University, Georgetown, TX.
- P72 S CHARACTERIZATION OF AN INSECT POLLINATOR COMMUNITY IN A NORTHERN CHIHUAHUAN DESERT BOTANICAL GARDEN, CHIHUAHUAN DESERT RESEARCH INSTITUTE, JEFF DAVIS COUNTY, TEXAS.
Cynthia G. McAlister* and Christopher M. Ritzi, Department of Biology, Sul Ross State University, Alpine, TX.
- P172 S DOMINANCE OF FIRE-SENSITIVE SPECIES IN THE SMALL MAMMAL COMMUNITY OF A TALLGRASS PRAIRIE REMNANT.
Brianna N. Kirchner*, Nicholas S. Green, Cathleen N. Early, Kenneth T. Wilkins, Baylor University, Waco, TX.
- P189 G RELATIONSHIP BETWEEN ARTIFICIAL STRUCTURES AND SURROUNDING HABITAT VARIABLES AS PREDICTORS OF POTENTIAL BAT DAY ROOSTS: COMPARISON STUDY OF PATTERNS IN INDIANA AND TEXAS.
Tara M. Poloskey* and Christopher M. Ritzi, Department of Biology, Sul Ross State University, Alpine, TX.
- P225 UJ HELMINTH PARASITES OF RED-WINGED BLACKBIRDS (*AGELAIUS PHOENICEUS*) FROM SOUTHEAST TEXAS.
Cary Nunez*, Randall Yoder and Andrew Kasner, Department of Biology, Lamar University, Beaumont TX.

A B S T R A C T S

ANTHROPOLOGY

- 103 RECONSTRUCTING THE EVOLUTION OF THE LINEAR B WRITING SYSTEM USING PHYLOGENETIC SYSTEMATICS.
Christina Skelton, Program in Aegean Scripts and Prehistory, Department of Classics, University of Texas at Austin, Austin, TX.

Phylogenetic systematics, the method used in biology to reconstruct evolutionary relationships among organisms, can also be used to reconstruct the evolutionary history of a writing system. Phylogenetic methods provide an independent, scientific, and repeatable means of establishing evolutionary relationships on the basis of changes in writing, and complement existing paleographical methods. I recently conducted a pioneering study using the pre-alphabetic Greek writing system Linear B as a test subject (Skelton forthcoming). In my study, taxa represent individual Linear B scribal hands. Phylogenetic characters represent differences in the way different scribal hands wrote the same Linear B sign. The phylogenetic analysis produced a phylogeny of Linear B largely consistent with what is known and theorized about the evolutionary relationships among the scribal hands included in the study. The analysis also provides important and independent evidence for the dates of the Linear B tablets from Knossos, one of the most intractable problems concerning Linear B. Here, it is shown that phylogenetic systematics can also be used to reconstruct how the Linear B writing system itself changed over time, including changes in the form of individual signs as well as the forms in use at a given stage in the writing system's history. It is hoped these methods will be of use to workers studying other writing systems as well as any other kind of stylistic evolution.

- 240 A MIDDLE PLEISTOCENE FAUNA FROM BOTSWANA: EVIDENCE FOR AN ENVIRONMENTAL SHIFT.
Alicia M. Kennedy*, Patrick J. Lewis, Monte L. Thies, Sam Houston State University, Huntsville, TX and Blythe Williams, Duke University, Durham, NC.

Recent excavations in cave deposits of the Ncumsta Hills, western Ngamiland, Botswana have produced a diverse mammalian fauna conservatively dated to 390,000 BP. The present climate in this region of the Kalahari is semi-arid, with annual rainfall of 400-450 mm per year that occurs during the austral summer. These deposits have yielded fossils of many mammals, including craniodental material of *Papio*. Along with the larger components of the mammalian fauna are fossils of many smaller mammals. Preservation of the small mammal fauna is consistent with an owl accumulation, most likely accumulated by *Tyto alba* (Barn Owl) given the depositional environment. The small mammals provide insight on the paleoenvironment associated with the primate fossils. While the small mammal fossils are fragmentary, some diagnostic specimens are available. Specimens attributed to the rodents *Aethomys chrysophilus*, *Gerbilliscus sp.*, *Steatomys krebsii*, and *Otomys saundersae* have been identified. These species are all known from the region today. *Otomys*, the most common species in the small mammal fauna, is currently found in swampy areas from the upper Zambezi (Zimbabwe) into the Okavango and Chobe River regions. *Aethomys* and *Gerbilliscus* are ubiquitous today in dry grassland environments of southern Africa, while *Steatomys krebsii* is associated with sandy, grassy plains from northeastern Zimbabwe to northern Namibia. The presence of these taxa suggests a mosaic paleoenvironment with grasslands and a water source in the vicinity at the time of deposition. Such an environment is similar to that expected in modern areas containing *Papio*, generally terrestrial, and other more arboreal cercopithecoids.

BOTANY

- 3 AMINO ACID AND CARBOHYDRATE CONTENT OF WINE CUP NECTAR AND POLLEN.
Leah Lawdermilk*, Bonnie Amos and Nick Flynn, Angelo State University, San Angelo, TX.

Amino acid and carbohydrate content of wine cup nectar and pollen was determined in order to investigate the role of these attractants in selection by insects. Reverse-phase HPLC was used to determine the concentration of several amino acids in nectar and pollen, and a UV-visible method was used to investigate the concentration of carbohydrates. Samples were statistically analyzed using either an unpaired t-test or ANOVA followed by Tukey's HSD ($p < 0.05$ = statistical significance). The highest concentrations of amino acids in both nectar and pollen were serine, aspartate, and asparagine; glutamine and histidine were the lowest. There were significant differences among the sugars in both the nectar and

pollen. Sucrose occurred at very low concentrations in nectar and pollen whereas glucose levels were high in nectar. Chemoattractant content, therefore, differs between pollen and nectar in these species and warrants further investigation.

42 THE SYSTEMATIC AND PHYLOGENETIC POTENTIAL OF CULM ANATOMY IN *ELEOCHARIS* SUBGENUS *LIMNOCHLOA* (CYPERACEAE).

David E. Lemke*, Department of Biology, Texas State University, San Marcos, TX, and David J. Rosen, S. M. Tracy Herbarium, Department of Rangeland Ecology & Management, Texas A&M University, College Station, TX.

Eleocharis is a cosmopolitan genus of about 200 species and over 600 published names with a center of diversity in the Neotropics. *Eleocharis* subg. *Limnochloa* is distinguished from other *Eleocharis* by a combination of cartilaginous, obscurely keeled, many-veined floral scales, coarse culms that are usually as thick as the cylindrical spikelet, and biconvex (rarely trigonous) achenes usually conspicuously sculptured with large, polygonal cells. The infrageneric classification of *Eleocharis* has a tumultuous history with numerous classifications proposed. A monophyletic *Limnochloa* clade is well supported by morphological and molecular data. However, relationships within subg. *Limnochloa* are poorly understood. As with other groups in Cyperaceae, instances of homoplasy could make resolving phylogenetic relationships based on morphology in subg. *Limnochloa* difficult. For example, both *E. acutangula* and *E. mutata* have sharply triquetrous culms, yet differ markedly in floral morphology. We pose the question, in subg. *Limnochloa*, are sharply triquetrous culms an indicator of close phylogenetic relationship or an example of homoplasy? In order to begin to answer this question, we examined vegetative anatomy of culms of *E. acutangula* and *E. mutata* grown as both submersed and emergent individuals, to better understand the usefulness of culm anatomy for interpreting phylogenetic relationships in *Eleocharis* subg. *Limnochloa*.

82 THE UNDERESTIMATED BOTANICAL DIVERSITY OF THE COASTAL PRAIRIE.

David J. Rosen, U. S. Fish and Wildlife Service, Houston, TX.

An intensive survey of the vascular flora of Nash Prairie, an ca. 120 ha Coastal Prairie remnant in Brazoria County, Texas, resulted in a checklist of 309 species of vascular plants representing 63 families and 196 genera. The six families containing the most species are Poaceae (70 spp.), Cyperaceae (36 spp.), Asteraceae (46 spp.), Fabaceae (17 spp.), Euphorbiaceae (9), and Scrophulariaceae (7). Rich native genera include *Carex* (10 spp.), *Cyperus* (9 spp.), *Juncus* (7 spp.), *Panicum* (7 spp.), and *Paspalum* (7 spp.). Non-native species accounted for 7% of the total; 50% (11 spp.) of which were grasses. The native flora comprises 287 species distributed in 63 families. The native grass flora includes 59 species in five subfamilies, and comprises 71% C₄ species, most of which belong to the Panicoideae (35 spp.). The flora of Nash Prairie includes numerous globally and regionally rare species and species with temperate amphitropical distributions. This research suggests previous estimates of species richness for climax upper Coastal Prairie in Texas are low, and that historic and potential losses of botanical diversity are greater than previously thought.

84 USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY TO IDENTIFY GIBBERELLIN AND GIBBERELLIN-LIKE COMPOUNDS FROM *ANEMIA MEXICANA* GAMETOPHYTE CULTURE MEDIA.

Candace Wise* and Joan E. N. Hudson, Department of Biological Sciences, Sam Houston State University, Huntsville, TX.

Anemia mexicana gametophytes produce several gibberellins (GA) and GA-like compounds which can be extracted from the culture media and identified by gas chromatography/mass spectrometry (GC/MS). These compounds are antheridiogens. Antheridiogens are produced by fern gametophytes and cause premature formation of antheridia in young developing gametophytes.

The purpose of this research is to identify GAs and GA-like compounds by their retention times with the use of High Performance Liquid Chromatography (HPLC) after preparative chromatographic fractionation of *Anemia mexicana* gametophyte culture media extracts. In past studies, the GA-like compounds were methylated using diazomethane for identification with GC/MS. Because diazomethane is highly explosive during synthesis and use, an alternate means of identification of GAs after preparative chromatography is desired. Previous fractions analyzed by GC/MS were processed with HPLC to determine exact retention times of GAs. HPLC utilized Spherisorb ODS2 C18 column with a flow rate of 1mL/min and a gradient of 20% to 100% methanol over 40 minutes. The detector was set at 205nm. This method allows us to purify sufficient quantities of GAs necessary for NMR analysis since several of the compounds have never been chemically characterized.

- 89 AN UPDATED VASCULAR PLANT INVENTORY OF TAYLOR COUNTY, TEXAS.
Herbert D. Grover* and Den Davis, Department of Biology, Hardin-Simmons University, Abilene, TX.

Taylor County lies near the geographic center of Texas at the confluence of three widely recognized ecoregions: the Rolling Plains, Cross Timbers, and Edwards Plateau. Elements of the plant associations representing these ecoregions intergrade in Taylor County with species distributions modified by topography, edaphic conditions, and land use practices. In the early 1970's, William F. Mahler compiled and published "The Flora of Taylor County," which was based partly on field collections he made while on the faculty of Hardin-Simmons University, in Abilene, TX. Using Mahler's seminal study as a baseline, we have prepared an updated inventory of the vascular plants of Taylor County by standardizing the nomenclature of the original Taylor County Flora; and by adding specimen records from collections deposited in the Hardin-Simmons University herbarium since the 1970's along with species reported for Taylor County in searches of available state-wide databases. Mahler's original flora contained a total of 668 species in 90 families and 342 genera. Our study compiled 895 species reported for the county, represented by 427 genera in 107 families. With 149 taxa, the Asteraceae is the most commonly reported plant family in our inventory, followed by the Poaceae (119 taxa), Fabaceae (80 taxa), and Euphorbiaceae (42 taxa). Seventeen species found in our study are listed as endemic to the state. Listed invasives constitute 107 of the species we identified for Taylor County, or about 12 percent of the county flora. Based on the collections and checklists reviewed for our study, no listed threatened or endangered plant species have been recorded for Taylor County.

- 91 APPLICATION OF IMAGE PROCESSING METHODS FOR DETERMINING STOMATAL DENSITY OF SEVERAL WOODY PLANT SPECIES.
Den Davis* and Herbert D. Grover. Department of Biology, Hardin-Simmons University, Abilene, TX.

Previous studies report that woody plant leaf stomatal density varies as a function of leaf age, leaf size, and environmental conditions affecting plant growth (e.g., moisture availability and atmospheric carbon dioxide concentrations). Historically, microscopic methods have been used to record stomatal density and distribution on impressions made of leaf surfaces. Our study used standard techniques for acquiring surface impressions from the underside of woody plant leaves collected in 2006, and preserved leaves collected 20 to 30 years ago from *Carya illinoensis*, *Celtis laevigata*, *Morus alba*, and *Quercus buckleyi*. Depending on the species studied, Nu Skin® liquid bandage or clear nail polish was applied to the leaf, allowed to dry, and lifted off of the leaf using clear cellophane tape. Leaf impressions taken in lower, middle, and upper thirds of leaves were mounted on glass slides and digital images were taken of each impression at 100-power magnification. Digital images were imported into the Manifold® 7.1 image processing and GIS software package, points were assigned to the location of each stomata, and nearest neighbor distances were calculated using algorithms available in the Manifold system. The image processing approach we developed appears to offer several advantages over methods reported in the literature. Preliminary results from *Q. buckleyi* leaves indicate that stomatal density is greater in impressions from the upper one-third (i.e. outermost) portion of the leaves. Comparative data on stomatal density and nearest neighbor distances between woody plant species included in this study, and between recent vs. historical leaf collections will be discussed.

- 153 PTERIDOPHYTE REPRODUCTION BY SPORES/GAMETOPHYTES AT THE CENTER FOR BIOLOGICAL FIELD STUDIES, SAM HOUSTON STATE UNIVERSITY, WALKER COUNTY, TX.
Joan E. N. Hudson, Department of Biological Sciences, Sam Houston State University, Huntsville, TX.

Pteridophytes usually can reproduce asexually by rhizomes. For genetic variability, pteridophytes must reproduce by spores and subsequent gametophytes. This study involved answering the question: Are pteridophytes reproducing by spores/gametophytes at the Center for Biological Field Studies, Sam Houston State University, Walker County, TX? Several populations of *Asplenium platyneuron*, *Pteridium aquilinum*, *Thelypteris kunthii*, *Woodsia obtusa* and *Equisetum laevigatum* were studied in spring 2006 at the CBFS. Plants were observed for the production of sporangia. Gametophytes were searched for in the vicinity of the mature plants. Young sporophytes were sought, indicating recent fertilization of gametophytes. Sporophytes of *A. platyneuron*, *W. obtusa* and *T. kunthii* produced numerous sporangia. Gametophytes with and without young sporophytes were observed indicating successful reproduction by spores/gametophytes. Although the *P. aquilinum* population was well-established, no fertile fronds and gametophytes were found, indicating very little reproduction by spores. Very few cones of *E. laevigatum* were found and all attempts to find gametophytes were unsuccessful although adult sporophytes are abundant along Harmon Creek. To answer the above question: evidence indicates that some ferns are commonly reproducing by spores/gametophytes while others are rarely reproducing in this way.

- 179 EARLY PERIDERM DEVELOPMENT IN THE STEMS OF *ULMUS ALATA* MICHX.
Tiffany B. Fowler and Ann E. Rushing*, Department of Biology, Baylor University, Waco, TX.

Stems of winged elm, *Ulmus alata*, were examined using scanning and transmission electron microscopy to determine features of initiation and early development of the periderm and the cork wings characteristic of this species. Periderm is initiated in young stems by conversion of parenchyma cells immediately beneath the epidermis into phellogen (cork cambium). Differentiation of phellogen begins in localized regions beneath the epidermis but spreads laterally around the circumference of the stem early in development. The first periclinal division in the phellogen results in formation of phellem (cork) cells to the outside of the stem, leaving the phellogen toward the interior. The first phellem layer expands radially early in development. The second periclinal division in the phellogen results in a layer of phellogen toward the stem interior, leaving the phellogen between its first two derivatives. All subsequent divisions during early development produce phellem toward the stem exterior. Phellem cells become suberized early in development while phellogen and phellogen remain unsuberized. Cork wings are initiated in a 5-7 layered periderm by radial expansion of multiple layers of existing phellem in localized regions, typically on opposite sides of the stem. After expansion of existing cells, further increase in wing length occurs by periclinal divisions in the phellogen beneath the wing. Phellogen in adjacent areas of the periderm do not keep pace with divisions in the wing phellogen.

- 227 AN ALPHA-TAXONOMIC STUDY OF THE EARLY SUMMER FLORA OF BUFFALO BAYOU.
Floribel Beiza, Robin May*, and Deanna McCullough, Department of Natural Sciences, University of Houston – Downtown, Houston, TX.

Buffalo Bayou is one of the largest bayous in Harris County, Texas and it passes through a section of downtown Houston, TX. The Buffalo Bayou Partnership's mandate is to maintain and restore the bayou to its native state. To effectively do this it was necessary to survey the existing flora and note native, introduced, and invasive species currently present. Plants that were either in flower or fruit were collected during June 2006 and permanent herbarium sheets were prepared and are stored in the UHD herbarium. One hundred seventy two taxa were collected belonging to forty five angiosperm families, three gymnosperm families, four fern families and two species of horsetails. Six invasive species were recorded including one previously unrecorded for this county. This inventory of the summer flora of the Buffalo Bayou including Turkey Bend is part of an on-going survey of the flora of these waterways conducted by the University of Houston – Downtown for the Buffalo Bayou Partnership.

- 233 ANALYSIS OF FLORAL ATTRACTANTS IN *CALLIRHOË SCABRIUSCULA* (MALVACEAE).
Michael Martinez*, Bonnie Amos, and Nick Flynn, Department of Biology and Department of Chemistry/Biochemistry, Angelo State University, San Angelo, TX.

Callirhoë scabriuscula (Malvaceae) is an endangered plant species restricted to deep sands in three west Texas counties. This species is dependent upon pollinators for successful seed production and relies primarily on two species of oligolectic solitary bees. To better define the floral attractants, we used reverse-phase HPLC to test nectar and pollen samples and successfully calculated the concentrations of 9 amino acids. In addition, we used a UV-visible method to determine relative concentrations of glucose, sucrose and fructose in both nectar and pollen. Glucose was the dominant sugar relative to fructose and sucrose in both the nectar and the pollen. For the amino acids in nectar glutamic acid was found in the highest concentration followed by serine, asparagine, aspartic acid, glutamine, valine, phenylalanine, histidine and methionine. In the pollen, asparagine was found in the highest concentration followed by glutamine, serine, valine, histidine, methionine, aspartic acid, phenylalanine and glutamic acid. ANOVA and q-tests will be used in order to determine the statistical significance of our data.

- 245 PATHOGEN INHIBITORY ACTIVITY OF INDIGENOUS *STREPTOMYCES* FROM LOWER RIO GRANDE VALLEY AGRICULTURAL SOILS.
Atenea A. Garza*, Christopher R. Little, Anita Davelos Baines, Department of Biology, The University of Texas – Pan American, Edinburg TX.

The impact of soil microbial communities on plant health has been well documented. Soil symbionts and pathogen antagonists may improve plant health while disease caused by soil pathogens can lead to reductions in crop yields and economic losses. Controlling pathogen activity via the use of natural antibiotic-producing bacteria is an ideal method for controlling

economic losses in crops without the use of harmful chemicals. There are a number of soil borne fungal pathogens that affect cantaloupe in the Lower Rio Grande Valley (LRGV) area. *Streptomyces*, well known antibiotic producing bacteria, are promising candidates for biocontrol of many of these fungal pathogens. Twelve streptomycetes native to the LRGV were isolated from three different agricultural soils located in Willacy and Hidalgo County. The antagonistic inhibitory activity of these twelve isolates was tested against six different fungal pathogens; *Didymella bryoniae* (cantaloupe and watermelon), *Fusarium oxysporum*, *Macrophomina phaseolina*, *Rhizoctonia solani*, and *Sclerotium rolfsii*. Six isolates were selected for further *in vivo* greenhouse experimentation based on their *in vitro* inhibitory activity. Each treatment was monitored for seedling emergence, vine length, plant death and plants that demonstrated signs of infection. Results indicate that streptomycetes are ideal agents of biocontrol. Field experiments were conducted using three isolates that exhibited the largest zone of inhibition in *in vitro* trials and the pathogen *Monosporascus cannonballus*. Plants were monitored for vine length, plant mortality and percent infection. The crop produced was monitored for cantaloupe production, size, weight and quantity.

P14 A GUIDE TO IDENTIFICATION OF WEEDS IN SOUTH TEXAS AND NORTHERN MEXICO.

James H. Everitt*, USDA-ARS, Weslaco, TX, Robert I. Lonard, and Christopher R. Little, Department of Biology, University of Texas – Pan American, Edinburg, TX.

A forthcoming book to be published by Texas Tech University Press will catalogue 189 species of weedy vascular plants found in south Texas and northern Mexico. Color photographs of each species will be included in the book. Some 144 genera and 45 families are represented. One species of fern, 142 species of dicots and 46 species of monocots have been documented. One hundred-eleven species of weedy dicots are native and 31 species are introduced, whereas 21 species of monocots are native and 25 species are introduced. Agricultural practices, urban development, road construction, and other perturbations have resulted in removal of extensive areas of native vegetation. Subsequently, the region has been prone to the invasion of native and exotic subtropical and tropical species. The introduced grasses, *Urochloa maxima* (Guineagrass) and *Pennisetum ciliare* (buffelgrass), have had the greatest impact on the native terrestrial vegetation. *Hydrilla verticillata* (hydrilla) has been the most detrimental introduction to aquatic ecosystems.

P30 PHOTOSYNTHETIC RATES IN *POPULUS TREMULOIDES* OVER A SINGLE GROWING SEASON: DECLINING PHOTOSYNTHETIC RATES ASSOCIATED WITH LEAF AGE AND SEASONAL VARIATIONS.

R. Nicolas Ragland* and William J. Quinn, St. Edward's University, Austin, TX.

Photosynthetic rates were measured by carbon fixation in leaves of *Populus tremuloides* at ambient environmental conditions at two times in a single growing season. Measurements were taken in southern Colorado in early June and September and stratified by leaf number. To determine significant differences in photosynthetic rate between leaves of different ages and to determine significant seasonal variation, statistical analyses were applied to the data sets from June and September. Analyses of variance produced interesting and surprising results for the association of leaf age and seasonal variation in photosynthetic rate. Seasonal variation in photosynthetic rate led to examination of variation in light intensity, temperature, and stomatal conductance. Stomatal conductance, with a two-fold difference between fall and spring, proved to be the most interesting variable related to photosynthetic rate. The experimental methods and results from the statistical analyses are presented.

P37 MEASURING VEGETATIVE CHANGE: FIFTY YEAR DIFFERENCES IN BIG BEND NATIONAL PARK.

Daniel J. Leavitt*, Allison F. Leavitt, and Christopher M. Ritzi, Department of Biology, Sul Ross State University, Alpine, TX.

While many studies have been conducted on post-grazing vegetational trends, few have been conducted in the Trans-Pecos of West Texas. In 1956, an ecological survey of Big Bend National Park was performed. In this study, data was collected on vegetation compositions and diversities in the Green Gulch area of Big Bend National Park, Brewster County, Texas (a north-facing slope). We resurveyed line transects and re-photographed photo points established in 1956 on 5 separate quadrats at elevations ranging from 850 – 1420 m. Our findings suggest an overall increase in vegetative cover in the post-grazing landscape. Shrub overstory has increased on all survey quadrats. General trends toward more mesic conditions have led to the disappearance of a few species (i.e. *Jatropha dioica*). These conditions have also resulted in the increase of other plant species (i.e. *Dalea Formosa* and *Dasyliirion leiophyllum*). A complementary plant list from all survey years will be presented along with a full set of photographs.

P104 BLACK MANGROVE (*AVICENNIA GERMINANS*) COMMUNITY STRUCTURE, GROWTH AND RECRUITMENT, ALONG THE SOUTH TEXAS COAST.

Mollie K. McIver*, Roy Lehman, and Kim Withers, Texas A&M University – Corpus Christi, Corpus Christi, TX.

The black mangrove, *Avicennia germinans*, is one of three species of mangrove found along the Gulf of Mexico coast. It is the only mangrove species reportedly found in Texas, Louisiana, and Mississippi because of its ability to tolerate cool temperatures. In the past, this species was thought to be ephemeral and with limited distribution in Texas but recent studies have shown increased and apparently more permanent populations along the coast. Mangroves are concentrated in three major areas in Texas: Port O'Connor area, Harbor Island, and South Bay area. Each of these areas share geographically similar characteristics: 1) protection by barrier islands that provide shallow, low-energy habitat and, 2) proximity to major barrier island passes that provide regular inflow of oceanic water that prevent hypersaline conditions. Extensive research has been conducted on black mangroves around the world, but little attention has been devoted to those along the Texas coast. This study focused on three major tasks: mapping and community characterization, mangrove plant community seasonality, and mangrove growth. Mapping and community characterization will be accomplished by analyzing aerial photos and determining plant community composition on the ground at many sites. Seasonality and growth will be determined at nine sites between Aransas Bay and the Upper Laguna Madre that will be intensively studied over 1 year. These sites represent the three general habitats where mangroves are found in the local area.

P160 PERIDERM INITIATION AND EARLY DEVELOPMENT IN *PLATANUS OCCIDENTALIS* L.

Constance Cole* and Ann E. Rushing, Department of Biology, Baylor University, Waco, TX.

Young stems of *Platanus occidentalis* L. were examined using scanning electron microscopy to determine features of the initiation and early development of the periderm. Transverse sections of the most recent four internodes of new growth were used in this study. The epidermis of the young stem is initially covered with trichomes of several types, most commonly short, uniseriate with a globose head and long, dendritic trichomes. The outer walls of the epidermal cells are distinctly thickened. The periderm initiates in the parenchyma layer immediately beneath the epidermis. Initiation begins in localized areas of the most recent internode and eventually spreads laterally around the circumference of the stem. The first periclinal division of the subepidermal cells, now designated the phellogen (cork cambium), forms a layer of phellem (cork) cells to the outside of the stem. These phellem cells expand radially and form a layer distinct from subsequent peridermal layers. Through the fourth internode, additional periclinal divisions of the phellogen result in a periderm comprised of 5-6 layers, with perhaps one layer of phelloderm to the interior of the phellogen. Anticlinal divisions of the phellogen are seen occasionally. This is a classical form of periderm initiation seen in many plants, including *Ulmus* and *Prunus*.

P194 SOIL FIDELITY IN GULF COAST *HELIANTHUS* SPECIES (NUECES COUNTY, TX).

Sean M. Thompson*, Karla L. Loya*, David J. Gris , and R. Deborah Overath, Department of Life Sciences, Texas A&M University – Corpus Christi, Corpus Christi, TX.

Sunflowers of the Texas Gulf Coast are described as preferring certain soil types; however, no studies have explored their distribution or its causes. We surveyed 122 sites to determine if the local *Helianthus* species segregate by soil type. At each site along roads containing sunflowers, we determined the species of *Helianthus*, marked the site with a GPS receiver, noted the soil type (sand or clay) and collected vouchers. Among the four local species *H. annuus* and *H. argophyllus* were most common, *H. praecox* was less common, and *H. ciliaris* was absent. *Helianthus* species had remarkable fidelity to soil type. All 77 clay sites contained only *H. annuus*. Of the sand sites, 35 contained *H. argophyllus*, 18 contained *H. praecox*, and of these 8 contained both species. In addition, three of the sand sites contained a few *H. annuus* plants; however, in at least one of these sites, *H. annuus* plants were on clay-containing fill deposited over the sand. To see if germination explains this distribution, we germinated *H. annuus* and *H. argophyllus* on both sand and clay soils. *Helianthus annuus* germinated equally well on both soil types ($\chi^2 = 0.09$, $df = 1$, $0.80 > P > 0.50$). In addition, this species had a much higher germination than *H. argophyllus*; however, this result may be due to differences in seed quality: a second study of seed germination in Petri dishes indicated that our *H. argophyllus* seeds were not viable. Therefore, the role of germination in determining distribution of these species is still unclear.

P199 GERMINATION OF TWO SUNFLOWER SPECIES ACROSS A SALT GRADIENT.

Hector Aguilar*, David J. Gris , Sean Thompson, and R. Deborah Overath, Department of Life Sciences, Texas A&M University – Corpus Christi, Corpus Christi, TX.

Helianthus annuus and *Helianthus argophyllus* are the two main species of sunflowers in Nueces County, Texas. In general, *Helianthus argophyllus* is found growing on sand and *H. annuus* is found on clay. Because the sandy soils on which *H. argophyllus* is found include dunes near saline environments, this difference in distribution may be due to salt tolerance. To determine if *H. argophyllus* is able to germinate in more saline environments, we compared the percent germination between the two species at different salinities. We monitored percent germination in sand-filled Petri dishes at four salinity levels over a course of 15 days. We used commercial seeds to avoid any dormancy that field collected seeds may have. Salinity levels were 0% (distilled water), 5%, 10%, and 15% salt. For *H. annuus*, we observed 68% germination in the 0% salt treatment, 69% germination in the 5% salt treatment, 59% germination in the 10% salt treatment, and 56% germination in the 15% salt treatment. For *H. argophyllus*, we observed 69% germination in the 0% salt treatment, 64% germination in the 5% salt treatment, 49% germination in the 10% salt treatment and 27% germination in the 15% salt treatment. Germination in both species decreased with increasing salinity, but the decrease was more severe in *H. argophyllus*. This result is contrary to our expectations based on field distributions of these species.

CELL AND MOLECULAR BIOLOGY

90 RICKETTSIA TYPHI AND RICKETTSIA FELIS AS HUMAN PATHOGENS IN TEXAS.

Robert J. Wiggers, Department of Biology, Stephen F. Austin State University, Nacogdoches, TX.

Zoonotic diseases are those that are capable of being transmitted from animals to humans. Of over 1400 well characterized human pathogenic organisms, over 800 fit the definition of a zoonotic disease. Murine typhus (classically caused by *Rickettsia typhi*) is a zoonotic disease common in extreme south Texas. Naturally harbored within opossums (reservoir) and spread by the cat flea (vector), *R. typhi* causes a usually mild febrile illness but can be fatal in the elderly, pulmonary, or renal impaired. Ten years ago, a new rickettsial species, *R. felis*, was identified as sharing the same reservoir / vector system as *R. typhi* and was identified as a human pathogen, causing an illness identical to murine typhus. *R. felis* is much more widely distributed than *R. typhi* and it seemed possible that most human "murine typhus" cases in Texas were due to *R. felis* instead. Using a recombinant antigen as part of an ELISA test, 244 serum samples were tested for the presence of *R. typhi* or *R. felis* antibodies. 36 were positive for *R. typhi* and only 3 for *R. felis*. Despite its wider distribution, most cases of murine typhus in Texas are still caused by *R. typhi*.

92 APOPTOTIC EFFECTS OF SANGUINARI CANDENSIS (BLOOD ROOT) EXTRACT IN MA-10 LEYDIG TUMOR CELLS.

Vanessa Carey*, Marcia Peck, Matthew Wyatt, Lori Pretzer, Kristen Raines and Adam Reinhart, Wayland Baptist University, Plainview, TX.

Ethanollic extracts of eleven widely used medicinal plants (*Withania somnifera*, *Ocimum sanctum*, *Sanguinari candensis*, *Harpogophytum procumbers*, *Lepidium meyenii*, *Pygeum africanum*, *Serenoa repeno*, *Urtica diocia*, *Arnica Montana*, *Citrus aurantium*, and *Zingiber officinali*) were evaluated for their prospective role in tumor regulation based on their ability to modulate growth characteristics of MA-10 Leydig tumor cells. These medicinal plants were chosen because they have been shown to be either potential cyclooxygenase (COX) -2 inhibitors or have been implicated as endocrine disruptors. COX enzymes effectively catalyze the conversion of arachidonic acid (AA) into prostaglandins, AA metabolites released during the inflammatory process. It is this pathway which is believed to play a central role in tumor progression. To assess cytotoxicity, MA-10 cells were treated with various concentrations of each extract (100 ug/ml, 10 ug/ml, 1 ug/ml, 0.1 ug/ml) and cell viability measured by means of both MTT and MTS cell proliferation assays. Ten of the eleven extracts were shown to have comparatively little effect on cell viability at the various concentrations. However, a significant decrease in cell viability was observed in MA-10 cells treated with 100 ug/ml *Sanguinari candensis* (Blood root). Results were consistent in both MTT and MTS assays. To determine whether the mechanism for this decrease was apoptosis or necrosis, DNA fragmentation and Caspase-Glo 3/7 assays were conducted on cells treated with 100 ug/ml Bloodroot. Results of the assays indicated an increase in caspase 3/7 activity and DNA fragmentation, suggesting the decrease in cell viability was due to apoptosis.

- 94 CYTOTOXIC AND APOPTOTIC EFFECTS OF *SANGUINARIA CANDENSIS*, *ZINGIBER OFFICINALI*, AND *SERENOA REPENS* ON THE H295R ADRENAL CORTICAL TUMOR CELL LINE.

Marcia Peck*, Vanessa Carey, and Adam Reinhart, Wayland Baptist University, Plainview, TX.

Ethanollic extracts of 10 widely used medicinal plants which are thought to have cyclooxygenase-2 (COX-2) inhibitory effects and/or have been implicated as endocrine disruptors were tested on the H295R adrenal cortical tumor cell line for cytotoxic effects. Cytotoxicity was evaluated by a cell viability assay using MTS (3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium) or MTT (3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide). Of the 10 ethanollic extracts tested only three, *Sanguinaria candensis* (Blood Root), *Zingiber officinali* (Ginger Root), and *Serenoa repens* (Saw Palmetto), were shown to have cytotoxic effects on the H295R cell line. These three plant extracts were further tested for their ability to induce apoptosis in H295R cells. Of the three, Ginger Root and Saw Palmetto appear to stimulate the Caspase 3/7 apoptotic pathway. Since the H295R cell line has been used to study adrenocortical tumorigenesis mechanisms, the anti-proliferative and apoptotic effects of Ginger Root and Saw Palmetto suggests they may be a viable treatment for adrenal cancer.

- 100 A STUDY IN *CAENORHABDITIS ELEGANS*: THE INVOLVEMENT OF SEROTONIN AND OCTOPAMINE IN NEURAL MODULATION OF THERMOTAXIS.

Margaret Brown,* Fidelma A. O'Leary. St. Edward's University, Austin, TX.

Thermal stimulus is an important factor influencing animal behavior (Eckert *et al*, 1988). *C. elegans* can sense a range of temperatures, and when placed on a thermal gradient will migrate towards their cultivation temperature (Hedgecock and Russel, 1975). This thermotactic response, provides an ideal system for studying the cellular processes involved in learning and memory. The present study tests thermotaxis in *C. elegans*, and explores the kinetics of memory formation. Worms transitioning from a well-fed to a starved state exhibited a slower transition to the attractive response (240 min), compared to worms transitioning from starved to well-fed state (20 min). It has been reported that the biogenic amines serotonin and octopamine are present in *C. elegans*, and may act antagonistically (Horvitz *et al*, 1982; Chao, 2004). We demonstrate that serotonin and octopamine do in fact act antagonistically in the neural circuitry mediating regulation of feeding state. Following exogenous administration, the neurotransmitters mimicked a well-fed state (84%, 5-HT), or a food deprived state (86%, oct.), respectively. Lastly, we investigated the possibility that other neurotransmitters are also involved. *Cat-1(e1111)* mutants, devoid of serotonin in their neuronal processes (Wen, 1997; Duerr, 1999), showed a delayed recovery from the starved state (80 min vs. 20 min for wild type). This suggests that serotonin, though sufficient, is not necessary to elicit a well fed behavioral response.

- 107 DETERMINING THE ROLE OF *AMRZ* IN THE REGULATION OF PA5339 IN *PSEUDOMONAS AERUGINOSA*.

Kimberly Bandy* and Patricia J. Baynham, St. Edward's University, Austin, TX.

Pseudomonas aeruginosa is a Gram-negative, environmental bacterium that resides in soil and water. Rarely causing disease in healthy humans, *P. aeruginosa* takes advantage of any defect in humans, infecting the lungs of cystic fibrosis (CF) patients, wounds of burn patients, and bladders of catheterized individuals. *P. aeruginosa* utilizes a mucoid phenotype, overproducing an exopolysaccharide alginate, to avoid the immune system in the CF patients' lungs. The bacterium regulates production of this alginate via the activator protein AmrZ. AmrZ has also been shown to be required for twitching motility, a type of locomotion across a solid surface utilizing pili. Both alginate production and twitching motility make this bacterium more virulent, so we wanted to determine what other genes AmrZ may regulate. During this study, two-dimensional gel electrophoresis compared the differential protein expression in a wild type strain and an isogenic *amrZ* deletion strain. These protein preparations were extracted from the gel and identified. One gene appearing to be positively regulated by AmrZ is PA5339, whose gene product is highly conserved between bacterial species but whose function is unknown. A plan was devised to interrupt this gene with the *xyIE* reporter gene in order to examine *amrZ* dependence. A catechol 2,3 dioxygenase (CDO) assay in an *amrZ*⁺ and an *amrZ*⁻ background will determine if PA5339 is *amrZ* dependent. Another approach underway is using semi-quantitative RT-PCR to look at gene expression of PA5339 in the wild-type strain and an *amrZ* deletion. If PA5339 is controlled by *amrZ*, further studies could determine its function.

- 112 ARBUSCULAR MYCORRHIZAL FUNGI AND MICROBIAL POPULATION ANALYSIS OF NATURAL EAST TEXAS HABITAT TYPES. Darya Fakhretdinova*, James E. Van Kley, Alexandra Martynova-Van Kley, Stephen F. Austin State University, Nacogdoches, TX.

Ecological classification of natural east Texas habitat types is based primarily upon their vegetation, topographic position, soil texture, hydrology, fire frequency, and plant nutrient availability. This classification scheme does not take into account such important components of terrestrial ecosystems as AMF (arbuscular mycorrhizal fungi) and soil bacteria. Almost all natural terrestrial plant communities contain AMF, which form symbiosis with 80% of all plant species. From this perspective it would be advantageous to study AMF microbial diversity across different natural east Texas habitat types. For achieving this main purpose three wide-spread east Texas plant species were chosen: *Toxicodendron radicans/pubescens*, *Callicarpa americana* and *Chasmanthium sessiliflorum*. Samples from each of these plants were checked for AMF presence. Soil and plant root samples were ground in liquid nitrogen. After DNA extraction, 2-step PCR will be performed. Amplified 18S rDNA genes of AMF and 16S rDNA genes of soil bacteria will be the target of DGGE (denaturing gradient gel electrophoresis). DGGE profiles for each habitat type will be compared with each other. We anticipate to observe differences between AMF and soil bacterial communities across the range of natural east Texas habitat types. Describing AMF and microbial diversity across different habitat types using molecular techniques will provide a new and additional powerful tool for ecological classification of east Texas natural habitat types.

- 120 GENOME REARRANGEMENTS IN EXPERIMENTAL EVOLUTION OF *CHLAMYDOMONAS REINHARDTII*. Meghan Smith, Richard N. Ragland* Bioinformatics Program, St. Edward's University, Austin, TX and Michael Siebert, National Renewable Energy Laboratory, Golden, CO and Charles Hauser, Bioinformatics Program, St. Edward's University, Austin, TX.

The ability of the unicellular green alga *Chlamydomonas reinhardtii* to grow with light as a sole energy source or on acetate in the dark has facilitated a detailed examination of the genes and proteins critical for photosynthetic or respiratory function. When cultured under anaerobic, sulfur-deplete conditions *C. reinhardtii* will store the energy of incident sunlight as high-energy H₂ molecules, which has led the National Renewable Energy Lab (NREL) to examine its potential use to produce H₂ as an alternative energy source. Previous studies on microbial and fungal (yeast) populations growing in continuous culture have demonstrated that genome rearrangements, especially amplifications and deletions, occur in response to the sustained application of the same strong selective pressure. *C. reinhardtii* was cultured in linked bioreactors in which cells flowed continuously from BR-1 (aerobic, sulfur-replete) to BR-2 (anaerobic, sulfur-deplete). The system ran under steady-state conditions for 6 months and produced hydrogen continuously. Changes in DNA copy number are being assessed at single-gene resolution using DNA microarray-based comparative genomic hybridization (CGH).

- 128 AGE-RELATED DEFICITS IN LEARNING: A STUDY IN *C. ELEGANS* SHOWING THE ABILITY OF THE ANTI-OXIDANT ALPHA-LIPOIC ACID TO RESTORE LEARNING ABILITY IN OLDER ORGANISMS. Brianna Murphy,* Kenton Venhuizen, Fidelma A. O'Leary. St. Edward's University, Austin, TX.

Aging is a progressive process of degeneration in tissues including the brain and nervous system. *Caenorhabditis elegans* are microscopic nematodes with simple neural circuitry that is well studied and homologous to the human nervous system. They also have well defined life stages, so that older organisms are easily identified. We used *C. elegans* to examine the correlation between oxidative stress and the loss of learning ability. Oxidative stress is manifested as cell and tissue injury caused by oxygen-derived radicals and is believed to significantly contribute to the ageing process (Vanfleteren 1993). In the nervous system, these free radicals accumulate through out life, with resultant degeneration of neural function (Hyung 2003). Using isothermal tracking, we compared the learning ability of young worms, with less oxidative stress, to the learning ability of elderly worms, with a life-long accumulation of oxygen-derived radicals. Our data indicate that younger worms consistently learned better than their elder counterparts (88% vs 63%). We suspected that antioxidants should be able to prevent the neurodegeneration underlying this learning deficit, and could rescue the learning ability of older worms. Worms were cultured with or without the antioxidant alpha-lipoic acid and both populations were trained and tested when they were older. The learning ability of the lipoic acid-cultured worms was significantly better than controls (94% vs 63%) and was closer to the learning ability of younger worms (88%). These data suggest that antioxidants can prevent the accumulation of oxidative stresses underlying the neurodegeneration that causes learning deficits in the elderly population.

141 MECHANISMS OF DORMANT MYCOBACTERIA.

Rachelle J. Alderson*, Todd P. Primm, Sam Houston State University, Huntsville, TX.

While there are 8-10 million active cases of tuberculosis a year worldwide, it is estimated that an amazing 2 billion people are latently infected (one-third of all humans). Thus greater than 99% of infections in humans are latent, which can reactivate to active disease. There is a major need to understand the mechanisms that activate dormant mycobacteria. In a previous study, it was found that after 4 months of stationary phase, *Mycobacterium tuberculosis* produced no colonies on solid media yet retained $>10^4$ viability in liquid media (Shleeva *et al* 2002). The research focuses on the mechanisms of this interesting difference, i.e., what is the mechanism that caused the viable bacteria to not grow on the solid media? Several possibilities will be carefully reviewed; including time dependency of growth, physical stresses, nutrient levels, cellular aggregation, and permeability changes, all in which will help us better understand dormancy in mycobacteria. Current work deals with understanding certain nutrient differences with casitone, valine, leucine, and other amino acids in Sauton's media where dormant mycobacteria does not grow on. Research shows that with the addition of 1 gram per liter of casitone, valine, leucine, glutamic acid, and casein, each in their own separate Sauton's media recipe—*Mycobacterium smegmatis* does grow, while with out the added nutrients the bacteria does not produce a single colony. It has also been shown that with the removal of any nitrogen source (L-asparagine), *Mycobacterium smegmatis* resuscitates well but with a different morphological colony appearance and a slower growth. A clearer view of dormancy may lead to new therapeutics against latent tuberculosis.

149 PHYLOGENETIC ANALYSIS OF SOUTHEASTERN USA EATHWORM SPECIES USING 16S RDNA AND COI SEQUENCES.

Yulia Leontieva*, Armen Nalian, George Damoff, and Alexandra Martynova Van-Kley, Stephen F. Austin State University, Nacogdoches, TX.

Earthworms are very important soil inhabitants which have beneficial influence on soil structure, composition, and properties. *Diplocardia*, considered to be the most species rich native North American earthworm genus (at least 44 described), belongs to family Megascolecidae the taxonomy of which is recognized as the most controversial in comparison to other Oligochaeta families. With many *Diplocardia*, species classification for many of them remains unclear. Identification of earthworms is complicated and requires a number of skills. Currently, *Diplocardia* species, as well as all Megascolecidae, are identified by dissection and observing internal anatomical features under the microscope. Identification is further problematic because for some species the existing classification is vague. Moreover, some species have just a small number of distinctive features which could be highly variable. DNA-based identification of taxa has great potential and it is a rapidly evolving tool to define the position of different taxa. In this research 20 earthworm species from the southeastern USA, most belonging to the genus *Diplocardia* were collected and identified by morphological methods. 16S rDNA and COI sequences were determined for each and 125 sequences were submitted to the NCBI database. Comparison of the morphological identification to a molecular phylogenetic approach using DNA sequence data of the 16S rDNA and cytochrome c oxidase subunit I (COI) genes is in progress. These molecular markers have been investigating for their ability to delimit *Diplocardia* species.

154 CHARACTERIZATION OF THE EFFECTS OF BACTERIA ON *DROSOPHILA MELANOGASTER* DEVELOPMENT.

W. Ryan Williamson* and Ted Brummel, Department of Biology, Sam Houston State University, Huntsville, TX.

It has been observed that the absence of bacteria plays a significant role in modulating lifespan in the *Drosophila melanogaster* mutant DJ817. The purpose of this study is to begin the exploration into determining which bacteria are involved in producing this phenotype. Methods first involved creating axenic egg cultures from DJ817 and the wild-type control w1118. Larvae were then allowed to develop: (1) axenically, (2) after adding *E. coli*, and (3) after adding specific bacteria previously isolated from the wild-type adult fly gut. Autoclaved Carolina® food was used in order to withhold yeast from the developing larvae, a novel method. Test results were determined by observing the size and number of emerged larvae and adult flies from both fly lines. Any observed difference in development between the axenic group and the colonized group would serve as a surrogate assay to account for the modulated lifespan for DJ817.

- 156 STRATEGY FOR DETECTION AND IDENTIFICATION OF *EIMERIA* SPECIES INFECTING CHICKENS.
Andrew Syvyk *, Armen Nalian, Irina Teplova, Alexandra Martynova VanKley, Stephen F. Austin State University, Nacogdoches, TX.

Eimeria is an intracellular protozoan parasite and the causative agent of Coccidiosis – one of the most economically important diseases in modern poultry production. There are at least seven known species of *Eimeria*. The disease is caused by the replication within the digestive tract by one or several of *Eimeria* species and leads to the destruction of epithelial cells. Birds with damaged intestine exhibit poor performance, loose weight and in severe cases can die. The total annual cost of coccidial infections in the US has been estimated to be around 700 million dollars annually. Treatment measures may differ depending on the *Eimeria* species, therefore accurate identification of the species infecting the flock is crucial. Presently, the most advanced system for simultaneous detection and identification of the seven *Eimeria* species is multiplex PCR. However, concurrent amplification of different target fragments with different primers is not free from bias, introduced by fragment size and primer annealing efficiency. We propose a different approach to the multiplex PCR methodology, the basis of which is the ability of denaturing gradient gel electrophoresis (DGGE) to separate DNA fragments amplified with a single pair of primers. Amplicons are separated not according to their size, but according to the nucleotide composition of amplified fragments, thus eliminating the inherent favoritism of multiplex PCR. This alternative DNA-based approach for simultaneous detection and identification of *Eimeria* species could potentially satisfy all the requirements for the sensitive and reliable test system and may be accepted by the poultry industry.

- 167 THE NUCLEIC ACID AND AMINO ACID SEQUENCES OF THE HEMOGLOBINS OF THE BRITTLE STAR *HEMIPHOLIS ELONGATA* SAY.
Ana Beardsley Christensen*, Eric F. Christensen, Biology Department, Lamar University, and Maxim V. Sukhodolets, Chemistry Department, Lamar University, Beaumont, TX.

The burrowing brittle star *Hemipholis elongata* has two hemoglobin proteins, Fraction 1 and Fraction 2, that are packaged in coelomocytes present in the water vascular system (Christensen *et al*, 2003). Using a polyT primer and primers designed from the partial amino acid sequences of the two hemoglobins, cDNA for these hemoglobin genes was amplified by PCR and sequenced. Sequences for both hemoglobins translate into a protein of 144 amino acid residues that differ by 15 amino acids. They share an 89% homology in both the nucleotide and amino acid sequences. They share a 40 to 50% homology with other hemoglobin sequences found in GeneBank. A 3-D structure of the fraction 1 protein was generated using homology modeling by Swiss Protein Bank. The protein very closely resembles in structure the hemoglobin from the lamprey, *Pteromyzon marinus*. The 5' noncoding region of the fraction 1 cDNA consists of 92 nucleotides. The 3' noncoding region is approximately 400 nucleotides for both fractions. Preliminary results of gene structure reveal the presence of three introns, two of which are typical of vertebrate and many invertebrate hemoglobins. Intron I splits the codon for amino acid 32 and is 327 nucleotides long for fraction 2 hemoglobin. Intron II occurs between amino acids 106 and 107 and is approximately 331 nucleotides in length for fraction 1. Intron III is highly unusual in it that occurs between the start codon and the codon for the first amino acid. This is not reported for any other hemoglobin gene.

- 186 GENOME-WIDE PREDICTION OF *CIS* NATURAL ANTISENSE TRANSCRIPTS IN *CHLAMYDOMONAS REINHARDTII*.
England Raimey*, Charles Hauser, Bioinformatics Program, St. Edward's University, Austin, TX.

Natural antisense transcripts (NAT) are a class of endogenous coding or non-protein-coding RNAs with sequence complementarity to other transcripts. Several lines of evidence have shown that cis- and trans-NATs may participate in a broad range of gene regulatory events. Genome-wide identification of cis-NATs in human, mouse and rice has revealed their widespread occurrence in eukaryotes. However, little is known about cis-NATs in model plant systems. We developed a computational method to predict and identify cis-encoded NATs in the unicellular green alga, *Chlamydomonas reinhardtii*. The pipeline mapped mRNAs, ESTs and assembled contigs to the draft genomic sequence (JGI) to identify overlapping.

- 221 HORMONE REFRACTORY PROSTATE CANCER: ALTERNATE PROSTATE SPECIFIC ANTIGEN PATHWAYS.
Cherice Roth, University of North Texas Health Science Center – Fort Worth, TX.

The American Cancer Society estimates that at least 230,110 men in the United States will be diagnosed with prostate cancer this year and that 29,900 men died of the disease in 2004. However the ethnicity of diagnosed patients is not evenly distributed. African American males are 50-60% more like to be diagnosed with prostate cancer. This is higher than any

other ethnic background according to the Center for Disease Control and Prevention (CDC). 55% of African American men that have been diagnosed with invasive prostate cancer will die from the disease. It has been shown that African Americans have several single nucleotide polymorphisms (SNPs) in interleukin 4 (IL4) that have been associated with the modulation of IgE gene transcription via the STAT6 pathway. IL4 has been found is high levels in and around the microenvironment of tumors and in fact aids in immunosurveillance and eventual clearance of some tumors. IL4 has also been linked to the transcription of prostate-specific antigen (PSA) via androgen receptor and the PI3 kinase pathway. It is hypothesized that there is an alternative pathway for the transcriptional activation and subsequent secretion of PSA. The focus of this study is to identify the alternate PSA secretion pathway. Upon cell line stimulation with IL-4 and LY294002 (a PI3Kinase inhibitor) two very different stories emerge. RT-PCR and PSA ELISAs reveal that when IL-4 in the present is presented to low passage androgen dependent LnCap cells PSA levels decrease in a dose dependent manner. However this decrease is not seen in PC-3 and LnCap C42 cells this is significant because the latter cell lines are androgen dependent. Further study will be employed in order to determine whether STAT6 is the secondary modulator of the PSA gene.

- 229 RESISTANCE PLASMIDS MAY CONFER HEAVY METAL TOLERANCE TO BACTERIA INHABITING A RARE HYPERSALINE ESTUARY. Tiffany L. Rubinstein*, Roshni P. Patel, Daren D. Molina, Michael W. Persans and Kristine L. Lowe. Department of Biology, University of Texas – Pan American, Edinburg, TX.

Plasmid-encoded genes encode for mechanisms that allow microorganisms to tolerate the toxic effects of metals and other pollutants. The Laguna Madre, one of only five hypersaline lagoons in the world, has been shown to contain several heavy metals in potentially toxic concentrations. We hypothesize that microbial communities in the Laguna Madre circumvent metal toxicity by using mechanisms encoded by plasmid-based genes. To test our hypothesis, bacteria were isolated from Laguna Madre sediments, tested for metal resistance and subsequently analyzed for the presence of plasmids. Wet sediment was collected from 4 sites in the Laguna Madre; individual colony forming units (cfu; n = 125) that arose on a nutrient-rich medium were chosen at random and tested for tolerance to the heavy metals Zn, Cd, Ni, Cu and Cr using a sensitivity-disc assay. Isolates were qualitatively scored for metal resistance; those which displayed a high degree of resistance were selected for further characterization. 20 isolates (16%) displayed a high degree of resistance to more than 1 metal. Plasmid extractions of the 20 multiple metal resistant strains revealed the positive presence of one plasmid in 5 samples; 2 strains housed 2 plasmids. A total of 7 plasmids were positively isolated from the multiple metal resistant Laguna Madre isolates ranging in size from ~7000 bp to ~13,000 bp. Transformation of a metal-sensitive *Escherichia coli* with plasmid DZ5 resulted in nickel tolerance by the bacterium. We are currently using restriction analyses and PCR amplification to construct a genetic map of the plasmid.

- 235 TRANSCRIPTONAL REGULATION OF AN E2F ASSOCIATED APOPTOTIC PATHWAY. Analyssa C. Medina* and Jonathan H. Lieman, University of Texas – Pan American, Edinburg, TX.

Most tumors have acquired mutations that affect the Rb/ E2F pathway, which controls the cell cycle. Mutations in proteins that affect this pathway can result in hyperproliferative cells which must be eliminated to guard against tumor formation. One mechanism to guard against hyperproliferative cells is apoptosis or programmed cell death. Hyperproliferative cells are eliminated through an apoptotic checkpoint mediated by E2F. E2F can induce apoptosis through two mechanisms, either through p53 which requires transactivation or through derepression by loss of Rb. Relatively little is known about the p53 independent pathway involving derepression by Rb which serves a critical function in the prevention of cancer, therefore further investigation is necessary. We use transcriptional assays to demonstrate the role of several key proteins in this pathway. Previous work has demonstrated that derepression of E2F sites results in apoptosis through expression of phosphatases, which inactivate FAK, which results in an apoptotic response. This apoptotic pathway can be overcome by overexpression of FAK, yet it is unclear how this occurs. We use cultured cells as a model to investigate the interplay between FAK and other key transcription factors which. We demonstrate FAK and E2F co-operate to transform rat embryo fibroblasts subverting this apoptotic checkpoint. We use several breast carcinomas and clones in normal fibroblasts which express high levels of these proteins to investigate the role FAK in this Rb/E2F checkpoint. Luciferase assays were used to demonstrate the roles of several signaling molecules which contribute to cellular transformation in these cells including E2F, Myc and p53.

P49 THE EFFECT OF THE DIPEPTIDE D-ALAGLY ON LEXA CLEAVAGE IN *E. COLI*.

Jason Burnham*, Frank Guziec, Lynn Guziec, and Martín Gonzalez, Southwestern University, Georgetown, TX.

Bacteria have evolved numerous mechanisms to resist antibiotics, one of which involves the SOS response. In the presence of β -lactam antibiotics, the *Escherichia coli dpiBA* operon is induced and one of its gene products, DpiA, binds to DNA, blocking DNA replication, thus initiating the SOS response. This permits the bacteria to arrest cell division, more specifically, to disrupt cell wall synthesis, thereby avoiding the bactericidal effects of β -lactam antibiotics, which require active cell wall synthesis to be effective. Since the SOS response is an inducible response that requires the cleavage of LexA (a repressor protein that binds to the promoter region of the SOS genes and blocks their expression) the bactericidal effects of β -lactam antibiotics could be increased by blocking LexA cleavage. This was attempted using high concentrations of D-alanine glycine (D-AlaGly), which was thought to mimic the necessary contact points in the LexA active site. Experiments were carried out at different concentrations of D-AlaGly, in different media, and with different strains of *E. coli*. All results show that D-AlaGly has little, if any, stabilizing effect on LexA, most likely resulting from the fact that it is a readily hydrolyzed dipeptide. In order to address this issue, current work has focused on the thionation of L-AlaGly with Lawesson's reagent in the solvent hexamethylphosphoramide (HMPA). After the thionated dipeptide is synthesized in sufficient quantities, it will be tested in *E. coli* to see if it prevents LexA cleavage.

P93 IDENTIFYING THE LON RECOGNITION SEQUENCE IN THE CARBOXYL-TERMINUS OF THE UMUC PROTEIN.

Julianne Stafford* and Martín Gonzalez, Southwestern University, Georgetown, TX.

Cells are constantly undergoing damage to their DNA, and in order to survive bacteria have developed mechanisms to repair damage in an error free manner. However, sometimes the nature of the damage is such that it cannot be repaired by error free mechanisms. In this case, some bacteria are able to utilize a repair mechanism called SOS mutagenesis, an error-prone mechanism of DNA repair that is a last resort for cell survival when the genome of a bacterial cell has undergone extensive damage in the form of DNA lesions. UmuC is an integral protein in SOS mutagenesis. UmuC, acting as a heterotrimer with UmuD', allows for DNA replication across DNA lesions and enables the cell to survive and pass on its genetic material. In order to turn off the SOS mutagenic response and ensure that it is only active when necessary to avoid excessive mutations, UmuC is degraded by the Lon protease. A specific amino acid sequence, which is located somewhere between 50 and 20 amino acids from the extreme carboxyl-terminus of UmuC, targets UmuC for Lon degradation. Our current research has developed two approaches to precisely define the region of UmuC that functions as a Lon recognition sequence.

P95 SCREENING FAMILIES OF BATS FOR THE SHORT INTERSPERSED DNA ELEMENT CALLED VES SINE.

Eeshita Ghosh Dastidar* and Loren K. Ammerman, Angelo State University, San Angelo, TX.

Short Interspersed Element or SINE is a unique repetitive DNA element that has been found in several eukaryotic organisms. SINEs are 80-400 base pairs of repetitive DNA sequence that increase in number as the eukaryotic genome goes through the process of transcription and reverse transcription. Their function is not fully understood, but it is thought that they play some role in evolution of the genomic DNA. This project was meant to determine which families of bats have a newly described VES SINE present in their genome and thus help in phylogenetically linking different families of bats and understanding where in the phylogenetic tree the SINE originated. Recent studies by Borodulina and Kramerov (1999) in bats of the Old World showed that SINEs were specific to certain genera in the family Vespertilionidae. We screened several species of bats of families Molossidae, Vespertilionidae, Noctilionidae, Natalidae, Phyllostomidae, and Mormoopidae from the New World for VES SINE using the primers from previous studies in PCR amplification reactions. We were unable to detect VES SINE in any of the genera tested, even in members of the family Vespertilionidae. Our results might be due to differences in the sequence of VES SINE found in the Old World bats compared to that of the New World bats.

P111 POTENTIAL INSERTION SITES IN THE TOBACCO MOSAIC VIRAL VECTOR.

Zun Liu* and Christopher M. Kearney, Department of Biology, Baylor University, Waco, TX.

The tobacco mosaic virus (TMV) vector is used to inexpensively produce pharmaceutical and other proteins in plants. We used vectors with green fluorescent protein marker ORF between the movement and coat protein ORF. We sought to find other potential insertion sites to allow the insertion of two genetic elements in the vector. A 250 bp insertion was found to be stably maintained within the CP ORF. In another construct, the CP ORF was eliminated and a duplicate pseudoknot

region was created, with the construct placed between the pseudoknots. This construct was noninfectious. Results with an insertion downstream of the viral terminus will also be presented.

- P130 CAN YOU TEACH AN OLD WORM NEW TRICKS? IN *C. ELEGANS* MEMORIES FOR ASSOCIATIVE TRAINING ARE MORE EASILY ACQUIRED BY YOUNG ORGANISMS, FOLLOWING RELATIVELY BRIEF TRAINING DURATIONS, IN CONTRAST TO OLDER ORGANISMS.

Kenton Venhuizen*, Brianna Murphy, Fidelma A. O'Leary. St. Edward's University, Austin, TX

On a radial temperature gradient, *C. elegans* worms migrate, after conditioning with food, toward their cultivation temperature. This experience-dependent behavior is called isothermal tracking (Gomez, 2001). As these organisms age, however, the ability to remember their cultivation temperature declines, partly as a result of oxidative stress (Murphy, 2006). This is in line with the free radical theory of ageing which states that cell and tissue injury by oxygen-derived radicals constitutes, or at least significantly contributes to, the ageing process (Vanfleteren 1993). An overall deficit in learning in elderly *C. elegans* was responsive to antioxidants, and their learning ability following 24 hours of training improved dramatically from 36% to 65% (Murphy, 2006). We were interested in establishing just how much more efficiently the young can learn in comparison with the elderly worms? To answer this question, we tested the ability of *C. elegans* to learn and remember with different durations of training. Results showed that younger worms did in fact learn and remember more efficiently than the elderly worms. Following 6 hours of training, 89% of young worms exhibited learning, compared to 36% of elderly worms. This is in contrast to 87% vs. 80% following 24 hours of training. In fact, with as little as 4 hours of training, 70% of the young worms exhibited learning and memory. Since associative learning involves establishing a neural connection between circuits, our data suggests that the elements of the neural circuitry mediating the learned behavior are more malleable in the younger organisms.

- P131 THE ROLE OF CELLULAR FACTORS ON THE ACTIVITY OF HUMAN IMMUNODEFICIENCY VIRUS TYPE-1 (HIV-1) INTEGRASE IN *SACCHAROMYCES CEREVISIAE*.

M. Whitney*, M. Mazour, K. Sanders, and P. King, St. Edward's University, Austin, TX.

Replication of human immunodeficiency virus type-1 (HIV-1) involves integration of the viral cDNA into the host cell chromosome. This requisite step is carried out enzymatically by the viral-encoded integrase (IN) but apparently involves a number of other viral and/or cellular factors for completion. However, the identification of the integration-involved cellular factors and the elucidation of their exact role in integration has been hampered by the limited ability to perform mutational reverse genetic studies in mammalian cells. In contrast, mutational analyses are simply performed in *Saccharomyces cerevisiae*, a model eukaryote commonly utilized for the elucidation of molecular pathways of higher eukaryotes. However, the use of *S. cerevisiae* as a model for the identification of cellular factors involved in IN-mediated integration requires a useful measure of IN activity in yeast cells. Recently, a *S. cerevisiae*-based quantitative assay has been reported that can be implemented to easily measure the activity of HIV-1 IN in yeast cells. Here we report the optimization of this assay to detect the role of cellular factors in integration and provide a mechanism for screening the contents of the *S. cerevisiae* deletion library for mutants with impaired IN activity. Additionally, we detail the affect of deletion of several putative integration-involved cellular factors on IN activity utilizing this assay.

- P132 NUCLEAR IMPORT OF HUMAN IMMUNODEFICIENCY VIRUS TYPE-1 (HIV-1) INTEGRASE IN *SACCHAROMYCES CEREVISIAE*.
J. Dougherty*, B. Cowsert, A. Meier, and P. King, St. Edward's University, Austin, TX.

Human immunodeficiency virus type-1 (HIV-1) replication requires the viral-encoded integrase (IN) which acts in the context of a large multi-protein complex, the pre-integration complex (PIC), comprised of a number of viral and host cellular proteins. Active nuclear import of the HIV-1 PIC is required for infection of non-dividing cells such as macrophages and resting T-lymphocytes; however, the molecular components of the HIV-1 PIC that are recognized by the cellular nuclear import machinery and the nuclear import pathway utilized for PIC import remain incompletely defined. HIV-1 IN has been implicated in a central role in the nuclear import process in mammalian cell culture, but the inability to perform reverse genetics in these cells has limited the ability to dissect details involving its import. We report here results from experiments utilizing *Saccharomyces cerevisiae*, a model eukaryote commonly utilized for the elucidation of molecular pathways of higher eukaryotes, in the investigation of the details of nuclear import of HIV IN. We additionally have evaluated the importance

of several yeast mutations on the nuclear import of IN. These results highlight the importance of *S. cerevisiae* in molecular studies of nuclear import and provide preliminary evidence of cellular factors that may play vital roles in the nuclear import of the HIV-1 PIC.

- P134 PHOTOSYNTHETIC EFFECTS OF DIFFERENT LIGHT INTENSITIES ON MUTANT AND WILD-TYPE *ARABIDOPSIS THALIANA*.
Phillip Scott* and Nathan Reyna, Howard Payne University, Brownwood, TX.

Plants respond to changes in light intensities by increasing or decreasing the size of their peripheral light harvesting complexes (LHC). In low light intensity, the number of peripheral light harvesting complexes increases and the chlorophyll a/b ratio decreases respectively. The opposite is observed in high light intensity. It is thought that increased production of chlorophyll b is responsible for the increasing number of peripheral light harvesting complexes. In this study, wild-type and YK1-3 mutant *Arabidopsis thaliana*, a member of the brassicaceae family, were grown under high (20,000 lux), medium (10,000 lux), and low (5,000 lux) light intensities. The YK1-3 mutant overexpresses the enzyme that catalyzes the conversion of chlorophyll a into chlorophyll b. The photosynthetic rates of wild-type and mutant plants growing under the various light conditions were measured using a CO₂ gas specific probe. Chlorophyll a/b ratio and total absorbance spectrum for each sample was determined using a Uv-vis spectrometer. For further study, differences in ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCo) protein expression between plants was measured using western blot analysis of the RuBisCo large subunit (Rbcl). YK1-3 mutants are expected to have smaller chlorophyll a/b ratios and higher photosynthetic rates than wild-type *Arabidopsis thaliana*.

- P144 *IN VITRO* EFFECTS OF 4-OH TAMOXIFEN AND 17 BETA ESTRADIOL ON THE HUMAN CERVICAL CELL LINE HeLa.
E. Navaira*, and M.E. Cuevas, Biology Department, Southwestern University.

Tamoxifen, used to treat breast cancer due to its anti-estrogen action, has been shown to increase the risk of developing cervical cancer in HPV positive women. The present study was designed to investigate the effect of 4-OH tamoxifen (4-OH TAM) and 17 beta estradiol (E₂) on the *in vitro* growth of the human cervical carcinoma cell line HeLa. Cells were cultured in media supplemented with 10% dextran-charcoal treated fetal bovine serum and various concentrations of 4-OH TAM and E₂ (10 nM-100 μM). A moderate increase in percent survival was observed when cells were treated with low concentrations of 4-OH TAM on day 1 and 3 with complete inhibition seen at 100 μM. A similar trend was observed with E₂ (10 nM to 1 μM) treatment on d1 and d2. However, on d2 of 4-OH TAM and on d3 of E₂ treatment there was a progressive decrease in percent survival with increasing drug concentrations. To distinguish between the cytostatic and cytotoxic effect of 4-OH TAM and E₂ dead cells were counted using trypan dye exclusion assay. Actual cell count showed cytotoxic effect only at 100 μM 4-OH TAM, with a 50% increase observed at 10 μM. E₂ cytotoxic effect was observed at both concentrations. Our results indicate that apoptosis is the biological parameter associated with the cytotoxic effect of 100 μM 4-OH TAM and E₂. Future studies include determination of the possible involvement of caspase 3 and/or 8 using Western blot analysis.

- P146 ANTI-OXIDANT EXPOSURE DURING TRAINING ONLY, IS SUFFICIENT TO SUBSTANTIALLY REVERSE MUCH OF THE LEARNING DEFICIT ACCRUED WITH AGING IN *C. ELEGANS*.
Glenda Colop, Fidelma O'Leary, St. Edward's University, Austin, TX.

Oxidative damage to the brain has been shown to increase as age increases (Akiko 2005). One consequence of this is an age related decline in learning ability (Murphy 2006). Using an associative learning model it has been shown that *C. elegans* can learn to associate food and temperature (Murakami 2004), which is measured by a behavioral modification. The normal cultivation temperature for *C. elegans* is 20°C. However, following cultivation for 18 h at 17°C, organisms migrated away from a 20°C environment to the training temperature of 17°C. (W. S. Ryu 2002). We were interested to know if administration of alpha-lipoic acid (LA) during the training would be sufficient to reverse some of the learning deficit accrued with aging (Head 2002). Worms were cultured at 20°C without LA. During the 18 h training period, LA was added to *E. coli* which they eat. After training the worms were tested on a radial temperature gradient, with a range of 17-25°C. Not surprisingly, more young worms than adults went to the trained temperature. (90% versus 70%). Additionally, the number of adults that went to their trained temperature when they were treated with antioxidant increased by 22%. This shows that, for *C. elegans*, even when age-related neural degeneration accrues over time, a change to an anti-oxidant-rich diet for a relatively short period of time can dramatically improve learning ability.

P171 REGULATION OF ADAPTATION GENES IN ANALOG MICROGRAVITY.

Jamal Plumber*, Kamaleshwar Singh, Bobby Wilson, and Alamelu Sundaresan, Texas Southern University, Houston, TX.

Space flight has presented a number of unusual situations for humans to work with. While in space the human immune system starts to weaken due to a loss of certain functions of the immune system. Previous experiments have shown that human immune system does not react in space as it would on Earth. This malfunction is due to the loss of certain lymphocyte functions, namely T cell locomotion and activation. These two functions are a major part of the human immune system. The objective of this project is to test lymphocytes that were cultured in microgravity conditions and to isolate what channels or pathways in the cells are active and inactive, finding the exact channel to promote healthy immune system functions. This was done by gene array and real time PCR (polymerase chain reaction). This study is looking for the gene or genes responsible for proper lymphocyte function. The targets that will be investigated will be Placental Induced Growth Factor or PIG F, and Interleukin 1 Alpha or IL-1 α . From prior experiments and gene array analysis, it was deduced that some vital genes involved in immune regulation such as IL-1 α , and cardiovascular response such as PIG-f, exhibited unusual expression profiles in the analog microgravity environment. Knowledge of the expression levels of key molecules in high stress environments such as microgravity, high altitude and other specialized aviation exercises is essential for the development of intervention strategies and prevention of catastrophic aviation events.

P198 CYTOTOXICITY OF ANTHRAPHYRAZOLES IN (AP-10 and AP-11) ON HUMAN PROSTATE CANCER (DU-145) AND TESTICULAR CANCER (NETRA-2) IN CULTURE.

K.C. Seilheimer*, F.S. Guziec, and M.E. Cuevas, Southwestern University, Georgetown, TX.

Anthracyclines (APs) are potent cytotoxic agents that intercalate into DNA, causing single-strand breaks, inhibition of DNA synthesis and topoisomerase II. The objective of this study was to determine the effect of AP-10 and AP-11 on DU-145 human prostate and NETRA-2 testicular carcinoma cell line. Cell cultures were treated for 1 hour with different concentrations (0.1 μ M-20.0 μ M) of AP-10 and AP-11. Cells were allowed to recover for 48 hours in fresh media, and cell viability was determined by MTS assay or trypan blue dye exclusion assay. The IC₅₀ of AP-10 on the DU-145 and NETRA-2 carcinoma was determined to be 0.4 μ M and 0.2 μ M, respectively. In contrast, the IC₅₀ of AP-11 on the DU-145 and NETRA-2 carcinoma was determined to be 3.2 μ M and 1.0 μ M. To determine if cells were able to recover after exposure to AP-10 and AP-11, DU-145 cells were incubated in the presence of the IC₅₀ concentration. After exposure, fresh media was added daily for 5 days and cell growth compared to control. Although cells exposed to AP-10 and AP-11 were able to recover, they never attained the cell number observed in cultures that were never exposed to the compounds. Finally, based on DNA gel electrophoresis, apoptosis seems not to be the underlying cellular mechanism of AP-10 and AP-11's cytotoxic effect. In conclusion, our results demonstrate that AP-10 has a higher cytotoxic activity than AP-11, their cytotoxicity is indeed due to cell death, but apoptosis seems not to be involved. Future studies will include further analysis of alternate cellular mechanisms involved.

P236 PHOSPHATASE REGULATION OF E2F ASSOCIATED APOPTOSIS.

Joe M. Garza* and Jonathan H. Lieman, University of Texas – Pan American, Edinburg, TX.

Apoptosis (programmed cell death) plays an important role in preventing cancer. Hyperproliferative cells are eliminated by apoptotic checkpoints thereby guarding against tumor development. Cancer cells have lost this apoptotic checkpoint. We have recently identified a novel pathway linking the control of apoptosis to the control of cell proliferation through Rb/ E2F. This novel pathway is p53 independent and mediated by several phosphatases which control the activity of Focal Adhesion Kinase (FAK). The loss of FAK activity has been shown to play a key role in initiating this apoptotic response. An estrogen responsive engineered cell line (DNE2F-ER) which inducibly expresses a dominant-negative form of E2F, lacking the transactivation domain, was used to initiate E2F associated apoptosis. Upon induction, Rb-E2F complexes are displaced from the promoters of genes associated with this pathway, resulting in an apoptotic response. We use real-time PCR and chromatin immunoprecipitation (ChIP) assays to identify phosphatases negatively regulated by the Rb/E2F pathway. RNA isolated from cells undergoing E2F associated apoptosis was collected to determine presence of phosphatases and their relative levels throughout this process. To determine if these are direct targets, promoter occupancy of the phosphatases was assessed using ChIP assays.

- P238 COMPARISON OF NUCLEOTIDE SEQUENCES OF HEMOGLOBIN PROTEINS FROM TWO CLOSELY RELATED SPECIES OF BRITTLE STAR.

Miriam Dark*, Ana Beardsley Christensen, and Eric Christensen, Biology Department, Lamar University, Beaumont, TX.

Hemipholis elongata and *Ophiactis simplex* are brittle stars that both belong to the same family of ophiuroids (Family Ophiactidae) and produce the respiratory pigment hemoglobin. Even though amino acid and nucleotide sequences for hemoglobin can vary greatly between closely related species (< 50% homology), we were successful in amplifying a partial nucleotide sequence for the hemoglobin of *O. simplex* using primers specific for *H. elongata*. As the sequence was generated from genomic DNA and most likely contains intronic sequences, there is a region of similarity that is shared between *O. simplex* and the two *H. elongata* gene sequences :a) 171 nucleotides with fraction 1 protein with 81% homology, and b) 190 nucleotides shared with fraction 2 protein with 78% homology. The *O. simplex* sequence translates into approximately 81 amino acids, roughly half of the protein molecule. Both of the *H. elongata* proteins are 144 amino acids in length. When the amino acid sequences are compared there is a 35% homology between *O. simplex* and fraction 1 protein and a 39% homology with fraction 2. Further investigations will examine the intron structure of *O. simplex* hemoglobin gene and compare it to the three introns of the *H. elongata* genes.

CHEMISTRY AND BIOCHEMISTRY

- 9 ASSIGNMENT OF THE UVVIS SPECTRA OF NITROANILINES USING ELECTRON DENSITY DIFFERENCE MAPS.

Darren L. Williams*, and Bassam Alnasleh, Chemistry Department, Sam Houston State University, Huntsville, TX.

The full assignment of UVVIS transitions has always been a complicated matter. Often, ground state orbital descriptions are used and the relaxation of the excited states due to configuration interaction is teased out of experimental measurements of oscillator strength, polarization dependence, and solvatochromic shifts. The increase in the speed of the PC has added computational chemistry software to the spectral-assignment toolbox. This talk will outline the steps taken to assign the UVVIS spectra of three nitroanilines, 1,3,5-triamino-2,4,6-trinitrobenzene, and other nitroaromatics. The molecular geometries were optimized at a level of theory suitable for PCs i.e. B3LYP/6-31G(d). A frequency calculation was employed to verify that the geometry was a minimum on the potential energy surface. The electronic transition energies and oscillator strengths were then calculated using the Zerner intermediate neglect of differential overlap (ZINDO) method. The total electron density cubes were calculated for the ground and excited states. The cubman utility program from Gaussian was used to subtract the ground state electron density cube from each excited state electron density cube. This produced electron density difference cubes that reflect the change in total electron density for each spectral transition. These electron density differences were color-mapped onto the ground state electron density isosurface to illustrate the shift in electron density within the molecule during the electronic transition. This is more accurate than a simple ground state MO diagram of the change related to the spectral transition. However, the ground state MO diagram showing the transitions is also presented.

- 20 PHOTOCHEMISTRY OF 2,2-DIMETHYL-1,2-DIHYDRONAPHTHALENE OXIDE.

Benny E. Arney, Jr. *, Tiffani Thompson, William Donaldson, and Rick C. White, Department of Chemistry, Sam Houston State University, Huntsville, TX.

Preparation and photochemistry of the title compound will be discussed. This system provides strong support for the advent of a carbene-aldehyde intermediate in the photochemistry of the dihydronaphthalene oxide system.

- 21 ELECTRON EFFECTS IN THE FORMATION OF 1,3,5-TRIARYLPYRAZOLES.

Nathan C. Duncan, Charles M. Garner, and Tim Nguyen*, Baylor University, Waco, TX.

Several para-substituted dibenzoylmethanes have been synthesized. These diketones were then reacted with 2-hydrazinopyridine and 2,6-bis-hydrazinopyridine. The product ratios were studied in order determine the extent that electron withdrawing and electron donating groups affect the regioselectivity in pyrazole formation. Several electron donating and electron withdrawing groups were used in order to vary the relative electron donating or withdrawing strength. Unlike similar previous studies, this one is unique in that it virtually eliminates steric effects in pyrazole formation.

- 29 AUTHENTIC SAMPLE PREPARATIONS ASSOCIATED WITH THE PHOTOCHEMISTRY OF INDENE OXIDES AND DIHYDRONAPHTHALENE OXIDES.

Benny E. Arney*, Jr., Tiffani Thompson, William Donaldson, Department of Chemistry, Sam Houston State University, Huntsville, TX and Irisa D. Arney, Anthropology and Forensic Science, Baylor University, Waco, TX.

The synthesis of several key reactants and proposed photoproducts, from the photolysis of 3,3-dimethylindene oxide and 2,2-dimethyl-1,2-dihydronaphthalene oxide, were attempted and the results of these efforts will be presented. Some useful examples of success and failure for the Organic Chemistry class will be discussed.

- 47 IDENTIFICATION AND PURIFICATION OF ANTIMICROBIAL PEPTIDES IN THE SKIN OF THE CRICKET FROG, *ACRIS CREPITANS*.
Lisa A. Chaney* and Jon B. Scales, Midwestern State University, Wichita Falls, TX.

Many living organisms have an innate immune response that includes the production of peptides that have antimicrobial activity against bacteria, fungi, and protozoa. An astonishing variety of antimicrobial peptides have been isolated from the skin and stomach tissue of amphibians. Antimicrobial peptides have been identified in frog species of the family Hylidae (tree frogs and their allies), including *Phyllomedusa ssp.* and *Hyla ssp.* Reported here is the identification of antimicrobial peptide(s) from a skin extract of *Acris crepitans* (Blanchard's cricket frog), which is a member of the family Hylidae. Disc diffusion assays using the skin extract have shown the inhibition of growth of *Escherichia coli*, *Staphylococcus epidermidis*, *Pseudomonas aeruginosa*, and *Candida albicans*. Initial purification of the active peptide(s) within the skin extract has begun with gel-filtration and will follow with RP-HPLC.

- 86 BEST QUALITY TRYPTIC PEPTIDE MAPS BY CAPILLARY ELECTROPHORESIS.

Aaron Lehnhoff* and Robert Holloway, Schreiner University, Kerrville TX.

Careful attention to analyte concentration, extent of protein digestion, buffer strength, extraneous salt removal, power dissipation and judicious choice of hydrogen ion concentration is necessary to obtain high quality electropherograms. We have been able to determine that a very inexpensive trypsin can produce very good results and we have made progress toward a longer term goal of improving this important analysis by tagging.

- 96 NOVEL GLUCOSE BIOSENSING AT VERY LOW POTENTIALS.

Xin Wei, Kun Tao*, Dan Mao, Tuan D. Phan, Yuanjian Deng, John B. Sapp, Renard L. Thomas, and Bobby L. Wilson
Department of Chemistry, Texas Southern University, Houston, TX.

A brand-new electrochemical glucose biosensing mechanism has been discovered in this work. It is known that, mainly due to the large molecular size and the folded protein structures, the electron transfer process between glucose oxidase enzyme and working electrode is so sluggish that the reduced enzyme cannot be detected directly via electro-oxidation. As a result, oxygen or other artificial mediators have been required to facilitate the electron transfer process. In this study, it was surprisingly discovered that, at very low potentials (-0.4 volts or lower potentials versus Ag/AgCl reference electrode), the reduced form of glucose oxidase, which was formed after reacting with glucose, could be directly detected on any regular working electrodes (such as glassy carbon, Pt, Au, etc.). This unusual electrochemical behavior has been confirmed in another unique experiment using dual working electrodes with a dialysis membrane. The new glucose biosensing technique is extremely selective, for most interfering species cannot be oxidized at so low potentials. This extraordinary discovery would be important for the development of new generation glucose biosensors for reliable diabetes diagnosis, monitoring and treatment. The detailed molecular behavior is being systematically investigated with Electrochemical Quartz Crystal Microbalance technique, which already revealed that the new biosensing mechanism is related with the absorption of the reduced enzyme molecules on the working electrode at low potentials.

- 99 A MICROWAVE ASSISTED METHOD FOR THE SYNTHESIS OF 1,4-DIPHENYL-1,3-BUTADIENE.

Jason Perrin* and Wayne C. Boring, Stephen F. Austin State University, Nacogdoches, TX.

A published procedure for synthesizing 1,4-diphenyl-1,3-butadiene (bistryl) requires a twelve hour reflux of cinnamaldehyde, phenyl acetic acid, and acetic anhydride with a lead (II) oxide (litharge) catalyst. By applying a microwave assisted pro-

cedure to this reaction, the reaction time was reduced, the yield was increased, and the need for the toxic lead (II) oxide catalyst was eliminated. In order to confirm bistyryl was the product of the reaction, its identity was established by comparing the IR and NMR spectra and the melting point of the product with those of an authentic sample.

115 SYNTHESIS AND CHARACTERIZATION OF DIRUTHENIUM COMPLEXES.

Tuan D. Phan, Nina Brinkley*, and John Sapp, Department of Chemistry, Texas Southern University, Houston, TX.

The synthesis and characterization of diruthenium complexes in the form of $Ru_2(L)_4(NCS)$, where L is the fluorinated derivative of 2-anilinopyridinate equatorial bridging ligand, are presented. The metal-metal bonded Ru_2 complexes containing isothiocyanate (NCS) axial ligand are synthesized by reacting the $Ru_2(L)_4Cl$ compounds with NaSCN in organic solvents. Detailed structural study has revealed that the formation of the Ru-N(CS) bond is thermodynamically preferable over the Ru-S(CN) bond. The electrochemical and spectroscopic behaviors of these compounds will be reported in details. In addition, preliminary results regarding the development of electron donor-acceptor system based on diruthenium complexes and porphyrin will also be discussed.

119 TETRAALKYLAMMONIUM EXCHANGED CLAYS – CALORIMETRY AND X-RAY DIFFRACTION.

Alyx S. Frantzen, Stephen F. Austin State University, Nacogdoches, TX.

A series of standard clays, each with different cation exchange capacities, was exchanged with tetraalkylammonium salts. The salts used ranged from tetramethylammonium to tetraoctylammonium. The heat of combustion of each organo-clay was investigated using bomb calorimetry. Results indicate a direct relationship between the heat of combustion and the chain length of the smaller organics. As the chain length of the tetraalkylammonium salt increases, a pseudobilayer of the organic is formed. This causes a dramatic increase in the heat of combustion. The arrangement of the organic was confirmed using X-ray diffraction. A similar trend is seen in the basal spacing of the organo-clays.

126 TiO_2 DEPOSITION ON ACRYLIC SUPPORT MATERIAL FOR PHOTOCATALYTIC DEGRADATION OF NO_3^- IONS.

Philip J. Carlson*, Lori A. Pretzer, Joel E. Boyd, Wayland Baptist University, Department of Chemistry, Plainview, TX.

Titanium (IV) Oxide (TiO_2) was utilized for the photocatalytic degradation of nitrate (NO_3^-) from aqueous solution. TiO_2 was deposited onto acrylic sheets via solvent deposition. The TiO_2 (titania) was dispersed in a solution of methylene-chloride and methanol and applied to the surface of the acrylic sheets. This deposition method resulted in a firmly adhered titania surface, which possessed uniform, high surface area coatings as evidenced by SEM micrographs. The titania deposited on acrylic support materials have superior durability and show only a slight reduction in photocatalytic activity as compared to titania deposited on glass supports. The relative amounts of titania that were active on the support materials was modeled kinetically. Titania on acrylic showed a reduction in activity remarkably less than that deposited in a polyvinyl alcohol film. A simple reactor was built for use with external illumination, in which the light was coupled through the acrylic support material directly to the titania. The photocatalytic properties of titania were enhanced by the photodeposition of palladium metal. The optimum metal loading content for the removal of nitrates was probed as well as the effectiveness of certain bimetallic palladium-metal loaded titania. A modest reduction of 19.6% of the total nitrate level was seen.

127 PHOTOCATALYTIC DEGRADATION OF AMMONIA OVER PLATINIZED TITANIUM (IV) OXIDE.

Lori A. Pretzer*, Philip J. Carlson, Joel E. Boyd, Wayland Baptist University, Department of Chemistry, Plainview, TX.

Aqueous ammonia was degraded using platinum-modified titanium (IV) oxide (titania) solvent deposited on acrylic support materials. The catalyst was doped with platinum to enhance the selective oxidation of ammonia to inert nitrogen gas. The optimum platinum concentration and oxidation state for ammonia oxidation was investigated. Total nitrogen reduction was verified by summing the concentrations of NO_3^- -N, NO_2^- -N, and NH_3 -N in solution during the course of the reaction. A 46 % reduction in the total concentration of dissolved nitrogenous compounds was observed in a 2 % (w/w) platinum/titania.

- 129 Botulinum Toxin: Clinical and Biowarfare agent! Computer-aided Drug Design.
James M. Briggs*, Tarek M. Mahfouz, Wei Fu, Jerry O. Ebalunode, Department of Biology and Biochemistry, University of Houston, Houston, TX.

Botulinum toxins are the most toxic biological substances known. One gram of the toxin is capable of killing one million people. Yet, BoTox has clinical as well as biowarfare uses. The goals of this project are to elucidate biophysical characteristics relating to the molecular mechanisms of action of these bacterial toxins, and ultimately to design counter-measures to defend against their use. Long time molecular dynamics simulations have been used to elucidate the molecular mechanism of a required pH-dependent conformational change. Finally, chemical property mapping of an ensemble of protein conformations was used in small molecule database searching and docking to identify new potential inhibitors of the catalytic function of the toxin.

- 155 COPPER AND ZINC UPTAKE IN CRAYFISH VENTRAL NERVE CORD.
Tyler Miller, Howard Payne University, Brownwood, TX.

The uptake of certain transition metals into nervous tissue is a known factor in the development of many neurological disorders. This study will quantify the amount of metal binding in nervous tissue of a live specimen (crayfish) as well as measure the effectiveness of the metal specific chelators. Ultraviolet-Visible Spectroscopy will be the instrumentation to obtain the data. The chelators' ability to inhibit binding will be the main purpose of this study. The information gained from this study may lead to further studies on specific chelators as treatments or preventative medicines for neurological disorders.

- 158 THE PREPARATION, DECOMPOSITION, AND VOLTAMMETRIC BEHAVIOR OF SODIUM FERRATE (IRON VI) IN AQUEOUS ALKALINE SOLUTIONS.
James Fowler*, Stephen F. Austin State University, and Wayne C. Boring, Stephen F. Austin State University, Nacogdoches, TX.

In 1844, Fremy reported the appearance of a purple color when he heated iron filings and powdered potassium nitrate in an aqueous solution of sodium hydroxide. Authors have associated the purple color that Fremy observed with the plus six oxidation state of iron in ferrate ion (FeO_4^{2-}). Although the chemical literature abounds with accounts of studies of ferrate ion, unanswered questions remain concerning its structure and chemistry in solution. In an effort to find answers to some of these questions, a study of the preparation, decomposition, and cyclic voltammetric behavior of sodium ferrate was initiated. The results of that study will be reported in this presentation.

- 161 THERMOISOMERIZATION OF CANOLA OIL.
Kyle Kinser, Howard Payne University, Brownwood, TX.

The objective of this study is to quantitatively analyze canola oil for content of trans and cis fats. Also, canola oil will be tested for its tendency for the cis bonds in the oil to convert to trans bonds during typical cooking periods. This analysis will focus on how long unsaturated fats can be used in cooking and meet USDA regulations before needing to be changed. Also a taste test will be given to analyze a preference for brownies cooked used oils that contain primarily cis or trans fats.

- 173 COMPARATIVE CHEMICAL AND ANTIMICROBIAL PROPERTIES OF THE CHINESE STAR ANISE AND ANISE ESSENTIAL OILS.
Kristina R. Casmire*, Brooke Woodard, Ezekeil Hudson II, Fawzia Abdel-Rahman, Wenlou Zhang, and Mahmoud A. Saleh. Department of Chemistry, Texas Southern University, Houston, TX.

The essential oil of the Star Anise (*illicium verum Hook F.*) and Anise (*Pimpinella anisum L.*) were discovered to have immense similarities in the chemical constituents of their essential oil even though the two species come from two different families. The chemical analyses were conducted utilizing gas chromatography-mass spectroscopy (GC-MS), thin layer chromatography (TLC), ultraviolet-visible (UV-VIS), and infrared (IR) spectroscopy. All of these techniques indicated vast similarity between the two essential oils. The biological activity of the essential of the two species was examined once more on a group of fungi and several strains of bacteria. Although the two oils were similar in their chemical composition their antimicrobial activities were dissimilar. This may possibly be due to synergists and/or antagonists among the minor components in each of the oils.

- 175 QUANTITATIVE STRUCTURE-ACTIVITY RELATIONSHIP (QSAR) OF QUORUM-SENSING INHIBITORS AS A NOVEL APPROACH FOR CONTROLLING MICROORGANISMS.

Brooke B. Woodard* and Mahmoud A. Saleh, Department of Chemistry, Texas Southern University, Houston, TX.

Quorum-sensing molecules are essential for bacterial and fungal biofilm formation. Biofilms are specific and organized communities of microorganisms initiated by quorum-sensing molecules. Bacteria and fungi pose direct threats to human health and affect various materials presenting an urgent need to control them. Farnesol, a sesquiterpene, was found to mimic the quorum signaling mechanism in fungi; therefore, a group of farnesol analogs were selected from the literature and subjected to a series of structural analyses including both Comparative Molecular Field Analysis (CoMFA) and Comparative Molecular Similarity Indices Analysis (CoMSIA), two separate but complimentary approaches to QSAR. This provided significant insight into the specific structural requirements for quorum-sensing activity revealing the role that steric and electrostatic effects play on the activity of a chemical. A group of 30 analogs of N-(3-Oxododecanoyl)-L-homoserine lactone, the quorum-sensing molecule in gram negative bacteria, were selected to conduct analyses for structural requirements for increased activity. The results of this study will be presented at the meeting.

- 182 ANALYZING SPACE SHUTTLE FOOD FOR NUTRITIONAL CONTENT.

Chelsea L. Harris, Space and Environmental Science, Internship Program, National Aeronautics and Space Administration, Houston, TX.

The purpose of this project is to analyze food samples, which compose the astronauts' diet, provided by the food scientists from the NASA Space Foods Laboratory. NASA dieticians from this group work with the astronauts to develop their meals, and therefore, require pertinent nutritional data about the foods. This data is composed of moisture, chloride, total iodine, total Kjehdahl nitrogen and protein, ash, dietary fiber, minerals, carbohydrates and cholesterol, fatty acid, total fat, and calories. The NASA Water and Food Analytical Laboratory (WAFAL) analyzes these food samples to provide this key data. The analysis of the food products will allow the dieticians to input the data found into a database to develop recipes and meals that meet their standards. This project directly benefits NASA as it ensures that the astronauts' dietary needs are met while in space.

- P53 DIFFERENTIATION OF MEZCAL USING GAS CHROMATOGRAPHY AND HIERARCHICAL CLUSTER ANALYSIS.

Michael M. Looney and Luke Whitmire*, Chemistry Department, Schreiner University, Kerrville, TX.

Mezcal is a regional alcoholic beverage prepared with sugars, extracted from the mature hearts of plants in the Agave family. Mezcal is produced in or around the region of Oaxaca, Mexico, by small families or distilleries. This product is often sold to larger bottling companies who package the spirit for sale. In this study, five brands of mezcal were analyzed using gas chromatography and compared by cluster analysis. An appreciable difference of volatile components is observed among all five brands. The study demonstrates a useful procedure for the determination between the different brands of mezcal. This method should prove functional to consumers and distillers to ensure the proper identification of mezcal after the bottling process.

- P62 SOIL ANALYSIS OF KERR WILDLIFE MANAGEMENT AREA.

Thomas Cable, Miguel Puga, and Kiley Millar, Schreiner University, Kerrville, TX.

The aim of the Kerr Wildlife Management Area (KWMA) is to better understand the dynamics of the Texas Hill Country's ecology. Focus is stressed on the research of optimal management techniques for regulating the populations of the white-tailed deer, native in the Hill Country. Current methodology rests in the areas of deer age, genetics, and nutrition. This research will evaluate the soil chemical composition which will add another facet of control for research conducted at KWMA. Analysis will consist of evaluating soil pH, fertilizer components (nitrogen, phosphorus, potassium) and other cationic and anionic soil components over changes in elevation.

- P87 ENZYMATIC PEPTIDE TAGGING.

Scott Kneese* and Robert Holloway, Schreiner University, Kerrville, TX.

In a pilot study, we have tagged a peptide with a strong UV absorber in order to increase sensitivity under CE or LC analysis. We anticipate both digestion of proteins and tagging of the resultant peptides with trypsin, and have investigated immobilization of the enzyme to facilitate this process.

P114 THERMAL ANALYSIS OF IONIC LIQUIDS.

Nicolle Patterson* and Maria Benavides, University of Houston – Downtown, Houston, TX.

In recent times we have all been aware of the problems associated with the use of fossil fuels. In this project, we performed thermal analysis on four recently synthesized ionic liquid samples. These four samples are phosphonium based iodide salts. The purpose of this experiment is to determine whether these new materials can potentially be used in solar cells. A solar cell is a semiconductor device that converts photons from the sun (solar light) into electricity. All of the samples were ionic liquids. Ionic liquids can be used in solar cells because of their physical properties. They have low vapor pressures and high thermal stabilities. They also have a great capacity to conduct electricity. The thermal studies were carried out using the Netzsch STA 409 CD calorimeter which provides simultaneously TG, DSC and MS curves. Our studies indicate that these four samples possess significant thermal stabilities suitable for use in nanocrystalline solar cells.

P121 THE ENERGY OF DELAMINATION OF SMECTITE CLAYS.

Kristen M. Baugh* and Alyx S. Frantzen, Stephen F. Austin State University, Nacogdoches, TX.

The energy required to delaminate smectite clays is under investigation using calorimetric techniques. In the process of hydrating a clay, the clay layers must first be separated. Then the cationic species occupying the interlamellar region can be hydrated. The energy required for the complete process was determined using solution calorimetry. Five standard clays were exchanged with four cations: sodium, potassium, calcium, and magnesium. The results indicate the energy associated with hydrating a clay is dependent on cation identity and the cation exchange capacity (CEC) of the clay. Cations with higher charge require more energy to hydrate due to increased electrostatic interactions with the clay layers. The higher the CEC value of the clay, the more cations are present in the interlamellar region, thus requiring more energy to hydrate the sample. The energy associated with hydrating the interlamellar cations should be numerically equivalent to that for dehydration. This quantity will be investigated using differential scanning calorimetry (DSC). Several events occur during the dehydration of a clay sample, each at significantly different temperatures. The first process, occurring at relatively moderate temperatures, is the vaporization of bulk water. Then the interlamellar cations are dehydrated, followed by the dehydroxylation of the clay structure. The DSC analysis of the samples is focused on the second event: the dehydration of the interlamellar cations. This combined with the results from solution calorimetry will give the energy of delamination. Preliminary results indicate trends similar to those shown in the solution calorimetry work.

P122 THE SEPARATION OF R- AND S-IBUPROFEN.

Katie Clark*, LaTisha West*, Michele R. Harris, and Alyx S. Frantzen, Stephen F. Austin State University, Nacogdoches, TX.

The pharmaceutical industry spends billions of dollars worldwide on the development of chiral drugs. In addition to pharmaceutical applications, the need for development of enantiomerically pure substances also applies to pesticides. In both the pharmaceutical and the agricultural industries, there is a need for analytical scale separation as well as bulk separation. An inexpensive method utilizing various modified clays has been developed. This method successfully separated L- and D-carnitine on the analytical scale and appears to be applicable to bulk separation as well. Ibuprofen has been chosen as the model compound to determine if this methodology is applicable to the analytical separation of pharmaceuticals.

P201 A METABOLIC MECHANISM FOR SCFA- INDUCED ACID RESISTANCE IN ENTERIC BACTERIA.

Erica Frugé and John W. Hawes, Department of Chemistry and Biochemistry, Miami University, Oxford Ohio and Texas Southern University, Houston, TX.

Short-chain fatty acids (SCFAs) are a common component of many foods and are common in the mammalian gastrointestinal (GI) tract. SCFAs are known to induce acid resistance in enteric bacteria - bacteria that live in the intestines of people and other vertebrates (animals with spines). For enteric bacteria to colonize or infect the GI tract, they must survive the acidic environment of the stomach. Acid resistance is an important part of this survival. SCFAs in foods or in the GI tract may produce acid resistance that aids in colonization by enteric bacteria. For commensal bacteria ("good" bacteria) this may be valuable. For pathogenic, disease causing bacteria, this may be a part of their virulence or "infectivity". Eating or drinking pathogenic bacteria such as *E. coli* or *S. typhimurium* from contaminated sources, such as polluted water or food that has not been processed properly, can cause severe food poisoning or even death. SCFAs play an important role in commensal colonization of the gut by these organisms as well as in pathogens. However, the mechanism of this process is not

known. Previous work in the lab has shown that development of acid resistance in *E. coli* and *S. Typhimurium* may be associated with the production of the amino acid glutamate from SCFAs. This work had led to a hypothesis for a metabolic mechanism for SCFA-induced acid resistance.

P202 DISSOLUTION OF A SIMULATED HIGH-LEVEL BOROSILICATE WASTE GLASS: EFFECT OF TEMPERATURE AND PH.

LaQuanti J. Calligan*, Texas Southern University, Houston, Texas, and Eric. M. Pierce, Pacific Northwest National Laboratory, Richland, WA.

To quantify the rate of glass dissolution, a series of experiments have been conducted using the single-pass flow-through (SPFT) apparatus. The SPFT apparatus allow for the transfer of fresh input solution from a reservoir bottle into a Teflon reactor and finally into a sample collection vial. These experiments were conducted under varying conditions such as: temperatures ranging from 23 to 90°C, solution pH, from 7 to 12 all calculated by the thermodynamic software package EQ3NR. Results from these experiments show that as the temperature and solution pH increases the glass dissolution rate also increases. For example, the dissolution rate at 90°C was approximately 56 times higher at pH (23°C) 12.0, $5.66 \pm 1.08 \text{ g m}^{-2} \text{ d}^{-1}$, compared to pH (23°C) 7.0, $0.016 \pm 0.003 \text{ g m}^{-2} \text{ d}^{-1}$. Performing a linear regression as a function of pH at each temperature resulted in a slope [power law coefficient (?)] of 0.50 ± 0.05 indicating that ? does not depend on temperature within experimental error. Temperature also affects the dissolution rate, evident by as much as a 14x increase in the rate with a 30° increase in temperature. Applying an Arrhenius expression to the data obtained at each pH suggested that the dominant mechanism of dissolution was a surface-controlled process, evident by an activation energy (E_a) of $58 \pm 4 \text{ kJ mol}^{-1}$. Although translation and interpretation of these SPFT results to long-term glass dissolution under repository conditions requires further analysis, these results provide the rate-law parameters needed to conduct source-term release calculations using reactive transport models.

P208 NICKEL SALT BASED SENSORS FOR DETERMINATION OF SMALL ORGANIC COMPOUNDS.

Binh Nguyen*, Mian Jiang, Larry G. Spears, Department of Natural Sciences, University of Houston – Downtown, Houston, TX.

In this work we systematically studied and examined surface-adhesive thin layers composed of nickel carbonate, nickel sulfide, and nickel hydroxide. Sensors based on these new inorganic films were developed by an easy-dipping fabrication protocol. All of these surface functional films are stable in basic condition while demonstrating electrocatalytic capacity towards the oxidation of small organic molecules such as alcoholic compounds. In operation, the sensors were made by alternately dipping a glassy carbon electrode in nickel chloride and respective carbonate, sulfide, and hydroxide solutions respectively. The resultant modified electrodes were thoroughly washed with water and then conditioned in corresponding salt solution repeated voltammetry scans. Small organic molecules such as methanol, ethanol, propanol, are added into NaOH solution and cyclic voltammograms are recorded. Although the nickel salt films are invisible, they show well-defined, stable, and reversible redox peaks ($\sim 0.4 \text{ V}$) by voltammetry in NaOH solution. The film further demonstrates its catalytic capacity towards $C_1 \sim C_4$ compounds by significantly enhancing their oxidation current while dramatically reducing their oxidation over potential. The oxidation current also indicates its concentration dependence on substrate molecules. Our study has shown the promise of the nickel salt based thin layers can be directly use as sensors for alcohols. Additionally, the electrocatalysis by the modified electrode have potential for making direct fuel cells based on the oxidation of $C_1 \sim C_4$ alcohols.

P209 NEW NANOTUBE-BASED FUNCTIONAL MATERIAL BY UV-TRIGGERED POLYMERIZATION.

Shajeer Noorudeen*, Mian Jiang, Byron K. Christmas, Larry G. Spears, Department of Natural Sciences, University of Houston – Downtown, Houston, TX.

We report here a novel, simple procedure to make a new type of material – the conducting polymer – carbon nanotube composite. Nanomaterial and nanotechnology have been the subject of enormous interests nowadays. Our method uses the Ultraviolet radiation to initiate polymerization and to solidify the well-dispersed monomer mixture. While several papers were reported with regard to the fabrication of conducting polymer – nanotube composite via routes such as template imprinting, chemical synthesis, or surface derivation, there has been no report of using a UV-radiation – the popular cost-effective and environmentally friendly approach. In our design, aniline and multiwalled carbon nanotubes (MWCNT) have been chosen to test this new concept. Our experimental results showed a surface adhesive polyaniline-MWCNT can be formed from this approach. Furthermore, the resultant composite demonstrates high electroactivity in wide pH range that is in drastic comparison to conventionally-made polyaniline. More unique features found in our experiment are: In UV radia-

tion there is no need for photosensitizer and in electrochemical characterization the composite film can be stable and reversibly electroactive in neutral pH media. Our approach can form both bulky and surface functional material that exhibit potential for various applications. The film displays electrocatalysis to nitrite that may be used in environmental monitoring of food preservatives; the composite shows high capacitive behavior that may find application for the prospective supercapacitor.

P241 THE SPECIFIC HEAT OF SUGAR POPS.

Phillip Lang, Howard Payne University, Brownwood, TX.

This experiment will look at the specific heat of breakfast cereals for different brands of the sugar corn pop variety and determine if there is a correlation between the specific heat calculated through bomb calorimetry and the Calories per gram from data stated on the cereal box. Also correlation between the specific heat and exposure to air will be tested, along with correlation between taste of the different brands and the specific heat of those brands. Through this experiment, it will be more accurately determined which brand of sugar corn pops will give off the most energy per gram for the cost and taste of the cereal.

P242 THERMODYNAMICS OF THE DYES ON M&M'S.

Derek A. Hagy*, Howard Payne University, Brownwood, TX.

The purpose of this experiment is to determine the equilibrium constant, rate constant, free energy, entropy, enthalpy, energy of activation and order of reaction of blue, green, and red dye used to coat M&M's® when the dyes are extracted from the M&M's® and treated with a bleach solution. The experiment will be carried out at different temperatures and with different concentrations of bleach solution using a Vernier Colorimeter at the maximum absorbance wavelength for each dye.

COMPUTER SCIENCE

36 PREDICTION OF MYOCARDIAL INFARCTION BASED ON THE COMPARISONS OF FUSION IMAGING WITH INTRAVASCULAR ULTRASOUND.

E. Obot*, Texas Southern University, Texas Medical Center-The Methodist Hospital Research Institute, Houston, TX, Juan Granada, Greg Kaluza, Armando Tellez, Darelle Schultz, David Bradley and Carlos Alviar, Institute for Research in Cardiovascular Interventions, Methodist DeBakey Heart Center Houston, TX.

Blood flow goes through arteries in a laminar fashion (normal blood flow). When fatty tissue is deposited in the inner layers of the vessel, the volume of the wall increases, creating atheroma, or plaque. When plaque creates a significant occlusion (large amount of plaque) of the blood flow, the cardiac cells lack oxygen, which causes death to the cells. Cardiac troponins, specifically troponin I, is found in the heart cells. An increase in troponins is a reliable marker that muscle cells are dying (myocardial infarction) because troponins leak out of cells and into the bloodstream. In order to accurately determine the culprit vessel or plaque that might provoke a myocardial infarction, we will compare the outcome of fusion imaging with IVUS in order to establish which instrument is more accurate. In doing so, this will allow us to find and locate the culprit vessel responsible for the infarction and differentiate the culprit vessel and no culprit vessel. This will enable us to define vulnerable plaque in-vivo and create an algorithm of fusion imaging for patient's myocardial infarction or vulnerable plaque.

80 SAMPLE SIZE EFFECTS IN KAPLAN-MEIER SURVIVAL ANALYSIS.

John A. Ward, Department of Clinical Investigation, Brooke Army Medical Center, Fort Sam Houston, TX.

Kaplan-Meier analysis estimates median survival time in the presence of censored cases. The method uses life tables and calculates the products of survival estimates at the time points when events occur to approximate the survival curve. We used a simulation of first order decay, $Survival = \exp(-k * t)$, to measure the precision and accuracy of the estimate of median survival time as a function of sample size and percentage of censored cases. Decreasing sample size or increasing the percentage censored overestimates median survival time and increases the 95% confidence interval. This relationship between percentage censored and the precision and accuracy of the estimate of median survival time is not generally stressed in statistics texts. It should be considered in sample size determination during the design of a scientific study.

- 170 ANALYZING EMERGENCY ROOM (ER) UNIT AND INTENSIVE CARE UNIT (ICU) RECORDS IN ORDER TO POTENTIALLY REDUCE MEDICAL ERRORS AND IMPROVE HEALTHCARE FACILITY PERFORMANCE.
LaKeisha Melton*, Texas Southern University, Houston, TX and Jonathan Young, Pacific Northwest National Laboratory, Richland, WA.

By analyzing Emergency Room (ER) Unit and Intensive Care Unit (ICU) records from two healthcare facilities using data analysis, data mining, and cluster analysis, a statistical representation and a data visualization of the analyzed data can support the discovery of complex and unanticipated relationships extant in the data. The primary focus of this project is to analyze medical process weaknesses and systematic problems throughout the datasets of patient medical records in order to potentially sustain improvements in the reduction of patient medical errors and the enhancement of medical records individually and thoroughly to find the complex relationships in the records. The tool further analyzes each cluster of records, categorizes and groups those records in order to potentially produce data visualizations and statistical representations of the analyzed data.

- 177 GRAPHIC USER INTERFACE FOR THE NIMROD SILICON DETECTORS.
Christopher Crane*, Texas Southern University, Houston, Texas, Sherry Yennello and Sara Wuenschel, Texas A&M University, College Station, TX.

The "Bias Box Control v3.2" Graphic User Interface program was created and designed with the intent of monitoring voltage and current while biasing to Nimrod's detectors rings, including the newest addition to the Texas A and M Cyclotron Institute ISIS a spherical particle detector. NIMROD and ISIS are both nuclear particle detectors located in the Texas A and M cyclotron. The program takes user input values and sends Biasing voltages to NIMROD's various rings. The GUI also monitors the actual charge held in the detectors of a specified ring, and the leakage current on a specific silicon of that ring. An experimentalist can load "voltage" files, save voltage values, set all channels at once, set all channels to zero, Refresh the monitoring status of the ADC, and change a voltage array load file. The current status of the GUI is functional and future revisions of versions may include support for Ion Chambers. The program was created in Linux but can easily be ported over to Windows and Macintosh formats.

- 183 VISUALIZING QUANTUM DOTS IN A VIRTUAL ENVIRONMENT.
Nathanael Pierce*, Texas Southern University, Houston, TX, David Ebert and Ross Maciejewski, School of Electrical and Computer Engineering Purdue University, Purdue University, IN.

VolQD is a unique volume-rendering software that is used to visualize quantum dots. Quantum dot visualization is essential because quantum dots are nano-scale particles that possess many characteristics and properties of atoms and are used as a tool to study atoms. Its drawback, however, is that the user interface is limited and not very efficient. We propose a configuration that significantly enhances the quality and efficiency of the user interface. To accomplish this task, we integrate VolQD with the InterSense IS-900 Motion Tracking System. This tracker system works like an interactive, three-dimensional mouse, with buttons that are programmed to perform explicit tasks. This exceedingly improves the functionality of the VolQD software. In the future we plan to further develop a user interface by implementing stereo graphics which allow users to visualize quantum dots in 3D.

- P138 MARS ADVANCED RADIATION ACQUISITION DATA CONVERSION UTILITY (MARA-DCU).
Shelley Smith, Texas Southern University, Houston, TX.

The Mars Advanced Radiation Acquisition (MARA) Project is developing advanced technology radiation detection systems for Shuttle, Space Station, Moon, and Mars missions. The detectors measure radiation by converting the energy deposited by a radiation event into an electrical current. The previous radiation instrumentation was developed in the 1980's under the direction of Dr. Gautam Badhwar and is a payload on the 2001 Mars Odyssey Orbiter, which was launched on 7 April 2001. The instrument measures doses from two sources of space radiation which are harmful to humans — galactic cosmic rays (GCR) and solar energetic particles (SEP). MARIE provided data during the cruise from the Earth to Mars, and in orbit around Mars until a large solar event on 28 October 2003. Over the years, however, MARIE had experienced some technological erosion, due to the moderate modifications to the existing design, which essentially brought on the need to develop new higher performance instruments with more advanced technology. As a result, MARA was born. MARA is currently

running real-time testing sequences as well as, storing that data in hexadecimal format. The objective of my project was to write a program that takes the raw hexadecimal data from MARA, converts it to a readable ASCII format and displays that data in 3 separate graphs. The MARA-DCU will aid physicist and other scientist by providing a more expedient data translation of raw data, allowing more efficient analysis for development of innovative technologies.

- P142 ULTRASONIC WIRELESS INSTRUMENTATION SYSTEM (ULTRA-WIS): AUTONOMOUS IMPACT AND LEAK DETECTION.
Shelley Smith*, Texas Southern University, Houston, TX and Jacob Fuch, Oklahoma State University, Stillwater, OK.

The NASA vision in developing advanced habitation for future exploration has propelled the fabrication of sensors capable of autonomous monitoring. Existing challenges that NASA faces are micro-meteoroid orbital debris impacting the International Space Station (ISS) causing leaks. Invocon, Inc. has developed a device that will assist the crew in detecting leaks to augment the Ultrasonic Leak Detector, which is a handheld, manual device that the crew uses to trace leaks. As part of a network of sensors, the Ultrasonic Wireless Instrumentation System is an autonomous, low power device that detects leaks within a pressurized spacecraft. At the onset of an impact, the sensors wake up to measure the acoustic emissions of leaks enabling the system to triangulate the leak location. Through the use of this wireless leak detection system, potential risks for holes and cracks on manned spacecraft can be reduced while saving crew time and energy. In order to fully understand the capabilities of the Ultra-WIS, this investigation served to determine the capabilities and limitations of the hardware and the use of the software for ISS board certification of the Ultra-WIS.

CONSERVATION ECOLOGY

- 56 VALIDATION OF A GIS-BASED HABITAT MODEL FOR MEXICAN SPOTTED OWLS IN THE GUADALUPE MOUNTAIN RANGE OF WEST TEXAS.

Timothy C. Mullet* and Christopher M. Ritzi, Sul Ross State University, Department of Biology, Alpine, TX.

The Mexican spotted owl (*Strix occidentalis lucida*) is one of the vital monitoring targets of threatened species listed by the National Park Service's Chihuahuan Desert Inventory and Monitoring Network. Effective management and monitoring efforts of spotted owls requires the identification of habitat-dependant variables and an accurate map depicting the extent and likelihood of breeding habitat within park boundaries. Although spotted owls are known to occupy montane mixed-conifer forests and rugged canyon systems isolated by an arid Chihuahuan Desert landscape, the ecology of this subspecies and the extent of suitable habitat within these sky islands are poorly understood. The Southwestern Geophysical Habitat Model is intended to identify potential breeding habitat across the entire range of the Mexican spotted owl using variables of topography and long-term average precipitation. An external validation of this model was conducted using owl locations taken from survey results (2003 to 2005) in the Guadalupe Mountains National Park of Culberson and Hudspeth County, Texas. These results were overlaid onto predicted areas of habitat using ESRI's ArcMap Ver. 9.1 software. Errors of omission and commission were determined based on the presence of owls within non-predicted habitat and lack of owl presence in predicted habitat, respectively. A Chi-square goodness-of-fit test was used to test the significance of these errors. The results and management implications of this validation are discussed.

- 66 RESTORING AQUATIC PLANT COMMUNITIES: THE SAN MARCOS EXPERIENCE.

Melissa L. Mullins* and Robert D. Doyle, Baylor University, Waco, TX.

Investigating relative competitive abilities of native aquatic macrophytes and invasive species can lead to more informed decisions in implementation of restoration projects. Defining measures such as relative growth rates, root-to-shoot ratios, and carbon acquisition abilities, and relating those to realized environmental conditions, may assist in understanding why particular plants (whether native or invasive) thrive or fail to thrive during restoration projects. Baylor University, in cooperation with USFWS and other partners, is developing a multi-year plan and initiating efforts to facilitate native macrophyte species restoration into areas impacted by dredging of invasive *Cryptocoryne beckettii* in the San Marcos River, TX. This project, as well as results from pilot in-river and mesocosm competition and pH drift experiments for native *Heteranthera dubia*, and invasives *Hydrilla verticillata* and *Hygrophila polysperma* will be discussed.

- 98 CONSERVATION OF THE OUACHITA CREEKSHELL *VILLOSA ARKANSASENSIS* (LEA 1852): REPRODUCTION AND HOST FISH SUITABILITY.

Sara E. Seagraves*, Arkansas State University Department of Biological Sciences, State University, AR, Jerry L. Farris, Arkansas State University Department of Biological Sciences, State University, AR, and Arkansas State University Environmental Sciences Program, State University, AR, John L. Harris, Arkansas State University Department of Biological Sciences, State University, AR, and Alan D. Christian, Arkansas State University Department of Biological Sciences and Environmental Sciences Program, State University, AR.

The Ouachita creekshell, *Villosa arkansasensis*, is endemic to the Ouachita River drainage of Arkansas and Oklahoma and is an Arkansas species of special concern. The objectives of this study were: 1) to determine the period of gravidity for *V. arkansasensis*; and 2) to determine suitable host fish from the Saline and Ouachita rivers. Female *V. arkansasensis* gravidity was observed from October through August of the following year. Like other *Villosa* species, *V. arkansasensis* was assumed to be bradytic (long term brooders), becoming gravid in late summer, early fall and releasing glochidia in late spring and early summer. Host fish suitability trials for the Saline River resulted in four suitable host fish, shadow bass (*Ambloplites ariommus*), Creole darter (*Etheostoma collettei*), Greenside darter (*E. blennioides*), and Green sunfish (*Lepomis cyanellus*). The most successful suitable host fish for the Saline River trial was determined to be the shadow bass consisting of 15 out of 20 total transformations. A second round of propagation for the Saline River drainage resulted in 27 transformations from two suitable host fish, Creole darter and Greenside darter. The Ouachita River drainage trial resulted in only one transformation from the Greenside darter. Investigation of the biogeographical patterns of the potential host fish for *V. arkansasensis* implies that this species is restricted to the distributions of their specific host fish. Thus, conservation and management of this species not only relies on understanding both the mussel's and the fishes ecological requirements of its host fish.

- 102 SMALL SNAILS, BIG APPETITES: CONTRASTING RESOURCE CONSUMPTION BETWEEN TWO SPECIES OF APPLESNAIL.

Brandon B. Boland*, Abigail K. Youens, and Romi L. Burks, Southwestern University, Georgetown, TX, Mariana Meerhoff, Claudia Fosalba, and Néstor Mazzeo, Departamento de Ecología, Facultad de Ciencias, Uruguay.

Based on size alone, adult herbivores often seem a more visible threat to aquatic resources than juveniles. The large size of applesnails (*Pomacea*) compared to average snails sparks immediate alarm. In particular, *P. canaliculata* have elicited the most attention due to their invasion history. We know less about recently identified invasive applesnails in Texas (*P. insularum*) but worry that this species could achieve similar notoriety. Furthermore, little research exists on resource consumption and assimilation by juveniles of either species. Beyond consumption, few studies examine the influence of multiple factors on resource assimilation. Our work investigates what factors alter juvenile feeding of exotic (*P. insularum*) and native (*P. canaliculata*) applesnails. To examine the influence of plant structure and chemistry, we presented two forms (whole versus reconstituted) of three plants (lettuce, *Myriophyllum*, and *Eichhornia*) to juveniles. Juvenile *P. insularum* exhibited slight preference for whole resources, while native *P. canaliculata* consumed more reconstituted. Chemical defense extracts from *Myriophyllum* and *Eichhornia* deterred feeding. *P. canaliculata* consumed resources regardless of periphyton presence, while juvenile *P. insularum* consumed more resource with additional periphyton. We also tracked resource assimilation by juvenile *P. insularum* under multiple environmental scenarios and found that they assimilated more per capita in the absence of salt and at greater densities. Overall, *P. canaliculata* juveniles consumed more resources per capita than *P. insularum*, although both species consumed more by mass than their adult counterparts. Our results suggest that consumption by juvenile applesnails may pose at least an equivalent threat as adults to aquatic ecosystems.

- 108 LANDSCAPE CHANGE NEAR WHITE-WINGED DOVE NESTING COLONIES IN NORTHEASTERN MÉXICO.

Yara Sánchez*, Fidel Hernández, David G. Hewitt, Eric J. Redeker, Caesar Kleberg Wildlife Research Institute, Texas A&M University – Kingsville, Kingsville, TX, Jay Roberson, Texas Parks and Wildlife Department, Austin, TX, and T. Wayne Schwertner, Texas Parks and Wildlife Department, Mason, TX.

Land use changes resulting from factors such as agricultural practices, timber exploitation, and dam construction have resulted in much habitat loss within historic white-winged doves (*Zenaida asiatica asiatica*) in northeastern México and southern Texas. Most of the loss has occurred in the state of Tamaulipas, México. Therefore, the objectives of this study were to: (1) document and geographically record the location of all known nesting colonies; (2) determine land-use changes that have occurred on the landscape surrounding nesting colonies since 1970, and (3) correlate changes in the fate of dove

colonies with large-scale changes in the landscape surrounding the colonies. Coordinates were obtained for most of the historic colonies. Using photo interpretation, landscape components (i.e., percent coverage of native brush, water, agricultural fields, and urban) were identified and delineated within radius of 1.6-km, 3-km, and 6-km of each colony. From an initial list of 50 nesting colonies that were thought to exist in Tamaulipas, only 31 colonies were located, of which 12 were active and 19 inactive. Paired *t*-tests were used to determine if there was a significant change in landscape components between time periods, with separate tests being done for active and inactive colonies. Our findings suggest that the loss of nesting habitat, primarily due to agricultural development, has contributed to the abandonment or disappearance of white-winged nesting colonies in northeastern México in the last 30 years.

123 BLANCO RIVER SYMPOSIUM: DISTRIBUTION OF CAGLE'S MAP (*GRAPTEMYS CAGLEI*) TURTLE IN THE BLANCO AND SAN MARCOS RIVERS.

Francis L. Rose*, Department of Biology, Texas State University – San Marcos, San Marcos, TX, and Thomas R. Simpson, Wildlife Ecology Program, Department of Biology, Texas State University – San Marcos, San Marcos, TX.

Cagle's Map Turtle (*Graptemys caglei*) is a small emydine aquatic turtle described in 1974. At that time, it was known from the Guadalupe and San Antonio river systems, including the Guadalupe, San Antonio, Blanco, and San Marcos rivers. Its presence in the Blanco and San Marcos rivers was based on few documented specimens. Surveys in 1991 and 1992 failed to detect the turtle's presence in the Blanco River or the upper reaches of the San Marcos River. *Graptemys caglei* was listed as threatened by Texas Parks and Wildlife in 2000 and is classified as vulnerable by the IUCN Red List due to the diminished distribution. In 2003, a male and female *G. caglei* were found at one location in the Blanco River. Systematic searches begun in 2005 revealed small-scattered populations of *G. caglei* in the Blanco River from near Fisher to San Marcos in Hays County. No *G. caglei* were observed in the upper reaches of the San Marcos River (Hays County); however, they were observed at several sites on the San Marcos River in Guadalupe and Gonzalez counties. Extensive surveys and trapping efforts have resulted in 4,000 individually marked turtles in Spring Lake (Hays County), the initial source for the San Marcos River, and no *Graptemys* were observed. The river dynamic (extreme drought to extreme flood) of the Blanco River probably plays a dominant role in the turtle's life history. This dynamic is muted in the lower San Marcos and the Guadalupe rivers.

162 LEAF CHARACTERISTIC RELATIONSHIPS TO LIGHT ENVIRONMENT.

J.A. Thomas* and J.D. White, Baylor University, Waco, TX.

Leaf characteristics in tree canopies vary with distance from the top of the canopy. Leaf morphology and nutrient concentrations are altered by transmittance of photosynthetically active radiation. Parameters such as specific leaf area and elemental composition including carbon, nitrogen, and phosphorus are dependent to some degree upon leaf distance from top of canopy and thus available radiation levels. These characters were explored for deciduous broadleaf, non-deciduous broadleaf, and evergreen needleleaf species common to Central Texas. We found that specific leaf area increases with canopy depth. Leaf nitrogen was found to increase with leaf height in most species. The relationship between leaf height and leaf nitrogen exhibits higher fidelity in deciduous trees than in evergreens. Life history traits can be related to leaf characteristics.

163 URBANIZATION AND THE FRESHWATER TURTLE BASKING COMMUNITY IN CENTRAL TEXAS.

Shannon Hill* and Darrell Vodopich, Baylor University, Waco TX.

Modifications to riparian corridors are often a consequence of urbanization. These changes may include increased development, decreased shoreline vegetation and a considerable human presence, any of which may alter key behaviors of many aquatic species. Freshwater turtle behavior may be particularly sensitive to urbanized aquatic systems as they use a variety of riparian habitats. One of the most gregarious behaviors of freshwater turtles is the act of basking. Clearly important to their biology, basking aids in thermoregulation, vitamin D synthesis, digestion and ectoparasite removal. Urbanization may influence the behavior of basking in freshwater turtles by altering basking community structure, basking site selection and the quantity of basking. The physical characteristics and availability of basking sites may also be affected by shoreline development. Multiple indices of urbanization were quantified for the Brazos River in McLennan Co., Texas. And replicated surveys of basking turtles were conducted in order to better define the relationship between urbanization, basking site attributes and basking site utilization

181 COMPARATIVE PLANT POPULATION AND COMMUNITY DYNAMICS IN A SOUTH TEXAS SALT MARSH RECEIVING TREATED WASTEWATER.

M. G. Forbes*, Baylor University, Waco, TX, Ken H. Dunton, University of Texas Marine Science Institute, Port Aransas, TX, Robert Doyle, Baylor University, Waco, TX.

We analyzed changes in a south Texas salt marsh receiving treated wastewater to evaluate the theory that the role of competition in determining plant species dominance increases as abiotic stress decreases. We measured species percent cover, pore water salinity and nitrogen, and soil moisture along permanent transects within the wastewater site and at three reference sites. In contrast to the reference sites, mean pore water salinity at the wastewater site was much lower and did not vary significantly with regional climate and hydrology. Additions of wastewater immediately resulted in decreases in *Salicornia virginica*, a clonal stress-tolerator, and increases in *Borrchia frutescens*, a clonal dominant. A flood disturbance and subsequent wet period resulted in expansion of *Borrchia frutescens* at the three reference sites as well. However, that trend ended as drought conditions returned. These results support the contention that as abiotic stress decreases, competitively superior species displace slower growing, more stress-tolerant species. Community level responses, however, were not correlated to abiotic stress.

P168 ANALYSIS OF BAT CALLS FROM EXURBAN ASPEN AND GAMBEL OAK-DOMINATED HABITATS IN UTAH.

Tommy Pettit and Kenneth T. Wilkins, Department of Biology, Baylor University, Waco, TX.

Currently, one of the best methods of studying the movements of bats is by monitoring their echolocation signals. Since most species of bats have a unique call structure and frequency, they can be identified using these echolocation calls. Study of bat activity in exurban developments is of conservation interest, with increasing human encroachment on previously undeveloped habitat. During the summer of 2006, bat call data was collected at two points in an exurban development in Heber Valley, Utah, using an Anabat II bat detector with a storage ZCAIM unit. Calls were collected over the course of 20 nights, for 30-minute periods at the two sites. Results indicate which species or species guilds are active in these areas, contributing to a general understanding of bat use of exurban habitats.

P247 AGE ANALYSIS OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) STRANDED ALONG THE TEXAS GULF COAST.

Christopher Marshall and Rachel Neuenhoff*, Texas A&M University at Galveston, Galveston, TX.

The objective of this study was to investigate age structure and population demographic parameters of bottlenose dolphins stranded along the Texas coast within the past twenty years. Galveston Bay provides a unique opportunity to gauge industrial impacts of some of the country's largest refineries and evaluate the overall health of surrounding ecosystems. Dolphins are a desirable model for this study because they are long-lived apex predators and sentinel species. Although *Tursiops truncatus* is the most commonly stranded marine mammal along the Texas coastline, little data are available for the western Gulf of Mexico regarding population demography. Dolphin age at stranding can be used to estimate calving season and establish predictable population patterns and life histories. Standard tooth aging methodology was used to characterize dentinal growth layer groups. Age data (n=23) was coordinated with necropsy reports to pair age with length. The data was used to predict bottlenose dolphin population growth using both curvilinear growth and logistic models in SPSS. Both models generated significant fits ($p < 0.001$). However, the growth model had an R-squared value of 0.62 and the logistic model had an R-squared value of 0.74. The better fit of the logistic model suggests that either neonate (<1 year) data must be excluded from the model (as they tend to reduce the fit) or more samples from a wider age range are necessary to more accurately depict length-at-age of *T. truncatus* along the Texas coastline. Growth curves for *T. truncatus* are consistent with recent data for the north and east Gulf of Mexico.

P259 EVALUATION OF POTENTIAL HABITAT FOR DESERT BIGHORN SHEEP IN COAHUILA, MEXICO.

Alejandro Espinosa-T.*, Desert Bighorn Sheep Restoration Program, CEMEX-Sustainability Vice-Presidency, Monterrey, NL, MX, Andrew V. Sandoval, Borrego Cimarron Wildlife Consulting, Chacon, NM, Mario Garcia-A., Facultad de Ciencias Forestales, Universidad Autonoma de Nuevo León, NL, MX, Armando J. Contreras-B., Laboratorio de Ornitología Facultad de Ciencias Biológicas, Universidad Autonoma de Nuevo Leon, San Nicolas de los Garza, NL, MX.

We analyzed the known historical desert bighorn sheep habitat in Coahuila, Mexico, which consists of 14 different mountain ranges: Sierra Maderas del Carmen, Sierra Hechiceros, Sierra la Encantada, Sierra el Pino, Sierra el Almagre, Sierra el

Fuste, Sierra Mojada, Sierra el Rey, Sierra la Madera, Sierra la Fragua, Sierra San Marcos y del Pino, Sierra los Alamitos, Sierra la Gavia, and Sierra la Paila. The analysis was conducted through the use of Geographic Information System (GIS), incorporating 1995 INEGI land use and vegetation digital information overlays (*Vectorial* format) with a scale of 1:250,000; INEGI digital elevation models (DEM *Raster* TIFF format), with a resolution of 30x30 m/pixel; and location of permanent and temporary water sources digitized from INEGI topographic maps with a scale of 1:50,000. Habitat components that we measured were the availability of escape terrain (slopes $\leq 60\%$), the presence of vegetative community types that permit a high degree of horizontal visibility (Semi-desert grassland and Desert succulent-scrub), suitable habitat defined as slope gradients between 20 and 59% situated within 150 m of escape terrain, and water availability defined as the amount of suitable habitat 3.5 km radius of water sources situated ≥ 200 m of escape terrain. The results were expressed as a habitat potential index. Field verification was subsequently accomplished through ground and aerial surveys. The areas containing the most habitat include the region of Cuatro Ciénegas (La Madera, La Fragua, San Marcos y del Pino, Los Alamitos and La Paila), located in southcentral Coahuila and Maderas del Carmen located in extreme northern Coahuila. These areas are considered priority transplant sites.

P260 SITE-SPECIFIC HABITAT ANALYSIS OF SIERRA MADERAS DEL CARMEN AND SIERRA SAN MARCOS Y DEL PINO FOR THE INITIAL RESTORATION OF DESERT BIGHORN SHEEP (*OVIS CANADENSIS*) IN COAHUILA, MEXICO.

Alejandro Espinosa-T.*, Desert Bighorn Sheep Restoration Program, CEMEX, Sustainability Vice-presidency, Monterrey, NL, MX, Armando J. Contreras-B., Laboratorio de Ornitología Facultad de Ciencias Biológicas, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, NL, MX, Andrew V. Sandoval, Borrego Cimarron Wildlife Consulting, Chacon, NM, Mario García-A., Facultad de Ciencias Forestales, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, NL, MX.

From January 2004-November 2006 we conducted a Geographic Information System based habitat evaluation of Sierra Maderas del Carmen (MDC) and Sierra San Marcos y del Pino (SMP), in order to select the most suitable sites for the restoration of desert bighorn sheep in Coahuila, Mexico. The components that we analyzed included escape terrain, vegetation, and water availability. In order to identify areas of escape terrain we used 1995 Instituto Nacional de Estadística Geografía e Informática digital elevation models (DEM *Raster* TIFF format), with a resolution of 30x30 m/pixel, selecting sites characterized by slope gradients $\geq 60\%$. Satellite imagery (LANDSAT ETM) with 30x30 m/pixel resolution was used to construct a coverage estimate of vegetation (spatial database) to identify open community types preferred by desert bighorn. Water availability was analyzed through the use of a water source coverage, digitized from INEGI topographic maps (1:50,000 scale), and field notes. We selected priority transplant sites based on potential contact with exotics (*Ovis aries*, *Capra hircus*, and *Ammotragus lervia*), amount and juxtaposition of escape terrain, and water availability. Priority transplant sites contain ≥ 15 km² of escape terrain, water, and are spatially segregated from exotic ungulates. Field verification was subsequently accomplished through ground and aerial surveys. We evaluated 2,804 km² of MDC; 10% (271 km²) was suitable habitat for desert bighorn sheep. Two priority transplant sites consisting of 25 and 34 km², respectively, were delineated in MDC. In the SMP, we evaluated 1,197 km², and 15% (175 km²) classified as suitable habitat. One area consisting of 18 km² was selected in SMP as a priority transplant site. Management recommendations include development and improvement of water source, control and eradication of exotic ungulates, and control of predators until transplanted populations of desert bighorn sheep become viable and self-sustaining.

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4 EFFECT OF TEMPERATURE ON TOXICITY OF A PYRETHRIN INSECTICIDE TO MOUNTAIN SPINY LIZARDS (*SCELOPORUS JARROVII*).

Fred Punzo*, Dept. of Biology, University of Tampa, Tampa, FL.

Studies were done to evaluate effects of temperature on the toxicity to *Sceloporus jarrovi* of a single concentration of pyrethrolone (PR) via percutaneous exposure, and to compare effects of temperature (20 vs. 35 deg C) on toxicity of various PR concentrations. Lizards exposed to a solution containing 315 mg/L of PR at 20 deg C was significantly higher than those tested at 35 deg C. Percent mortality at 20 deg C was 95% as compared to 45% at 35 deg C. Temperature clearly affected the sensitivity of these lizards to PR.

- 19 THE PRELIMINARY ANALYSIS AND CHARACTERIZATION OF ENDOCRINE DISRUPTING COMPOUNDS IN AQUATIC ENVIRONMENTS UTILIZING LIQUID CHROMATOGRAPHY – DIODE ARRAY DETECTION – MASS SPECTROMETRY (LC – DAD – MS). Katoria Tatum-Gibbs*, Renard L. Thomas, and Bobby L. Wilson, NASA University Research Center for Biotechnology & Environmental Health, Texas Southern University, Houston TX.

In recent times, the presence of endocrine disrupting compounds (EDCs) in the environment has become increasingly important to scientific researchers. Among the various compounds considered as emerging environmental pollutants, natural and synthetic steroids, pesticides, and industrially produced by-products all warrant particular concern; both because of the volume of these substances used, and because of their potential to act as endocrine disruptors. Of the various groups of substances with reported endocrine-disrupting properties, female sex hormones and synthetic steroids are considered to be the most potent types of estrogenic compounds (Alda et al., 2003). Unfortunately, it has not been until recent investigations that these compounds have received any attention from the scientific community, most likely because they are present in the environment at very low concentrations. Now, researchers are beginning to realize that the widespread use of oral contraceptives and animal growth stimulators formulated with these potent estrogenic chemicals are yielding potentially dangerous consequences with their presence in waste water and aquatic environments (Ying et al., 2002). Furthermore, these compounds are capable of inducing adverse responses in various organisms at extremely low concentrations (Snyder, 1999). This study seeks to identify and quantify EDCs in aquatic environments. Results obtained from this study will show the extent to which aquatic environments are affected by EDCs and show the possible toxicity of these contaminants to the environment and human health. Identification of these compounds is important to understand their health impact, and how to deal with them once they have entered the environment.

- 25 COMPARISON OF VARIOUS METALS ON THE EFFECTS OF OXIDATIVE STRESS USING 8-HYDROXY,2-DEOXYGUANOSINE AS A BIOMARKER. Eugene A. Gibbs-Flournoy*, Renard L. Thomas, Bobby L. Wilson, NASA University Research Center for Biotechnology & Environmental Health, Texas Southern University, Houston, TX.

In the recent years of scientific investigation, the role of DNA in disease pathology has become increasingly important. In attempts to understand the effects of foreign materials and energies on DNA structures and interactions, several types of genetic damage have been characterized. One type of genetic malfunction that is of interest to this laboratory is oxidative damage to DNA. Oxidative damage can result when cells are exposed to stimuli such as metallic cations, creating free radicals from metabolic processes that can attack and damage vital cellular components such as DNA. This, in return, leads to elevated levels of oxidative stress. The objective of this investigation is to examine the effects of various metals on oxidative damage to DNA. It is a goal of this study that a loose hierarchy be attributed to various metallic members of the periodic table in relation to their oxidative damage of DNA. The investigation into the effects of various metals on oxidative stress shall be monitored and assessed by means of HPLC-ECD analysis of 8-Hydroxy,2-deoxyguanosine, a specific biomarker of oxidative stress.

- 28 TRANSPORT OF ARSENIC IN AYISH BAYOU STREAM SEDIMENT, SAN AUGUSTINE COUNTY, TEXAS. Walter F. Killion III, University of Arkansas and Ernest Ledger*, Stephen F. Austin State University, Nacogdoches, TX.

Elevated levels of As occur in the stream sediment of Ayish Bayou in San Augustine County. The source of the As appears to be the Reklaw and Weches Formations of the Eocene Claiborne Group. Arsenic levels reach 74 mg/kg, over 5 times higher than background. The As is thought to occur in easily transported colloidal and larger Fe oxides particles. Ayish Bayou flows from near Bland Lake, where it is on the Carrizo Formation, to the south across the Reklaw and Weches near the town of San Augustine. It then continues south across the Sparta, Cook Mountain, and Yegua formations until it flows into Sam Rayburn Reservoir. Sam Rayburn Reservoir is known to have elevated levels of As in its bottom sediments. Ayish Bayou is a direct link between outcrops of the Reklaw and Weches Formations, and Sam Rayburn Reservoir. Samples below the dam have normal As concentrations, so Sam Rayburn Reservoir is a sink for As.

74 FISH ASSEMBLAGES IN AN URBAN AQUATIC SYSTEM WITH TWO CONTRASTING WATER SOURCES.

Robert J. Edwards, Department of Biology, University of Texas-Pan American, Edinburg, TX.

The 40-acre Edinburg Scenic Wetlands and World Birding Center was completed in 2003 and is composed of artificially constructed wetlands, canals, and small to large ponds which are fed from one of two non-mixing water sources. One source is from wastewater effluent from Edinburg's Municipal Wastewater Treatment facility which puts approximately 8.5 million gallons of treated wastewater per day through part of the wetlands and the other is untreated river water from the Rio Grande delivered through irrigation canals. Collections of fishes from similar habitats, except for water source, were begun in 2003 to determine whether the fish assemblages differ in wastewater versus raw river water-fed environments. In general, the fish assemblage from the treated wastewater site was less diverse, contained fewer species and greater variability as might be expected. In March 2004, a break in a sewage line leading to Edinburg's Wastewater Treatment Plant occurred and untreated sewage was released into the treated water site causing a massive fish kill. Fish collections were continued to the present in order to document recovery at this site. Periodic urban pollution events affecting the treated water site have kept the fish assemblage at this station from returning to their pre-sewage release state and the species composition has shifted to species that are highly tolerant of poor water quality conditions.

79 RISK ASSESSMENT OF VOLATILE ORGANIC COMPOUNDS (VOCs) EXPOSURES IN INDOOR PARKING FACILITIES.

Gabriel A. Kristanto*, Felicia L. Conley, Renard L. Thomas, and Bobby L. Wilson., Environmental Toxicology Program, Department of Chemistry, Texas Southern University, Houston, TX.

Risk assessment has been widely used as a method for identifying risks of human exposures to different types of pollutants. In this study three different types of indoor parking facilities in Houston, Texas have been assessed for the VOC concentrations which include attached garages, underground, and ground parking. Indoor air samples were collected using 6-L stainless steel canisters for 24-h period and analyzed using a modified version of EPA Method TO-15 with GCMS coupled to cryogenic preconcentrator. Eight most abundant VOCs were identified in every sample. Six out of the eight VOCs identified are classified as hazardous air pollutant based on EPA regulations. It is found that attached garages had the highest concentrations of TVOCs followed by underground and ground parking facilities. The estimated lifetime cancer risks due to individual exposures to benzene in various types of indoor parking facilities ranged from 4.87×10^{-8} to 7.32×10^{-6} while total hazard indices for noncancer risks ranged between 5.37×10^{-4} to 9.22×10^{-2} . These results would not only be a beneficial reference to assess risk of exposure when it combine with human activity pattern and microenvironment or personal measurement of pollutant concentrations but also to establish strategies for reducing human exposure to VOCs.

81 GEOLOGIC CONTROL OF STREAM WATER COMPOSITION IN CHEROKEE, SMITH AND RUSK COUNTIES, TEXAS.

Melinda G. Shaw*, Alyx S. Frantzen and Ernest B. Ledger, Department of Geology and Department of Chemistry, Stephen F. Austin State University, Nacogdoches, TX.

Water samples from selected streams in east Texas were analyzed to determine the relationship of specific geologic formations and their influence on stream water composition. The two lower formations of the Claiborne Group, the Carrizo Sandstone and the Reklaw Formation, have a subtle influence on the chemical composition and water quality associated with local streams. As these streams travel across the Reklaw Formation, natural buffers in the form of clays, alluvial sediments and organics tend to lessen the impact of the Reklaw's acid sulfate weathering patterns. Acidity of these waters increase as they flow over the Carrizo Sandstone. The lack of buffers in the Carrizo Sandstone allows pH values to drop and sulfate concentrations to increase slightly. Thirty-six samples from six streams were analyzed semi-monthly over a period of eight months to document how their chemical composition and concentration levels changed as they flowed across these formations. While most of the 36 sample locations yielded results within normal limits, several locations produced anomalous readings. As these streams continue through the study area and merge with larger rivers, attenuation and dilution allows pH values to stabilize.

164 WATER/SEDIMENT ANALYSIS OF THE HOUSTON SHIP CHANNEL.

Adedotun Adebawale*, Adetoun Aboaba, Herb Nance and Mohmoud A. Saleh Department of Chemistry, Texas Southern University, Houston, TX.

Water and sediment samples were collected from eight locations representing the high industrial activities along the Houston Ship Channel. Water analysis was carried out by ICPMS for trace metals and by IC for anionic composition. Organic

pollutants in the water were analyzed using solid phase extraction, followed by GC/MS. Sediments were analyzed only for organic contaminants by extracting the samples with 1:1 methanol/methylene chloride as a solvent in the soxhlet apparatus. Solvent was removed from residue and extracted with ether and analyzed with GC/MS. Our preliminary results show correlation between industrial activities and the level of contaminants in water and sediments but to a lesser extent in the water.

169 HUMAN HAIR AS AN INDICATOR OF EXPOSURE TO ENVIRONMENTAL TOXICANTS.

Charlotte A. Smith-Baker*, Fawzia Abdel-Rahman, James H. Nance and Mahmoud A. Saleh, Department of Chemistry, Texas Southern University, Houston, TX.

Hair analysis can be used to evaluate possible exposures associated with environmental toxicants. Hair analysis has been successfully used to assess chronic and acute exposure to xenobiotics. The successful detection of toxicants in hair will add valuable information concerning exposure of individuals/mixtures of environmental toxicants and show different impacts between sex, race, and economic status. Hair samples were collected from barber shops and hair salons to represent the greater Houston area. Samples were separated according to sex, race, age, and location. Gas chromatography (GC) equipped with Electron Capture Detector (ECD)/Nitrogen phosphorous detector (NPD), high performance liquid chromatography (HPLC) with post column derivatization, gas chromatography/mass spectrometry (GC/MS) and liquid chromatography/mass spectrometry (LC/MS) was used to analyze toxicant levels in the hair. In addition to chromatography/spectroscopy, scanning electron microscopy with x-ray detectors was also used in the analysis. Preliminary findings of this research indicate that hair is a good marker for trace elements and possible a good marker for pesticide exposure. Findings of this research will be presented in the meeting.

190 ANTIFUNGAL PROPERTIES OF ESSENTIAL OILS OF SELECTED SEEDS OF THE FAMILY APIACEAE.

Torrye D. Hooper*, Fawzia H. Abdel-Rahman and Mahmoud A. Saleh. Biology Department. Texas Southern University, Houston, TX.

Several fungi were collected from different surface areas such as exterior of buildings, bark of trees, door hedges, floors, windows, soil and water pipes. Fungi were then isolated in pure cultures; light microscope (LM) and scanning electron microscope (SEM) were used to identify the isolated fungi. The antifungal activity of the essential oils of selected seeds in the Apiaceae family was evaluated using the diffusion bioassay. The selected oil within the family Apiaceae included seeds of anise, caraway, carrot, celery, coriander, cumin, dill, and fennel seeds. Oils that are also tested for the antifungal activity but outside the Family Apiaceae included star anise, and mustard seeds. Different amounts of each tested oil were used, 0.5, 1.0, and 2.0 μ l, were applied into small drilled holes in the potato dextrose agar in each Petri plate, then each plate was inoculated, with one of the tested fungi. Every treatment was replicated three times, plates without any oil served as control. All the plates were incubated for 72 hours on 27 °C. The results indicated that some of the tested oils possessed some antifungal properties as it was evident from the inhibition zones surrounding the area where the chemicals were applied. Oil from caraway seeds was very effective in inhibiting the growth of several of the tested fungi with the highest inhibition against *Aspergillus flavus*, *Monilia* sp. and *Aspergillus niger*. Other oils showed different antifungal activity or no inhibition at all. All the results will be discussed.

197 BIOLOGICAL ACTIVITY OF ROSES.

Wenluo Zhang*, Florence Doziel, Fawzia H. Abdel-Rahman and Mahmoud A. Saleh, Department of Chemistry, Texas Southern University, Houston, TX.

Based on our field observation of flowers we discovered that insects, bacteria, and fungi only devoured the stem and leaves leaving the petals untouched. The three groups of roses analyzed were the yellow, white, and red rose. As a result, roses were selected to perform a series of testing to determine their biological activity. Three groups of roses were collected and extracted with 1:1 methanol/methylene chloride. The crude extract was evaporated to remove all of the solvent using rotary evaporator and redissolved in ether. Ether extracts of the three roses showed antibacterial activity with white roses being the most effective followed by red and then yellow. The red roses had the highest antifungal activity followed by white than the yellow rose. The Thin Layer Chromatography bioautography (TLC) was used to find the nature of the active component in the mixture. Other analytical techniques including High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC), Ultra Violet/Visible (UV), and Infra red spectroscopy (IR) were used for chemical identification.

- 210 PHYSICAL AND HYDROLOGICAL FACTORS ASSOCIATED WITH ELEVATED INDICATOR BACTERIA WITHIN LAKE MADELINE, GALVESTON, TEXAS.

Kelli Haskett*, George Guillen, Heather Biggs, Susan Moore, University of Houston - Clear Lake, Clear Lake, TX.

Due to ongoing concerns about potential risks associated with exposure to sewage contaminated water and reoccurring fish kills, we conducted a bacteriological study of Lake Madeline and surrounding waters during June to October 2006. Based on our study, Lake Madeline does not appear to be meeting State of Texas contact recreation water quality standards. The data collected during this study and past investigations supports the hypothesis that contaminated storm water runoff is a significant source of indicator bacteria within the watershed. Data collected during our study supports our hypothesis that most sources of bacteria are probably of human or mixed origin. These elevated indicator bacteria probably originate from leaking wastewater collection systems (sanitary sewers). In addition to continuing bacteriological problems Lake Madeline is exhibiting ongoing low oxygen levels in the deeper portions of the Lake. The City of Galveston has already embarked on a sanitary sewer rehabilitation project to address some of these issues.

- 231 GENETIC DIVERSITY OF *XYLELLA FASTIDIOSA* STRAINS IN AND AROUND TEXAS VINEYARDS.

Dennis Garcia*, Shermel Maddox* and Lisa Morano*, University of Houston – Downtown, Houston, TX.

Xylella fastidiosa is a Gram-negative plant pathogen that infects the xylem of grapevines causing water-stress and death of the vine in as quickly as one year. The bacterium is thought to have a center of origin along the Texas Gulf Coast or farther south. Since this disease is currently a serious threat to both the CA and burgeoning TX wine industry understanding the ecology and epidemiology of the bacterium is critical for learning to control it. This study involves the description of strains of *X. fastidiosa* collected from around Texas. Initially, cloning of the gyraseB gene was very useful in categorizing the strains as either grape or ragweed strains. Cloning of the ITS region proved very unreliable in describing the genetics of the strains, but restriction digests of the gyraseB PCR products has proven to be a very quick method for distinguishing several grape and ragweed strains. It is our goal to compare strains from around the state and eventually to compare variability of strains collected within one vineyard in order to better understand epidemiological spread.

- P2 EVALUATION OF NICKEL(II) CATION IN THE AMMONIA RECOVERY PROCESS.

Mahesh Paladugu and Paul Loeffler*, Sam Houston State University, Huntsville, TX.

Ammonia contamination is a well-documented issue of environmental concern. Contemporary agricultural practices, specifically concentrated animal feeding operations (AFO), contribute significantly to these problems. The livestock sector produces an estimated 73% of problematic ammonia emissions. Reported emissions of ammonia from swine operations are equivalent to 5.9 % of dietary nitrogen. Municipal wastewater treatment plants (WWTP) also contribute significantly to nutrient loading. Atmospheric emissions of nitrogen and water pollution are not independent effects. Peer-reviewed research documents atmospheric deposition and ground water contamination as contributing factors to eutrophication of bays and estuaries, notably the Gulf of Mexico and Chesapeake Bay. The Ammonia Recovery Process (ARP) targets these sources.

This study reports an evaluation of nickel(II) as a complexation agent for ARP. The ARP employs resin-bound, transition metal cations, such as zinc, copper(II) or nickel(II) in a strong acid, ion exchange matrix. In the ARP procedure, an influent with high ammonium concentration is pumped through an ion exchange resin, previously treated and loaded with nickel(II). Ammonia extraction is followed by pH monitoring which defines an operational breakout volume. Effluent ammonia concentrations routinely reflect 90% - 99% ammonia removal. Ammonia-N concentrations are obtained by ISE and metal concentrations by ICP analyses. Our laboratory has investigated ammonia extraction efficiencies in bench-scale and laboratory-scale experiments addressing ammonia concentrations typical of WWTP's and in treated swine urine from a university-based AFO. This nickel(II) study employs a simulant with ammonia concentrations approximating those found in agricultural waste. Findings and comparisons with previous work will be presented.

P43 THE EFFECTS OF RADIATION & CULTIVAR ON SOY-FOODS.

Apollonia McMillan*, SESIP Program-Texas Southern University Houston, TX, Lester Wilson, Faculty Fellows Program-Iowa State University Ames, IA and Steve French, NASA Johnson Space Center Food Laboratory Houston, TX.

In the year 2030, NASA plans to venture out to Mars. While on this long mission, the astronauts will have to eat. To lower cargo weight on the spaceship, NASA plans to have the astronauts grow crops on Mars and use that as their food supply. Soybeans are one of the crops that NASA is considering to take to Mars. From the soybeans, soymilk, tofu, and other soy byproducts can be made. During space flight, radiation exposure may cause the soybeans to not behave in the same manner. Two cultivars of soybeans (Vinton 81 and IA2032LS) were studied with varied amounts of radiation. The tofu, okra, and whey were analyzed for texture, color, moisture, and pH. Radiation does have an effect on soy-food characteristics. Also, the type of cultivar that is used has an effect on soy-food yields, sensory, and process characteristics.

P45 A COMPARISON OF VOLATILE ORGANIC COMPOUNDS IN NEW HOMES, OLDER HOMES AND THEIR OUTSIDE ENVIRONMENT.
Alicia Newman*, Corina McIntosh and Felicia L. Conley. Texas Southern University, Houston, Texas.

Recent increases in indoor air pollution episodes have prompted researchers to pay closer attention to indoor air quality, since most people spend 75 to 90 percent of their time indoors. Researchers have found that pollutant levels in the air inside our homes are 2-5 times higher than the air outside (www.ecco.org). The majority of the population suffers from asthma and other pollution-related health problems because of indoor VOC levels (Guo, H. et al, 2003). "New construction techniques and new materials such as carpet and paint, and consumer products have been introduced...some of which out-gas more pollutants." (ASHRAE) In this study, we planned to compare the VOC levels in new homes, old homes, and their outside environments. I found that newly constructed homes can be worse offenders, having significantly elevated VOCs and poor IAQ (www.ecco.org). According to my research there will be higher concentrations of VOCs in the new homes compared to the old home because of current construction materials and techniques (Environmental Council of Concrete Organizations, 1999). The VOCs were identified using a GC-MS to determine which VOCs are the most prevalent in the selected homes. The concentration and the possible health effects associated with VOCs found in the samples of the new homes were expected to exceed EPA standards.

P58 TOLUENE AND XYLENE INDUCED EXPRESSION OF STRESS PROTEIN DETERMINED BY GENE ARRAY ANALYSIS IN KIDNEY CELLS.
Kahkashan Malik*, Gabriel Kristanto, Felicia Conley, Renard L. Thomas, Bobby L. Wilson, Texas Southern University, Houston, Texas.

Toluene and Xylene are petroleum derived compounds and are commonly found in the ambient air of Houston Texas. They are colorless flammable aromatic compounds. These industrial solvents are used in the production of different types of chemicals such as paint, adhesive glues. They also are by-products of automobile emissions. Exposure to toluene and xylene can occur via inhalation, ingestion, and eye or skin contact. Different studies on animal have shown that they affect skin, eyes, upper respiratory tract and also cause CNS depression at different concentration levels. Case studies have shown that toluene causes liver, kidney damage. Neurophysiology and psychological abnormalities have also been reported in exposed animal and humans. Toluene is also considered as a possible candidate for teratogenicity in human. Acute exposure of toluene and xylene also induce proximal tubular cell necroses by oxidative stress. However the mechanism by which Toluene and xylene induce necroses is not clear. The over all objective of this study is to investigate the effects of low concentration of toluene on kidney cells and also additive effect of toluene and xylene at different concentration. Cell will be exposed to 5 ppb, 10 ppb, 100 ppb and 250 ppb of toluene and xylene. Gene array analysis will be done to investigate the expression of stress gene/protein.

P76 PREFERENTIAL BIODEGRADATION OF DIESEL FUEL HYDROCARBON COMPONENTS.

Josh Crowell, Meagan Johnson*, Gary Stanlake, Justin Gates, Richard Garner, Hardin-Simmons University, Abilene, TX.

The location of selected hydrocarbon components of diesel fuel was identified by gas chromatography. The ability of *Pseudomonas aeruginosa* to utilize these selected hydrocarbons as carbon and energy sources was determined in a mineral salts basal medium. Correlation of biodegradability to location within the diesel fuel gas chromatographic spectrum was evaluated.

P78 USE OF FLUOROMETRY IN KINETIC STUDIES OF HYDROCARBON BIODEGRADATION.

Josh Crowell*, Tracie King, Gary Stanlake, and Richard Garner. Hardin-Simmons University, Abilene, TX.

Concurrent studies of the biodegradation of hexadecane, a component of diesel fuel, by *Pseudomonas aeruginosa* using fluorometric, plate count and optical density measurements have been carried out. Close correlation between each of these techniques for measuring growth rates was observed. Fluorometric measurements indicated growth of the bacteria earlier than the other techniques, allowing us to obtain useful kinetic data.

P83 URANIUM-INDUCED OXIDATIVE STRESS ACTIVATES APOPTOTIC SIGNALING PATHWAY IN RAT LUNG EPITHELIAL CELLS.

Adaikkappan Periyakaruppan*, Chidananda S. Sharma, Shubhashish Sarkar, Renard Thomas, Bobby L. Wilson and Govindarajan T. Ramesh. Molecular Neurotoxicology Laboratory/Proteomics Core, Department of Biology, Texas Southern University, Houston, TX.

Uranium compounds are widely used as nuclear fuel, anti tank weapons and also as a pigment to color ceramic glass. Several reports have shown that uranium or depleted uranium induce oxidative stress causing DNA damage, mutagenic cancer and other neurological defects. The DNA damage caused by uranium may be due to alteration in related signaling mechanism. Hence, effective management and proper disposal of uranium wastes are necessary, as it may have adverse health effects on the health of human population. To evaluate the role of oxidative stress in signaling cascade induced by uranium we used rat lung epithelial cell culture as a model system. In the present study uranium was found to induce oxidative stress significantly with decrease in viable cell proliferation by 72 h. The decreased in cell number may be due to increased cell death or decrease in cell proliferation mechanism. Uranium also reduced the levels of glutathione and superoxide dismutase the antioxidant protective mechanism present in LE cells. Treatment of cells with uranium activates both caspase 3 and caspase 8 significantly compared to control. This suggested that oxidative stress induced by uranium activates apoptotic signaling pathway in rat lung epithelial cells.

P85 ASSESSMENT OF AQUATIC ENVIRONMENTAL ESTROGENS IN THE LOWER GALVESTON BAY WATERSHED.

Bitu Maki*, Renard Thomas and Bobby Wilson, Department of Chemistry, Texas Southern University, Houston, TX.

Traditional chemical analyses are being used to measure the concentrations of selected medical and non-medical Environmental Estrogens (EEs) in the waters of the lower Galveston Bay watershed in order to test the hypothesis that chlorophylls and other algal pigments (carotenoids) characteristic of aquatic phytoplankton may be effective biomarkers for exposure to EEs. This objective is being investigated through the following specific aims: Specific Aim 1: Site-specific monitoring to identify and determine the extent of contamination by EEs and related compounds in major tributaries emptying into the Galveston Bay System and the open water of Upper Galveston Bay. Specific Aim 2: To investigate the effects of EEs on changes in concentration of algal chlorophylls and other algal pigments.

P196 NANO ANALYSIS OF HERBAL SEEDS OF THE APIACEAE FAMILY.

Fawzia Abdel-Rahman*, Torrye Hooper, Jennifer Walker, Brooke Woodard, Wenlou Zhang, Kristina Casmire, Ezekeil Hudson II, Herb Nance and Mahmoud Saleh. NASA University Research Center for Biotechnology and Environmental Health, Texas Southern University, Houston, TX.

This abstract presents our preliminary results of research representing different trends in biotechnological studies of selected herbal species of the Apiaceae family. These species are a well-known source of many important herbal products. Our investigation focuses on the antimicrobial activity of the essential oil and of the secondary metabolites of selected species from the family. Whole seed bioassays, head space contents and the essential oil of the seeds were tested for their antifungal activities against 6 different fungi species. Their antibacterial activities against 5 gram positive and 5 gram negative bacteria were analyzed as well. Nanoanalysis was carried out using scanning electron microscopy/x-ray elemental analysis of the seed surfaces. Chemical analysis was carried out using gas chromatography/mass spectrometry (GC/MS), high performance thin layer chromatography (HPTLC), and infra red (IR), ultra violet (UV) and ¹³C Nuclear Magnetic Resonance spectroscopy. *Carum carvi* and *coriandrum sativum* were among the most effective species inhibiting fungi and bacteria.

P220 A PENCIL-BASED SENSOR FOR ENVIRONMENTAL MONITORING AND REMEDIATION.

Cynthia Garza*, Ambar Cancino, Mian Jiang, and Larry G. Spears, Department of Natural Sciences, University of Houston – Downtown, Houston, TX.

The purpose of this work was to find a cost-effective, yet user-friendly approach for environmental monitoring and remediation. Lead was selected as a target because of its massive use in auto and welding industry and their chronological impact to neural systems. Solid phase microextraction (SPME) is a recently developed protocol for extracting organic compounds and has been used in chromatography. Here we present a new remedy and monitoring method for lead ions based on electrochemical SPME followed by anodic stripping detection. Our design involves the preparation of polypyrrole and polyaniline when using Chromosomal DNA as dopants on the pencil graphite bases, and applying them for Pb^{2+} . The procedure consists of (1) Pb^{2+} extraction, (2) Release of extracted Pb^{2+} , and (3) Detection. When the electrode was put into the sample with -1.0V, a Pb^{2+} reduction was observed and is therefore extracted from the media. The follow-up remediation and detection further demonstrated the presence of Pb. The detected Pb also exhibited a direct correlation with the Pb^{2+} content in original samples. This work has developed a Pb^{2+} remediation plus monitoring by using SPME for the first time. The new polymer/DNA matrix emerges as an innovative material for its solvent-free, easy to recycle features. The utilization of pencil represents a new try of conventional material for sophisticated task and the use of DNA is for its application beyond the life science circle.

P232 EVALUATION OF MICROBIAL COMMUNITIES WITHIN POTATOES WITH AND WITHOUT ZEBRA CHIP SYMPTOMS TO DETERMINE CAUSAL DISEASE ORGANISM.

Jonathan Barchas*, Mike Carolan* and Lisa Morano, University of Houston-Downtown, Houston, TX.

Zebra Chip (ZC) is a disease caused by and unknown microbe infecting potatoes of South Texas and Mexico. Symptoms of the disease are black stripes within the potato tuber that appear when the potato is cooked making potatoes with ZC unusable by the potato chip industry. The economic impact of this disease for 2006 is estimated to be about 5 million dollars for the Frito Lay Corporation alone. Evaluation of possible viral or bacterial causes has been unsuccessful. Some evidence from culture and Gram staining suggests the disease may be caused by a collection of microbes. This research project involves cloning all bacterial DNA directly from potato tubers and searching for microbial communities most closely associated with symptoms. Thus far, the bacterium *Xylella fastidiosa* has been identified by amplifying the PCR product for the gyraseB gene from total DNA extracted from potatoes. ZC potatoes also show higher glucose concentrations as symptoms increase, presumably an effect of the disease organism in the tuber. Sugar concentration will be used as an indicator of disease and microbial communities evaluated for the microbe or microbes associated with highest percent sugar.

FRESHWATER AND MARINE SCIENCE

6 SPHAERIACEAN CLAM DISTRIBUTION IN TEXAS.

Jesse Todd, MA Consulting/AR Consultants, Inc., Carrollton, TX.

Eleven species of Sphaeriacean clams are listed in the literature as being native to Texas. The species include one each for the general *Eupera* and *Sphaerium*, four for *Musculium* and five for *Pisidium*. In this presentation, the distribution of certain species of the diminutive freshwater mussel is discussed. The distribution of the Sphaeriacean clams is based on information derived from archaeological and biological literature as well as field research. The time frame ranges from the Pleistocene to Recent. The distribution of the clams is presented by county, followed by chronological placement and then by drainage systems.

16 RE-DISCOVERY OF THE TROPICAL GREEN MACROALGA, *PENICILLUS CAPITATUS* LAMARCK (CHLOROPHYTA: BRYOPSIDALES), IN LOWER LAGUNA MADRE, TEXAS.

Joseph L. Kowalski* Department of Biology and the Center for Subtropical Studies, The University of Texas – Pan American, Edinburg, TX, Donald L. Hockaday and Gilbert H. Boza, Jr., Coastal Studies Laboratory and the Center for Subtropical Studies, The University of Texas – Pan American, South Padre Island, TX and Hudson R. DeYoe, Department of Biology and the Center for Subtropical Studies, The University of Texas – Pan American, Edinburg, TX.

The siphonaceous green alga *Penicillus capitatus* Lamarck (hereafter *Penicillus*) was an inhabitant of the Lower Laguna Madre Texas (LLM) until about 40 years ago when the population was decimated following a salinity decline in the fall of

1959, another salinity reduction due to Hurricane Carla in 1961, and finally a severe freeze in 1962. Since that time, there have been no reports of *Penicillus* in the LLM. During a reconnaissance trip in July 2006, a small population was found in the southern portion of the LLM. *Penicillus* thalli were mostly concentrated on unvegetated, unconsolidated sediment, colloquially termed "potholes" or "blowouts", surrounded by the seagrass *Thalassia testudinum* at a site characterized by clear, nutrient-poor water 1.2 to 1.3 m deep. Characteristics of *Penicillus* morphometrics and distribution at the site will be discussed and the possible implications of its re-discovery on LLM ecology, along with that of the recent discoveries of the benthic macroalgae, *Halimeda incrassata*, *Caulerpa prolifera*, and *Codium taylorii*.

- 24 AN ANALYSIS OF AQUATIC MACRO-INVERTEBRATE COMMUNITIES IN WEST TEXAS SPRINGS.
Jaimie Maher* and Glenn Longley. Texas State University, San Marcos, TX.

Established community ecology has focused primarily on local scales as opposed to larger, regional scales. When patterns of abundance and distribution are analyzed, variables which affect the environment at larger scales should also be considered. Multivariate statistical analyses are used to establish the possible relationships of biotic and abiotic factors on the spatial distribution of macro-invertebrates. Abundance and richness are compared with physical and chemical water parameters. A metacommunity is a set of local communities associated by the dispersal of various possible interacting species. The dispersal of species in local communities within a metacommunity may result in spatial dynamics, which can adjust local species diversity both directly and indirectly by altering the local community processes that modify features of the regional biota. The purpose of this study is to establish spring baseline aquatic macro-invertebrate inventories and analyze their community dynamics. A greater ecological understanding of the area will be gained, to aid in effective management and conservation of land and water resources.

- 32 OXBOW LAKES HYDROLOGIC AND BIOTIC CONNECTIVITY WITH THE LOWER BRAZOS RIVER.
Ray Mathews*, Jordan Furnans, Texas Water Development Board; Kirk Winemiller, Steve Zeug, Texas A&M University; Tim Bonner, Casey Williams, Texas State University; Tim Osting, Espey Consultants Inc.

The ecological value of oxbow lakes has not been very well understood because of their varying connectivity to the river system, off-channel proximity in the connected floodplain, and lack of hydrological information. We studied six oxbow lakes of the Brazos River at various stages of geomorphologic development, and each of the adjacent riverine sections of the river for comparison of faunas. Oxbow lakes were colonized by a diversity of fishes during flood events, and the pattern of colonization was analyzed based on connectivity to the river and geomorphic age. After flood waters recede, disconnected oxbow lakes developed significantly different fish assemblages associated with a gradient of water depth, temperature, and conductivity. Old, shallow oxbow lakes that dry out periodically have fish assemblages dominated by small colonizing species; whereas young, deep oxbow lakes and the river channel have high species richness and a greater diversity of life history stages. Hydrologic assessment of the predictability, frequency, and duration of connections between rivers and their off-channel oxbow lakes, provided inferences about how lateral movement patterns affect fish community structure in both oxbow lakes and channel habitats.

- 50 BLANCO RIVER SYMPOSIUM: REPRODUCTIVE ECOLOGY AND DIET OF THE GRAY REDHORSE.
Preston T. Bean* and Timothy H. Bonner, Department of Biology, Texas State University – San Marcos, TX.

Reproductive ecology and diet of gray redborse *Moxostoma congestum* were examined in a Texas Hill Country karst stream and a central Texas reservoir from September 2004 through August 2005. Temporal patterns in gonadosomatic index and oocyte diameter frequency indicated that *M. congestum* spawns over a very brief period in late March or early April. *Moxostoma congestum* was found to be an opportunistic benthic invertivore and diets differed among stream and reservoir habitats and among seasons. Though habitat degradation is of concern for *M. congestum*, it has persisted in habitats disturbed by low-head dam and main-stem reservoir construction as its opportunistic feeding strategy allows it to be adaptable to lentic systems.

- 51 BLANCO RIVER SYMPOSIUM: SPATIAL AND TEMPORAL PATTERNS IN THE BLANCO RIVER FISH ASSEMBLAGE.
Timothy H. Bonner*, Preston T. Bean, and Bradley M. Littrell, Department of Biology, Texas State University – San Marcos, TX.

The fish assemblage of the Blanco River, Texas, watershed was sampled at eight sites on the main stem of the Blanco River, one site on the Little Blanco River, and one site on Cypress Creek quarterly for two years. *Cyprinella venusta* (41%),

Pimephales vigilax (14%), and *Notropis amabilis* (11%) were the most abundant species and cyprinids made up 78% of the overall assemblage. Using Canonical Correspondence Analysis, 40% of the fish assemblage variation was explained by physical habitat parameters (15.3%), site effects (11.2%), and season (2.3%) as well as 10.7% of the variation shared among these three factors. Differences in low-head dam impoundment and riverine assemblages were determined using Analysis of Similarities ($P < 0.01$). The low-head dam impoundment assemblage was markedly different from riverine main-stem sites in that it was dominated by more lentic species and generally lacked species associated with higher velocity runs and riffles. Long term monitoring is proposed at sites 3, 6, 8, and 10 to determine future shifts in the Blanco River fish assemblage.

63 A GROSS MORPHOLOGICAL AND HISTOCYTOLOGICAL ANALYSIS OF GASTROINTESTINAL FUNCTION IN PYGMY AND DWARF SPERM WHALES (*KOGIA BREVICEPS* AND *K. SIMA*).

A.L. Moss* and C.D. Marshall, Texas A&M University Galveston, TX.

Members of the genus *Kogia* (kogiids) comprise the second largest group of stranded cetaceans in the Southeastern United States. Despite their common occurrence, there is little or no knowledge of their gastrointestinal (GI) anatomy and physiology. Rehabilitating kogiids succumb to GI complications within a month of captivity. Evidence from rehabilitating patients suggests that kogiids possess a derived digestive tract physiology. This is likely the mechanism for the production of copious volumes of reddish-brown liquid feces termed "ink" which is, stored in an expanded colon. Five GI tracts were collected through the Southeast United States Marine Mammal Stranding Network to conduct a gross morphological and histocytological analysis. Standard morphometrics of the GI tract were taken (length, diameter, and volume) and samples were processed for histology then stained with a modified Masson's trichrome. Morphometrics of epithelia were taken and enterocytes were identified and quantified. Mean lengths of the jejunum and colon were 23.3 m and 2.26 m, respectively. External lengths of the duodenum and ileum were arbitrary due to the lack of gross external distinctions between adjacent segments. Mean diameter of the duodenum, jejunum, and colon, were 2.28, 1.93, and 7.84 cm, respectively. Mean volume of the duodenum, jejunum, and colon were 220, 8,693, and 1,399 ml³, respectively. Maximum colon diameter and volume was 16.5 cm and 1772 ml³. Plicae and villi of the jejunum and colon were remarkably limited, short and exhibited a low surface area relative to bottlenose dolphins. Mucous cells dominated both the jejunum and the colon.

68 FATTY ACID COMPOSITION IN MAYFLY (*HEXAGENIA LIMBATA*) NAIADS AND ADULTS FROM LAKE ARROWHEAD, TEXAS.

Kristen M. Wellington*, Roy C. Vogtsberger, and Michael M. Shipley, Department of Biology, Midwestern State University, Wichita Falls, TX.

Aquatic naiads of mayflies (Insecta: Ephemeroptera) as are known to be filter feeders on detritus and algae, and are non-feeding in the short life of the adult. Naiads of *Hexagenia* form U-shaped burrows in the silt of lake bottoms where they remain for a year or more before emerging as subimagos to move to the lake shore. Adults must rely on stored energy sources, principally in the form of glycogen and lipids. This study focuses on the fatty acid composition of the lipid stores in *Hexagenia limbata* adults and naiads from a North Texas lake. Mayfly naiads were collected with shovels and sifted through D-frame aquatic nets. Late instar naiads were kept in fresh water before transporting to the laboratory. Adult mayflies were collected off of vegetation near the shoreline with sweep nets and separated by sex in the laboratory. Lipids from whole-body homogenates were extracted with organic solvents, and fatty acids were analyzed by gas chromatography-mass spectrometry. Palmitic acid (16:0) was the most abundant fatty acid in the naiads (43% of total), while oleic acid (18:1) was the second most abundant (25%). The trend was reversed in adult mayflies of both sexes, with 18:1 forming 40% and 16:0 comprising 26%. Overall, saturated fatty acids were slight more prevalent in naiads, while unsaturated fatty acids were more abundant in adults. These modifications in whole-body profiles suggest changes in physiological processes in response to developmental and dietary factors.

75 BLANCO RIVER SYMPOSIUM: SURFACE AND GROUNDWATER INTERACTIONS IN A SUBTROPICAL KARST STREAM.

Michael Cave* and Alan Groeger, Texas State University, San Marcos, TX.

The Blanco River is a little-studied karst stream that traverses the Texas Hill Country and Balcones Fault Zone regions associated with the eastern Edwards Plateau. It is intimately connected with the Trinity Aquifer, the Balcones Fault Zone Edwards Aquifer, and the San Marcos River, all being extremely valuable regional resources. This study characterizes water quality in the Blanco River from the headwaters to mouth, with particular attention given to the effects of spring and tributary inputs on concentrations of dominant ions calcium, magnesium, and bicarbonate. Historical correlations between discharge and

concentrations of specific ions are considered as evidence of active diagenesis, specifically dedolomitization, in rock units of the Blanco River. A greater concentration of dolomitic weathering products in the headwaters region also supports this conclusion.

97 GRASS SHRIMP DETECTION AND RESPONSE TO PREDATORY AND NON-PREDATORY FISHES.

Jason A. Mills*, Richard L. Pollock and Andrew C. Kasner, Department of Biology, Center for Coastal and Marine Studies, Lamar University, Beaumont, TX.

Grass shrimp (*Palaemonetes pugio*) were collected in Sabine Lake, Jefferson County, Texas during Summer 2006 and used in a laboratory study to determine: 1) Whether they distinguish between predatory killifish (*Fundulus grandis*) and non-predatory striped mullet (*Mugil cephalus*) and 2) Which sensory cues (tactile, chemical or visual) elicit behavioral responses to killifish (*Fundulus grandis*). Number of shrimp groups and number of shrimp in groups were significantly higher in the presence of killifish than in the presence of striped mullet. Shrimp movement was significantly lower in the presence of killifish than in the presence of striped mullet. Grouping defensive behavior increased significantly and shrimp movement decreased significantly in response to the presence of the tactile cue compared to the presence of the chemical and visual cues of killifish. Results suggest that grass shrimp primarily use tactile sensory cues to detect and distinguish predatory and non-predatory fishes.

118 GROWING AT A SNAIL'S PACE: NEGATIVE IMPACTS OF SALINITY AND HIGH DENSITY ON GROWTH MEASURES OF *P. INSULARUM*.

Abigail K. Youens*, Brandon B. Boland, and Romi L. Burks, Southwestern University, Georgetown, TX.

Environmental conditions can lead to faster development and earlier reproductive maturity in applesnails. Such effects may bolster fecundity, an indication of invasive potential. *Pomacea canaliculata* exhibits global invasive success, with multiple documented negative effects. A newly identified species, *P. insularum*, recently established an invasive population in Armand Bayou (Houston, Texas). Because *P. insularum* are larger and may have the same macrophagous eating habits as *P. canaliculata*, they could pose a similar threat to biodiversity. We investigated juvenile *P. insularum* growth in a factorial experiment at two temperatures (29.5 and 31°C) where snails experienced one of two levels of salinity, conspecific population density, and fish predator cue (*Lepomis microlophus*). To study growth, we measured operculum width, shell height, and weight every four days for 24 days. We also measured 100 adult *P. insularum* and conducted regression analyses on body size relationships. Operculum width, shell height, and weight had highly predictive relationships for both life stages. Fish cue did not affect growth. Juveniles grew more at 31°C than 29.5°C. Juveniles in high salinity treatments grew significantly less at the cooler temperature. Juveniles in high density treatments grew significantly less at the higher temperature, but assimilated significantly more resource at both temperatures. This suggests that snails may allocate resources to processes other than growth. Brackish waters may also be stressful to juvenile *P. insularum*, especially at high population densities. With more information about basic life history parameters such as growth, ecologists can better gauge the magnitude of *P. insularum*'s threat to biodiversity.

124 SPATIAL AND TEMPORAL FOOD WEB ANALYSIS OF POTENTIAL, ESSENTIAL FISH HABITAT TYPES IN LAVACA BAY, TEXAS.

Jenny L. Wrast*, Texas A&M University-Corpus Christi, Corpus Christi, TX., James Simons Texas Parks and Wildlife Department, Corpus Christi, TX., Gregory W. Stunz, Texas A&M University-Corpus Christi, Corpus Christi, TX.

Food webs exemplify the transfer of material and energy from one organism to another within an ecosystem and are generally analyzed using stomach contents and/or stable isotopes. Stable isotope ratios are most informative when combined with stomach content analysis, especially in species-rich systems where predators consume diverse prey items. The present study is examining the temporal and spatial aspects of community structure and food webs of subtidal oyster reefs compared to that of: marsh edge, seagrass, and non-vegetated habitats in Lavaca Bay, TX. Two of four quarterly samplings have been completed. Samples of fish and macroinvertebrates were collected for community structure, gut content, and stable isotope analyses. Benthic sleds were employed directly over each habitat type, and gill nets were utilized in collecting transient predators. Samples of vegetation, phytoplankton, zooplankton, benthic algae, macroinvertebrates, and fish tissue were collected for stable C and N isotope analysis. Over 5,800 fishes and macroinvertebrates have been collected. Fishes collected include *Ctenogobius boleosoma* (darter goby) to *Carcharhinus limbatus* (blacktip shark). Approximately 270 speci-

mens have been selected for gut content analysis and 190 for stable isotope analysis. The species kept for analysis characterize the range and occurrence of representative species from different trophic levels. A conceptual model of the trophic flows in the Lavaca Bay system that integrates the habitat types and potential isotopic influences will be developed. After defining the community structure, trophic structure, and carbon sources of these productive habitats, we will better understand how essential each habitat type is to fisheries.

133 A COMPARISON OF CARBON, NITROGEN, AND PHOSPHORUS STOICHIOMETRY AMONG DEVELOPMENTAL CLASSES OF THE MAYFLY *CAENIS* SPP.

Jeffrey A. Back*, Emily Hintzen, and Ryan S. King, Center for Reservoir and Aquatic Systems Research, Department of Biology, Baylor University, Waco, TX.

We examined the carbon, nitrogen, and phosphorus (C:N:P) stoichiometry of nymphal *Caenis* sp. mayflies (Ephemeroptera:Caenidae). We hypothesized that nymphs would have different elemental requirements among stages of development and therefore differ in their relative body chemistry. Adult mayflies do not feed, thus nutrient demand may be greatest in latter stages of development as nymphs shift from growth to production of P-rich reproductive structures. *Caenis* sp. were collected with a Hess sampler from both an intermediately and highly nutrient-enriched reach of the North Bosque River, TX. Nymphs were assigned to one of five developmental classes based upon external morphology of wing pads. Each developmental class was analyzed for C, N, and P concentrations, which were converted to molar ratios for comparison. C:N ratios increased across developmental classes between both sites. C:P and N:P ratios increased from developmental class 2-4, then declined sharply at developmental class 5 at both sites. However, C:P was lower (and thus P content was higher) at the highly nutrient impacted site for all but one development class. These trends imply that later stages of development have higher N and P requirements than earlier developmental classes. Moreover, nutrient enrichment may affect sequestration of P by nymphs and thus developmental processes dependent upon P, such a growth rates and gamete production, in these stream insects.

143 PHOSPHORUS LIMITATION OF GROWTH VARIES ACROSS DEVELOPMENTAL CLASSES OF THE MAYFLY *CAENIS* SPP.

Jason M. Taylor*, Kari Fallert, and Ryan S. King, Dept. of Biology, Center for Reservoir And Aquatic Systems Research, Baylor University, Waco, TX.

A laboratory study was conducted to test the hypotheses that growth rates of the mayfly *Caenis* (Ephemeroptera: Caenidae) are not limited by phosphorus (P) and not different among stages of development. *Caenis* nymphs were collected from a relatively unenriched location in the North Bosque River, sorted into five different development classes based on wingpad morphology and held individually in 20 ml glass vials for 10 days on a 12 hr light cycle at 20°C. Ten nymphs from each development class were reared on each of four food P enrichment treatments. Growth rates were calculated using initial and final head capsule width measurements converted to biomass values based on a previously published relationship for *Caenis*. A two-way ANOVA showed that there were significant interacting effects of P treatments and development classes on growth rates ($F = 2.36$, $p = 0.039$). *Caenis* growth rates generally increased in response to P enrichment, but particularly in the earliest developmental class. This growth response diminished in later development classes, suggesting that nymphs may shift P allocation from somatic growth to reproductive development as organisms mature.

148 ABUNDANCE AND DIVERSITY OF DRAGONFLIES SURROUNDING MCLENNAN COUNTY RESERVOIRS.

Isis Dominguez* and Darrell Vodopich, Biology Dept., Baylor University, Waco, TX.

For six weeks, we monitored the diversity and abundance of dragonflies at three different reservoirs in McLennan County, Texas. Two of the reservoirs (Battle Lake and Tradinghouse Creek Lake) shared very similar vegetation types. They both consisted of tall grasses and emergent vegetation. The third and largest reservoir (Lake Waco) primarily consisted of either bare shoreline or woody vegetation along the shoreline. Lake Waco had the greatest diversity of dragonflies, but the lowest abundance. Odonates at Battle Lake and Tradinghouse Creek Lake were dominated primarily by two species: *Celethemis eponina* (Halloween pennant) and *Brachymesia gravida* (Four-spotted pennant). Battle Lake had the greatest richness, with a total of 16 species.

- 150 WATER QUALITY IN THE BAHIA GRANDE FOLLOWING RESTORATION OF TIDAL FLOW.
Hudson DeYoe*, Reuben Trevino, Erin Bieberbach and Antonio Villarreal. Center for Subtropical Studies and Biology Dept. University of Texas – Pan American, Edinburg, TX.

The Bahia Grande is a 6,500-acre shallow basin in south Texas that was cut off from tidal exchange in the 1930s. For 75 years, the basin was largely dry. In July 2005, a pilot channel was constructed that resumed tidal exchange. Quarterly sampling at nine locations in the three sectors of the basin (NE, NW, S) from August 2005 to August 2006 was performed. Water temperatures ranged from 31.8°C in August 2005 to 11.8°C in February 2006. Salinities were nearly always hypersaline with highest value being 120 PSU in May 2006. Dissolved oxygen values ranged from 4.3 to 9.4 mg/L while percent saturation was normally higher than 80% but often exceeded 100%. Values for ammonium, nitrate and phosphate were low to moderate with no notable patterns. Total suspended solids ranged from 40 mg/L to 300 mg/L and appeared to be related to wind velocity. Water column chlorophyll values were low to moderate ranging from 0.31 to 14.4 g/L with highest values occurring in February 2006. Sediment chlorophyll values ranged from 2 to 26 µg chl a/g with the highest values occurring in February 2006. There was no consistent pattern in the water quality parameters among the three sectors in the Bahia Grande. The microphytobenthos community is likely the main energy and carbon source for the ecosystem. There is no seagrass in the basin likely due to high salinity, unstable sediments and grazers. The Bahia Grande is likely to always be a highly variable and therefore stressful system for marine organisms.

- 159 BLANCO RIVER SYMPOSIUM: CONSERVATION PLANNING AND MANAGEMENT OF RIPARIAN HABITATS IN THE BLANCO RIVER WATERSHED.
Steve Jester, The Nature Conservancy, Wimberley, TX, Lacey Halstead, and Ryan Smith*, The Nature Conservancy, San Antonio, TX.

The Blanco River is 140 km (87 mi.) in length and drains a watershed of 1,067 km² (412 mi.²) and has been identified as a priority conservation area through The Nature Conservancy (TNC)'s ecoregional planning exercise for the Edwards Plateau. Following its delineation as a conservation priority, we applied the next step of TNC's conservation process, Conservation Area Planning (CAP). Central to the CAP process is the five-s framework, a step-by-step process for identifying the highest priority conservation activities. The five-s framework includes: 1) Systems, or the biodiversity attributes to be conserved along with estimates of viability; 2) Stresses on the systems; 3) Sources of the stress on biodiversity; 4) Strategies to abate the threats to biodiversity and; 5) Success or measures to monitor progress in threat abatement. A stakeholder-driven modification to this process, Participatory Conservation Planning, was applied in the Blanco River watershed to develop the Conservancy's action plan for the Blanco River Project. One primary aspect of the resulting conservation action plan for the Blanco watershed is improvement of riparian vegetation management. Better management of riparian zones is necessary to ameliorate the affects of historical grazing activities and current ex-urban residential development, vacation home development and recreational ownership of rural land. TNC riparian conservation-related activities to date include active outreach to riparian landowners, provision of technical and financial assistance for conservation projects and development of a streamside landowner's guide.

- 176 THE DISTRIBUTION AND EXPANSION OF *ARUNDO DONAX* (GIANT REED), AN INVASIVE RIPARIAN PLANT SPECIES, ALONG THE LAKE BRAZOS CORRIDOR.
Sharon Conry*, Melissa Mullins, and Robert Doyle, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX.

Arundo donax (Giant reed) is an invasive perennial plant, native to the freshwaters of Asia. The plant grows to a height of 3-4 meters in very dense monoculture patches. Unfortunately, the plant is now widely distributed along roadways and riparian areas of fresh waters systems throughout Texas. Anecdotal observations over the years have indicated that the species has expanded significantly along the Lake Brazos shoreline in Waco, Texas. The Lake Brazos corridor consists of the normally impounded waters of the Brazos River through Waco, Texas. However, the presence of *Arundo donax* has become a nuisance along the Brazos corridor requiring regular maintenance by the City of Waco. In April 2005 the Brazos River was initially surveyed for the presence of *Arundo donax*. The abundance and distribution of the plant was documented using GPS mapping technology. Data was again collected along the shores of Lake Brazos in March of 2006 and October 2006. March sampling data indicate that while the total area of *Arundo donax* had not increased significantly, there were many new small patches of the nuisance plant. The October 2006 data is still being analyzed and will be included in this present-

tation. This project documents the spread of *Arundo donax* along the Brazos River corridor here in Central Texas and will provide managers with information about the potential rate of spread of this species.

180 BLANCO RIVER SYMPOSIUM: MACROINVERTEBRATE STRUCTURE AND DRIFT IN THE BLANCO RIVER: A KARST TEXAS STREAM SUBJECT TO HYDROLOGIC VARIABILITY.

David R. Pendergrass*, Department of Biology, Texas State University, San Marcos, TX, and Thomas L. Arsuffi, Field Research Station, Texas Tech University, Junction, TX.

Patterns in benthic macroinvertebrate communities were assessed within the Blanco River drainage of central Texas to determine structuring mechanisms related to abiotic and biotic influences of the watershed. The Blanco River is a flashy karst system and naturally fragmented because of water loss to underlying aquifers. Seven mainstem sites, two tributary sites, and two seep sites were sampled qualitatively and quantitatively within the Blanco River drainage seasonally from October 2003 through July 2005. In addition, 24-h drift samples were taken in Spring, Summer and Fall from three sites. Ephemeroptera, Trichoptera and Diptera were the most abundant taxa in benthic and drift samples, riffle beetles (Coleoptera) and *Argia* (Odonata) were the most ubiquitous. Habitat, site, and season explained 33% of community variation in the drainage ($F = 1.35$, $P < 0.01$). Current velocity and substrate were primary habitat factors associated with taxa occurrence and distribution. Adjacent communities differed (analysis of similarity: $R = 0.086$, $P = 0.02$) among mainstem sites suggesting community structure was largely influenced by local habitat factors. Tributary and seep communities were similar through time and provided habitat for several taxa not found in the mainstem. Biodiversity of the Blanco River watershed is dependent upon the diversity and persistence of mainstem, tributary, and seep habitats. However, these habitats are susceptible to degradation by increasing surface and groundwater withdrawals and water detention devices such as low-head dams.

185 IN TOO DEEP: EGG CLUTCH WATER EXPOSURE MAY SUPPRESS HATCHING AND INCREASE CONSPECIFIC PREDATION OF EGGS IN THE POTENTIALLY INVASIVE APPLESNAIL *POMACEA INSULARUM*.

Matthew A. Barnes*, Abigail K. Youens, Sarah A. Hensley, and Romi L. Burks, Southwestern University, Georgetown, TX.

The aquatic applesnail *Pomacea insularum* demonstrates high fecundity, ovipositing thousands of eggs in bright pink clutches above the water surface. Submersion may present considerable challenges to hatching success, including physical damage and conspecific predation. To test effects of submersion on eggs, we divided halves of 18 freshly deposited clutches into 4 treatments (N=9): no submersion, rapid (6 seconds; "rain"), lengthy (6 hrs; "high tide"), or constant submersion. No eggs hatched under constant submersion. On average, "rain" clutches required 32 days until hatching with only 16.3% hatching efficiency. Four clutches failed to hatch. Unexpectedly, "high tide" clutches demonstrated the highest hatching efficiency (62.3%), and only 30.1% of unsubmerged clutches hatched. However, "high tide" clutches yielded many underdeveloped hatchlings, possibly related to higher hatching efficiency. Unsubmerged and "high tide" clutches both required approximately 25 days before hatching. To examine predation upon eggs by conspecifics, we separated individual eggs from clutches by soaking clutches in hot-water or sodium hydroxide (NaOH) solution. We presented eggs to well-fed or starved conspecifics, with or without alternative food (lettuce). Feeding occurred for 8 hours (4.5 dark/3.5 light). Snails consumed significantly more eggs from clutches dissolved in hot-water than from NaOH-dissolved clutches. Previously-fed snails consumed significantly more eggs than those that had been starved, and no difference in egg consumption occurred with or without lettuce. Overall, our results suggest that water-exposure and conspecific predation may threaten egg success. Therefore, submersion deserves consideration as a control method of potentially invasive *P. insularum* populations.

187 BLANCO RIVER SYMPOSIUM: MODELING FUTURE FLOWS IN THE BLANCO RIVER UNDER VARIOUS DEVELOPMENT AND RAINFALL SCENARIOS.

Joanna C. Curran, Department of Geography, Texas State University-San Marcos, San Marcos, TX.

The Blanco river is supplied through spring flow and tributaries within a 1143 km² watershed. Land use in the watershed is predominantly rural, but in recent years the rate of urbanization within the watershed has increased, and it is expected to increase into the future. The SWAT (Soil and Water Assessment Tool) model is used to predict the impact of land management practices on water yields in complex watersheds with varying soils, land use, and management conditions. Using SWAT, future land use scenarios were modeled for their effect on flow conditions in 30 separate sub-basins within the Blanco watershed. By dividing the watershed into numerous sub-basins, flow rates were predicted for ungaged river

reaches. Three land use urbanization scenarios were modeled against two sets of rainfall records. Rainfall from 1990-2005 and 1945-1960 was used to model both a normal precipitation period and the 1950's drought of record. Results show an increase in extreme flow events, both in terms of frequency and magnitude, with urbanization. Lower magnitude flows that are expected to occur most frequently, are reduced with urbanization. These trends are similar between the two rainfall scenarios.

191 GROUNDWATER MONITORING OF MILL SPRING IN TOM GREEN COUNTY OF WEST CENTRAL TEXAS.

David A. Ballard* and Ned E. Strenth, Department of Biology, Angelo State University, San Angelo, TX, Dan Brown, Christoval, TX.

Mill Spring discharges into the South Concho River near the municipality of Christoval in southern Tom Green County of west central Texas. The surface area providing both runoff and potential groundwater recharge lies to the east between Mount Susan and Brushy Knob. Both spring discharge and local rainfall events were monitored on a regular basis from January through December of 2006. During this time period, 10 rainfall events of less than 2.5 cm, seven events of between 2.5 and 5 cm, two events near 5 cm, and one event totaling 12 cm were monitored. Rainfall events of less than 2.5 cm produced detectable but variable increases in spring discharge, rainfall events between 2.5 and 5 cm produced increases of greater than 10% of short duration (less than 7 days), the two rainfall events at or near 5 cm produced increases greater than 10% of longer duration (7 to 14 days), and the single rain event of 12 cm produced an increase of greater than 50% with a duration of 18 days. Discharge rates varied from 0.058 to 0.090 cubic meters per second (2.06 to 3.18 cubic feet per second) during the course of this study. Existing soil moisture appears to represent a significant factor in determining both percent increase and duration of spring flow following rainfall events of 5 cm or more.

195 CARBON-SOURCE UTILIZATION PROFILES OF *ESCHERICHIA COLI* ISOLATES FROM VARIOUS MAMMALIAN SPECIES.

R. Bryn Cooper, Baylor University, Waco, TX.

Escherichia coli samples were isolated from mammalian fecal samples, including beef cattle, dairy cattle, sheep, goats, horses, humans, deer, and poultry. and were analyzed for their ability to metabolize specific carbon sources. Carbon-source utilization profiles were obtained for these isolates using the Biolog system (Biolog, Inc.). Biolog measures microbial utilization of 95 carbon sources. The carbon sources metabolized most differentially by the *E. coli* isolates were used to develop carbon source utilization profiles. Comparison of profiles indicates variation in ability to metabolize specific carbon sources among the isolates. Isolates obtained from organisms within the same group (i.e. within total beef cattle isolates) exhibited similar profiles.

203 ESTIMATING THE EFFECTS OF NUTRIENT ENRICHMENT ON ALKALINE PHOSPHATASE ACTIVITY (APA) AND NITROGEN (N₂) FIXATION USING A NOVEL NUTRIENT DIFFUSING SUBSTRATE.

David A. Lang*, J. Thad Scott, and Ryan S. King. Center for Reservoir and Aquatic Systems Research, Department of Biology, Baylor University, Waco, TX.

Nutrient pollution is one of the most common causes of degraded water quality in stream ecosystems throughout the world. Alkaline phosphatase activity (APA) and N₂ fixation rates of stream periphyton are key indicators of nutrient limitation status. We evaluated novel nutrient-diffusing substrata (NDS) to estimate the effect of nutrient treatments (control, nitrogen = N, phosphorus = P) on APA and N₂ fixation in a low-nutrient, stream-like outflow of a constructed freshwater marsh. Periphyton biomass accrual, APA and N₂ fixation were measured 6, 18, and 29 days after deployment. We also estimated nutrient diffusion rates from the NDS media in order to evaluate to what degree nutrients were depleted during the study period. Moreover, we evaluated whether APA can be accurately estimated on the same-sample NDS following estimation of N₂ fixation by acetylene reduction. APA rates of controls and N treatments were significantly higher than the P treatment on each day of measure following deployment. N₂ fixation rates of both controls and P treatments were significantly greater than the N treatment only on day 18, though controls remained significantly higher on day 29. APA results were different when periphyton were analyzed following the acetylene-reduction assay, thus only those results of APA measured alone were utilized for comparison of periphyton APA. These data demonstrate that APA and N₂ fixation are strongly influenced by nutrient availability and may be useful in assessing the effects of nutrient pollution on key stream ecosystem processes.

- 212 BLANCO RIVER SYMPOSIUM: CAN INVASIVENESS OF NATIVE CYPRINIDS BE PREDICTED FROM LIFE HISTORY TRAITS? A COMPARISON BETWEEN TWO CYPRINIDS IN THE BLANCO RIVER, TEXAS.

Bradley M. Littrell*, and Timothy H. Bonner, Texas State University – San Marcos, San Marcos, TX.

Anthropogenic alterations to stream environments generally lead to a decrease in occurrence and abundance of native fishes, and successful establishment and increase in occurrence and abundance of non-native fishes, causing a reduction of global biodiversity and extirpations of distinct and local faunas. Under some circumstances however, anthropogenic alterations will improve conditions for certain native fishes that subsequently become more abundant, thus altering biotic interactions and affecting occurrence and abundance of other native taxa. This study tests the hypothesis that common, over-abundant native fishes, relative to endemic forms, exhibit life history characteristics similar to highly invasive exotic species by comparing life history attributes (e.g., habitat selection, reproduction, growth, longevity, and diet) between a species known to increase in abundance after alterations (blacktail shiner, *Cyprinella venusta*), and a regionally endemic species (Texas shiner, *Notropis amabilis*) in the Blanco River, Texas. Results indicate that *C. venusta* exhibits a more ubiquitous distribution among habitats, invests more energy into reproduction, and has a larger size and longer life span when compared to *N. amabilis*. Collectively, life history attributes of *C. venusta* were similar to those of successful exotic invaders and likely indicate why some native fishes are more successful than others in persisting in modified aquatic systems.

- 214 SEASONAL ABUNDANCE AND DISTRIBUTION OF MYSIS AND POSTLARVAL WHITE AND BROWN SHRIMP IN KEITH LAKE ESTUARINE SYSTEM.

Richard Pollock and Andrew Kasner, Lamar University, Beaumont, TX.

The objective of this study is to determine what species of planktonic shrimp mysis and postlarvae were recruited into Keith Lake, a part of the Sabine Lake estuary, and their seasonal patterns of abundance and distributions within Keith Lake in relation to weather and water chemistry. White and brown shrimp postlarvae were collected in Keith Lake, but they were not abundant. Total number of white shrimp postlarvae collected for the entire study was 42. Total number of white shrimp postlarvae in May and June 2005 were 18 and 13 respectively, which was 73.8% of all white shrimp postlarvae collected. The total number of brown shrimp postlarvae collected for the entire study was 45. The total number of brown shrimp postlarvae in March 2006 was 37, which was 82% of all brown shrimp postlarvae collected. White shrimp mysis were present during summer and were more abundant than white and brown shrimp postlarvae. The total number of white shrimp mysis from June-September 2005 was 424. White shrimp postlarvae were more abundant at north shoreline sample stations, with 57.1% of all white shrimp postlarvae collected at two sites. White shrimp mysis were widespread in Keith Lake but most abundant in the middle of Keith Lake with 43% collected at three stations. Brown shrimp postlarvae were also most abundant in the middle of Keith Lake, with 58% collected at 3 stations. Water temperature, salinity, and dissolved oxygen concentrations were all within the tolerance ranges of the two species of shrimp and appeared to have a limited effect on abundance and distribution of white and brown shrimp postlarvae and white shrimp mysis.

- 230 BLANCO RIVER SYMPOSIUM: STATE OF RIVERS IN TEXAS: THE BLANCO RIVER PROJECT.

Andy Sansom, River Systems Institute, Texas State University – San Marcos, San Marcos, TX.

Perhaps the most critical environmental issue facing Texas today is the lack of protection for environmental flows in our rivers and streams. These are instream flows which are found in the upper reaches of our river systems and freshwater inflows which are those river flows which are delivered to our bays and estuaries and are the critical factor for maintenance of virtually all estuarine ecosystems, including coastal wetlands, seagrass communities, as well as sport and commercial fisheries. The Blanco River Study undertaken by Texas State University and The Nature Conservancy is the seminal characterization of the hydrologic and aquatic systems in the river and land use trends in its drainage basin. This work will be essential in determining both what the instream needs of the system are and how anticipated changes in the watershed will affect our ability to ensure them.

- 237 BLANCO RIVER SYMPOSIUM: HYDROLOGY AND BIOLOGY OF CYPRESS CREEK.

John E. Dedden* and G. Longley, Aquatic Biology and Edwards Aquifer Research Center, Texas State University, San Marcos, TX.

This study describes the spatial and temporal patterns of the fish and benthic macro-invertebrate communities of the spring-fed Cypress Creek (Hays County). Four study sites were sampled seasonally from March-October 2005. Monthly Stream

flow was measured at the ten sites along the creek. Jacob's Well is a major karst spring which discharges into Cypress Creek approximately 5km northwest of Wimberley and is the primary source of water to the creek. It issues from an inclined shaft 40m deep, from what is possibly the longest underwater cave in Texas. During the period between July and September 2000, it stopped flowing for the first time in recorded history. During this study, flow measurements ranged from 1.4 cubic meters per second (49 cubic feet per second) during early March, to <0.06 cubic meters per second (<2.0 cubic feet per second) during the late summer and fall. Twenty-one fish species and benthic macro-invertebrates representing thirty-one families were collected. Natural flow regime is important in sustaining the ecological integrity of flowing water systems. Major alterations in freshwater ecosystems often lead to changes in species abundance and composition. The changes in Cypress Creek are documented in this study.

239 BLANCO RIVER SYMPOSIUM: A MULTI-PARTNERSHIP AND MULTI-DISCIPLINARY APPROACH TO THE CONSERVATION AND ECOLOGICAL STUDY OF THE BLANCO RIVER WATERSHED IN TEXAS.

T.L. Arsuffi*, Llano River Field Station, Texas Tech University, Junction, TX, Jim Bergan, The Nature Conservancy, San Antonio, TX, A.W. Groeger and T. Bonner, Aquatic Station, Texas State University, San Marcos, TX.

The Nature Conservancy identified a portion of the Blanco River watershed (400 sq. mi.) as a Conservation Area in July 2002 as part of an ecoregional assessment of the Edwards Plateau. The Blanco River basin is exposed to numerous anthropogenic stresses. To begin the conservation process, the Nature Conservancy and River System Institute (Texas State University) developed additional partnerships with landowners and other stakeholders, and used their "5 's' approach. We evaluated systems, stresses, and sources of stress, strategies and success measures, to assess and determine strategies to restore biodiversity health of the Blanco River watershed. Stresses and their sources include nutrient inputs from a wastewater treatment plant, municipal and agriculture runoff and dewatering, flow alterations from low-flow dams and recreational activity. These stresses, individually or in combination, alter natural flow regimes and other abiotic characteristics of the water, which influences the biotic (e.g., macroinvertebrates and fish) components. The multidisciplinary studies include: water chemistry and quality, macroinvertebrates, fish, hydrology and land use patterns across multiple spatial and temporal scales. We also conducted an examination of historical flow patterns and determined how they have changed in the Blanco River basin. Integration and analysis of component studies show important patterns and relationships not evident by single disciplinary studies. The diversity of interests and stakeholders, and the cost of environmental studies to provide baseline data and information, on which sound watershed management principles and plans can be developed, shows the efficacy of multi-partnership approaches to river conservation.

243 SHELL FORMATION IN A FRESHWATER CLAM.

Francis Horne, Biology Department, Texas State University, San Marcos, TX.

Freshwater clams/mussels form a highly calcified shell, often in waters where pH values are near neutral and calcium concentrations low. In the Concho River, known for its populations of clams/mussels, has an alkaline pH and adequate calcium levels. In contrast, the upper San Marcos River has few clams/mussels, neutral pHs, but high calcium concentrations. How do fresh water species differ from their marine relatives that have lots of calcium available and high pHs that make carbonate ions more readily available when forming shells. Calcium ions are pumped in from the environment and then out again at the site of mineral deposition. In shell calcification the calcium and carbonate ion product must exceed its solubility product to sustain crystal growth. Low pHs greatly reduce the availability of carbonate ions. Two issues arise: a) availability of bicarbonate ions to provide carbonate ions, and b) removal of protons. An extracellular CA might solve both quandaries. *Quadrula apiculata* shells, collected from the Concho River, were decalcified with formic acid, sectioned and treated with antibodies to bovine RBC CA II. Clam CA appears to be localized through out the shell matrix in large quantities. Non-calcified periostracum and controls did not react with antibodies and did not seem to have CA. Differences in shell mineralization in freshwater and marine forms will be presented. Extracellular CA may function along with intracellular CA in maintaining bicarbonate levels and/or removing protons in both crustaceans and mussels.

- 244 CHARACTERIZATION OF METAL-REDUCING BACTERIAL POPULATIONS FROM DIFFERENT SUBTROPICAL AND TROPICAL AQUATIC ECOSYSTEMS.

Omar R. Elizondo, Domingo Molina and Kristine L. Lowe. University of Texas – Pan American, Edinburg, TX.

The research objective was to characterize sediment metal-reducing bacteria from different aquatic environments. We hypothesize that environmental differences, such as salt water concentration, result in different bacterial communities involved in manganese biogeochemical cycling. Manganese-reducing bacteria (MRB) are ecologically important; these organisms reduce solid Mn^{IV} to soluble Mn^{II} during anaerobic respiration which may be released to porewater, absorbed by aquatic vegetation, or sequestered by sulfides. Sediment was collected from the Laguna Madre (Texas), Ala Moana Beach (Hawaii), Manoa Stream (Hawaii), and the Edinburg Scenic Wetlands (Texas); sediment porewater salt concentration was 4.1%, 3.5%, 0% and 0%, respectively. MRB density was determined by diluting sediment, spreading it on solid media amended with Mn^{IV} and a salt concentration equal to environmental conditions, and incubating anaerobically. Random isolates were characterized biochemically by API20E® strips. Preliminary results suggest that salt concentration has an impact on the density and niche structure of sediment MRB. Density of MRB in Laguna Madre and Ala Moana sediments were $>10^6$ colony forming units (cfu) per gram whereas MRB density in Edinburg Wetlands sediments was 10-fold lower. Biochemical tests indicated that organisms isolated from freshwater sites (Edinburg Wetlands and Manoa Stream) had a diverse array of enzymatic capabilities; isolates from marine sediments (Ala Moana and Laguna Madre) had few positive reactions on the API strips. This suggests that MRB in marine sediments occupy specialized niches and those in freshwater sediments have a more generalized niche. Work continues to characterize the metal-reducing bacterial communities sediments from these locations.

- 246 BLANCO RIVER SYMPOSIUM: INTERACTION OF CLIMATE AND WATER IN THE BLANCO RIVER, TEXAS.

A.W. Groeger and M.S. Cave*, Dept. of Biology, Texas State University-San Marcos, San Marcos, TX.

The Blanco River is a karst river on the eastern edge of the Edwards Plateau, running for 140 river km from its headwaters to its confluence with the San Marcos River. Portions of the river and its primary tributaries flow underground for extended distances and periods for substantial lengths of the river length.

- 251 CHEMICAL TOXICITY DISTRIBUTIONS AS AN APPROACH TO ASSESS THE SENSITIVITIES OF COMMON *IN VITRO* AND *IN VIVO* ASSAYS OF ENVIRONMENTAL ESTROGENICITY.

Laura L. Dobbins*, Richard A. Brain and Bryan W. Brooks, Baylor University, Waco, TX.

A number of aquatic contaminants in municipal effluent discharges and effluent-dominated streams are estrogen agonists to fish. *In vitro* and *in vivo* techniques have been developed to assess the relative toxicity or estrogenicity of these compounds or aggregate samples. The relative sensitivities of three common *in vitro* methods for determining estrogenicity, YES (yeast estrogen screen reporter gene assay), MCF-7 (human breast adenocarcinoma cell lines) and cultured fish hepatocytes assays, were assessed using probabilistic hazard assessment estimations (PEHAs). PEHA incorporates a toxicity endpoint into a probability distribution where a toxicological benchmark concentration, corresponding with a percentile, is derived. PEHAs utilizing chemical toxicity distributions (CTDs) for EC_{50} values were derived from literature data for compounds existing in the environment that have the potential to be estrogenic. The distributions predict that, using the data from YES, MCF-7 and hepatocyte assays, that there is a 23.6%, 19.3% and 3.3% probability, respectively, of finding a compound in aquatic systems that will elicit an estrogenic agonist response at a concentration below $0.1 \mu g L^{-1}$. The data implies that when evaluating an *in vitro* screen to utilize for assessing estrogenicity, the YES assay is the most sensitive assay. Ongoing efforts are extending PEHA to assess the relative sensitivities of utilizing fathead minnow, Japanese medaka and rainbow trout vitellogenin induction as *in vivo* models for assessing estrogenicity of single compounds or aggregate aquatic exposures.

252 SEDIMENT CONTAMINATION BY URBAN-USE INSECTICIDES IN WATERSHEDS NEAR RESIDENTIAL AREAS IN CENTRAL TEXAS, USA.

Emily P. Hintzen* and Jason B. Belden, Department of Environmental Studies, Baylor University, Waco, TX.

Since the ban of most organophosphate insecticides within the US, the residential use of pyrethroid and other recently developed insecticides has increased substantially. Past sediment-based research has demonstrated that these compounds can cause toxicity to aquatic invertebrates. Although a nationwide survey of chemical contaminants in US surface waters found that urban insecticides may contribute more toxicity to surface waters than agricultural insecticides, the impact of current use insecticides to benthic invertebrates in urban streams is largely unknown. Recent studies have indicated that insecticide contamination from residential areas may be a serious problem in parts of California. The objective of this study was to determine the presence and concentration of pyrethroids and other hydrophobic pesticides in the sediments of residential streams in central Texas. In addition, the toxicity of these sediments to *Hyalella azteca* was evaluated. Over the course of an insecticide application season, sediment samples were collected from 18 sites in urban streams that were selected for their proximity to residential neighborhoods, their potential for quality habitat, and historical pesticide and benthic data availability. The sediments were extracted and analyzed using a Varian 2100 gas chromatograph with electron ionization and MS/MS for the presence of the pyrethroids bifenthrin, permethrin, lambda-cyhalothrin, cyfluthrin, deltamethrin, cypermethrin, esfenvalerate, and other commonly used insecticides including fipronil and indoxacarb. 10-day sediment toxicity tests using *H. azteca* were also conducted on the sediments. Results of this study will help clarify whether insecticide contamination of urban sediments may indeed be a widespread problem.

253 WATER QUALITY AND LIMNOLOGICAL GRADIENTS IN AN EFFLUENT-DEPENDENT CHAIN OF URBAN RESERVOIRS.

Barry Fulton*, J. Thad Scott, Theodore Valenti, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX, Michael Hooper, Texas Tech University, Lubbock, TX, Bryan W. Brooks, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX.

The Jim Bertram Lake System in Lubbock, Texas is a series of effluent-dependent urban reservoirs, representing one of the largest reclaimed urban aquatic systems in the United States. Effluent that has first been land applied with circle pivot irrigation, percolated through soils and then reclaimed from groundwater flows through a series of five urban reservoirs. Historical studies indicate a decreasing gradient of nitrate levels through the cascading reservoirs, which suggests that this system may provide a treatment approach for future water reuse efforts. Ambient water quality and limnology of this system was assessed in summer 2006. Specifically, nutrient and chlorophyll *a* levels, alkaline phosphatase activity, nitrogen fixation potential, ambient toxicity to *Daphnia magna*, and physicochemical parameters were determined in each reservoir. Diel dissolved oxygen and temperature data were used to estimate ecosystem metabolism; metabolic rates were subsequently used to compute site specific P:R ratios. Our findings confirmed previous studies of decreasing nitrate through this system. Further, ambient chronic toxicity observed in the initial reservoirs was ameliorated at downstream sites. Interestingly, autotrophic conditions were observed in reservoirs 1 and 2 (P:R>1), while reservoirs 3–5 were increasingly heterotrophic (P:R>1). A corresponding decrease in alkaline phosphatase activity and N:P ratios, and an increase in chlorophyll *a* values were observed through the cascading system. N₂ fixation was only observed in the last reservoir. Although the cascading system appears to improve select water quality parameters, shifting N:P ratios throughout the reservoir gradient provide conditions suitable for select harmful algal blooms.

P147 GRAZING EFFICIENCIES OF THREE MARINE SNAILS, *LITTORINA IRRORATA*, *ANACHIS AVARA*, *BULLA STRIATA* FROM THE LOWER LAGUNA MADRE, TEXAS.

Antonio Villarreal* and Hudson DeYoe, Biology Dept and Center for Subtropical Studies, University of Texas – Pan American, Edinburg, TX.

As part of a seagrass culture study, we evaluated the ability of three snail species common to the Laguna Madre to control seagrass epiphytes. Snail grazing efficiency was quantified in the laboratory using glass slides colonized with epiphytes (consisting mostly of diatoms). Snails (3-7 for each species) were placed on a colonized glass slide with barriers that forced linear movement. Snails were allowed to graze for periods up to 3-60 min. and then light microscopy was used to enumerate algal cells in grazed and un-grazed areas. All species exhibited some degree of epiphyte removal ranging from 5-67%. For *L. irrorata* grazing runs were performed in the light and dark. Preliminary results indicate that grazing efficiency was higher in the dark (67%) than in the light (28%).

P218 CHARACTERIZATION OF A HIGH ENERGY MACROALGAL COMMUNITY IN QUINTANA ROO, MEXICO USING DIGITAL IMAGE ANALYSIS.

Ryan L. Fikes*, Leslie C. Smith, and Roy L. Lehman. Center for Coastal Studies, Texas A&M University – Corpus Christi, Corpus Christi, Texas.

Macroalgal community structure was characterized for a high energy portion of the lower midlittoral, upper infralittoral zone of a rocky point on the eastern coast of Mexico's Yucatan peninsula. This intertidal zone of Punta Yu Yum has historically been inaccessible due to high energy wave action. However, meteorological conditions during a 2005 summer research expedition made it possible to conduct intensive sampling. A species checklist was developed for the macroalgal community, and three sets of voucher specimens were collected of each species encountered. A random design of 132 quadrats (20cm X 30cm), imaged with a Sony 4.1 mega pixel Cyber-shot digital camera, were used to collect data. Images were evaluated with Coral Point Count (CPC), which assigned 25 random points per image. Each organism per point was identified to lowest possible taxon. Datasets were analyzed for species diversity, richness, evenness, and relative cover using both CPC and Quantitative Analysis in Ecology programs. Maximum Shannon diversity was found to be 1.51, following normal trends of low diversity in high energy habitats, and evenness was 0.591. Species richness was found to be 31, with class Florideophyceae constituting 10 species, Phaeophyceae 9 species, and Chlorophyceae 10 species. In total, 10 orders of marine macroalgae were represented. *Chondrophycus papillosa* [Laurencia papillosa] had the greatest relative cover at 37.08 percent, followed by *Turbinaria tricostata* with 17.64 percent cover.

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46 Differentiating pedogenesis from diagenesis in early terrestrial paleoweathering surfaces formed on granitic composition parent materials.

Steven G. Driese*, Baylor University, Waco, TX; L. Gordon Medaris, University of Wisconsin, Madison, WI; Anthony C. Runkel, Minnesota Geological Survey, Minneapolis, MN; Minghua Ren and Richard P. Langford, University of Texas, El Paso, TX.

Unconformable surfaces separating Precambrian crystalline basement and overlying Cambrian sedimentary rocks provide an exceptional opportunity to examine the role of primitive soil ecosystems on weathering and resultant formation of *saprolite* (weathered rock retaining rock structure) and *regolith* (weathered rock without rock structure), but many appear to have been affected by burial diagenesis, leading some researchers to discount their suitability for such studies. We examine one modern weathering profile (Cecil series), four Cambrian paleoweathering profiles from the North American craton (Squaw Creek, Franklin Mountains, Core SQ-8, and Core 4), one Neoproterozoic profile (Sheigra), and one late Paleoproterozoic profile (Baraboo), to test the hypothesis that these are terrestrial paleoweathering profiles despite their diagenetic and hydrothermal overprinting, especially additions of potassium. We employ an integrated approach using: (1) detailed thin-section investigations to identify characteristic pedogenic features associated with saprolitization and formation of well-drained regoliths, (2) electron microprobe analysis to identify specific weathered and new mineral phases, and (3) geochemical mass-balance techniques to characterize elemental gains and losses of major and minor elements, relative to the inferred parent materials. Pedogenic evidence of paleoweathering includes clay illuviation, sepic-plasmic fabrics, redoximorphic features, dissolution and alteration of feldspars and mafic minerals to kaolinite, gibbsite and Fe-oxides, as well as geochemical evidence, such as whole-rock losses of Na, Ca, Mg, Si, Sr, Fe, and Mn greater than in modern profiles. Evidence for diagenesis includes net additions of K determined through geochemical mass-balance, K-feldspar overgrowths in overlying sandstone sections, and feldspars with reaction rims in weathered basement.

48 LACCOLITHS OF THE MUSQUIZ CANYON AREA, DAVIS MOUNTAINS, TEXAS.

Don F. Parker, Department of Geology, Baylor University, Waco, TX.

Over 50 hypabyssal intrusions are exposed within the Davis Mountains volcanic field; these range in composition from basalt to trachyte to peralkaline rhyolite, nepheline trachyte and phonolite, and mostly occur in a northwest to southeast zone that is the central section of a 400-km-long belt of alkalic intrusions stretching from the New Mexico southeastward across Trans-Pecos Texas into Coahuila, Mexico. Six major silicic laccoliths and sills occur in the Musquiz Canyon area; these were emplaced at two major bedded tuff horizons: large laccoliths (3-4 km diameter) at the base of the volcanic section and smaller laccoliths (~1.5 km diameter) and sills higher in the volcanic section. The laccoliths vary from a nearly symmetrical dome (Barillos) to trapdoor (Pollard). They are mostly silicic trachyte to rhyolite in composition, although one (Barillos) has a composite core

with an early rhyolite sill domed by younger trachyandesite. Calculations using the G.K. Gilbert model for laccolith formation indicate that the larger intrusions were emplaced at a depth of 750 m, roughly the total thickness of the preserved volcanic section. The Musquiz Canyon intrusions and the larger belt of which they are a part may reflect the near-surface expression of a deep-seated mafic dike associated with early (~35 Ma) development of the Rio Grande Rift in Trans-Pecos Texas.

67 STATISTICAL ANALYSIS OF PHYSICAL CHARACTERISTICS OF LOWER PERMIAN SPIRALED HETEROPOLAR BROMALITES FROM ARCHER COUNTY TEXAS.

Christen Shelton*, Michael M. Shipley, Chris Hansen, and Pamela Buzas-Stephens, Midwestern State University, Wichita Falls, TX.

Lower Permian vertebrate remains from both terrestrial and aquatic organisms have been collected from Archer County, Texas for over a century. This includes shark cartilage and spiral bromalites, produced by the freshwater shark, *Orthacanthus*. Physical characteristics (length, width, height, mass, eccentricity volume, and density) were measured and recorded for 300 spiral bromalites and compared by linear regression analysis. The length to width ratio of these spiral bromalites averaged 2.2:1. The specimens had an average length of 31.74 mm; a width of 14.43 mm; a height of 10.51 mm, and a mass of 7.971 g. Eccentricity, the degree of flatness, was between 0.9399-0.0602. In addition to the statistical collection a new formula has been proposed to help measure the volume of these elliptical fossils as an alternative to measuring volume by water displacement.

106 MACRO- AND MICROTTECTONIC FEATURES IN THE BURRO MOUNTAINS, SW NEW MEXICO, AND THEIR IMPLICATION FOR EVOLUTION OF SOUTHERN LAURENTIA: PRELIMINARY RESULTS.

Manetta Dillingham* and C. A. Barker, Stephen F. Austin State University, Nacogdoches, TX.

The Burro Mountains of SW New Mexico are a complex association of mostly Precambrian metasedimentary and granitic rocks intruded and partially buried by Tertiary volcanics. Precambrian supracrustal rocks are part of the Bullard Peak Series of Hewitt (1959) and the larger intrusions are part of the Burro Mountain batholith. Interpretation of the tectonic history is complicated by high grade metamorphism, abundant faulting and lack of consistent stratigraphy. Reconnaissance mapping and oriented sample collection in the Wind Mountain quad, 10 km NW of the Tyrone porphyry Cu mine, revealed areas of Proterozoic amphibolites, schists and gneisses that are weakly to strongly mylonitic, occasionally migmatitic, and locally cut by mineralized, brecciated brittle faults. Several prospect pits are located along breccia and gossan zones. Sense of shear indicators, primarily sigma-wings in augen gneiss, and S-C fabrics in gneisses and schists, were noted. Oriented thin-sections will be analyzed for microtectonic shear indicators and mineralogy. Metamorphic foliation in the area trends primarily NE and is locally crenulated. The combination of early ductile shearing with subsequent crenulation, brittle faulting and mineralization indicates a complex tectonic history for the region, probably associated with the growth of southern Laurentia by accretion of exotic terranes during the Precambrian, followed by multiple episodes of tectonic activity during the Phanerozoic.

109 WEATHERING AND SLOPE STABILITY OF GRAVE MARKERS IN FIVE CEMETERIES IN CENTRAL TEXAS.

R. LaRell Nielson*, Chris A. Barker, Patricia S. Sharp, Melinda Shaw, and Wesley A. Brown, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX.

Grave markers in five cemeteries in a North-South traverse across the Llano Uplift in central Texas were studied to assess possible differences in weathering and displacement patterns. Grave markers in Fredericksburg, Oxford, Llano, Babyhead and San Saba cemeteries in central Texas were studied. Processes found to be effecting the headstones are chemical weathering of limestone markers producing meringue weathering surfaces, dissolution pits, and often obliterated engraved lettering. Spheroidal weathering has rounded the corners of tombstones. Plant roots have tilted grave markers. Lichens on older markers accelerated weathering and destroyed the marker surfaces. Antique iron fences around graves are deeply oxidized. Creep has tilted many headstones and has contributed to the fracturing of some, particularly the tall, thin markers. Dominant creep direction was down slope and affected many of the headstones. Shrink-swell clays in the soil also resulted in the tilting of the graver markers. Polygonal cracks (desiccation cracks) in concrete tombstones were noted. Rock type plays a significant role in the longevity of headstones in these cemeteries. Grave markers of limestone are most deeply weathered, followed by cement and then marble. Gneiss and granite markers are the least weathered, and polished surfaces are less weathered than rough surfaces. The relative resistance to weathering of granite versus limestone, and the general pattern of weathering of tombstones, was the same in a North-South traverse across the Llano Uplift. Weathering patterns in an East-West direction will be examined in future studies.

- 139 PALEONTOLOGIC RECOGNITION OF THE *OS CORDIS*.
Jeri Rodgers, University of Texas at Austin, Austin, TX.

The *os cordis* is a heterotopic endochondral bone that has been well-recognized by meat processors, but is apparently known to only a few anatomists. It has never been reported in the fossil record. It is situated within the fibrous trigone between the aortic valve and the right ventricle. It is known to occur in Artiodactyla (within Bovidae and Cervidae), and Carnivora (within Mustelidae), and was reported in the Proboscidea by Galen in A.D. 177 (although a modern account of its occurrence has not been given). The primary reason for its absence in most collections may be that recent specimens are gutted (including the heart) before processing for comparative skeletal collections. After the paleontology group at the University of Texas, Austin assembled the largest known comparative collection of this bone a visit to the Page Museum at the La Brea Tar Pits yielded no recognizable *ossa cordum*. Future recognition of this bone in the fossil record will depend on more complete comparative collections, education of paleontologists, and paleontologic identification of the bone *in situ*.

- 174 UNUSUAL PATTERNS OF FAULTING IN THE EASTERN MARGIN OF THE TEXAS LINEAMENT, BIG BEND NATIONAL PARK.
Joseph I. Satterfield* and Jonathan E. Dyess, Angelo State University, San Angelo, TX.

Our 1:12,000 – scale geologic map of a twenty-five km² area in Sierra del Carmen, within northern Big Bend National Park, contains curved high-angle normal faults, some active, that cross-cut large-displacement thrust faults. This fault arrangement differs from published regional patterns. The map area is in on the eastern margin of the Texas Lineament, a long-lived wrench fault zone that spans all of the Big Bend region and extends northwestward to El Paso. Regional Laramide faults include NW-striking thrust faults of the Chihuahua tectonic belt in the SW margin of the Texas Lineament and high-angle reverse faults, WNW-striking left-lateral strike-slip faults, and thrust faults in the NE margin. Regional Basin and Range faults in the Texas Lineament are primarily NNW-striking high-angle normal faults that terminate at five or six coeval E-W fault zones. In Sierra del Carmen, WNW-striking right-lateral strike-slip faults cross-cut normal faults. Known active faults are concentrated along the Rio Grande River, the western margin of the Texas Lineament. Laramide and Basin and Range faults are interpreted to be parts of a flower structure produced by transpression and later transtension. However, in the map area east-dipping thrust faults accommodated large displacements. High-angle faults curve from N-S to NW. Kinematic indicators on high-angle faults recorded a single episode of NE-SW extension. Four normal faults apparently cross-cut Quaternary units. These unusual patterns may indicate wrench fault displacements are partitioned by widely separated dip-slip and strike-slip faults or that the flower structure model does not fit parts of the Texas Lineament.

- 178 CONTRIBUTION OF CADMIUM FROM LIGNITE IN THE YEGUA FORMATION, ANGELINA COUNTY, TEXAS.
Marcy Stonecipher*, Stephen F. Austin State University, Nacogdoches, TX, Glen Collier, Hydrex Environmental, Inc., and Ernest and R. LaRell Nielson, Stephen F. Austin State University, TX.

Lignite beds are a source of heavy metals, rare earth elements, and other trace metals. During deposition, lignite is an effective filter for these elements. At the Angelina County Waste Management Center lignite beds in the Eocene Yegua Formation contain Cadmium concentrations from 0.54 to 1.8 ppm. When environmental conditions change due to weathering, metals present in the lignite may be released. Changes include the introduction of dissolved oxygen which causes the oxidation of organic matter and sulfides, which then lowers the pH. In the study area, groundwater tested from 3 out of 8 monitoring wells consistently show concentrations of cadmium that are above the maximum contaminant level of 5 ppb. At the present time, much of the Yegua lignite is still in the subsurface, but excavation introduces oxygen to the ground water. Factors such as a low selectivity coefficient for cadmium, poor competition with other metals, and high mobility explain why cadmium levels are consistently high. There is no indication of an anthropogenic source.

- 217 THE *CORBULA* BED AND *SALENIA TEXANA* ZONE: DEFINING AN INTERVAL BETWEEN THE LOWER AND UPPER GLEN ROSE FORMATION BASED ON FAUNAL ANALYSIS AND DIGITAL DATA FROM CANYON LAKE, TEXAS.
Rebecca Comeaux*, Elizabeth Dunn, Christian George, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, Austin, TX, Ann Molineux, Texas Natural Science Center, Austin, TX, and William Ward, University of New Orleans, New Orleans, LA.

Heavy rainfall in 2002 caused Canyon Lake in Comal County, Texas, to overflow its spillway and carve a massive 60m (197ft) thick and 1350m (4430ft) long gorge, exposing an extensive section of the Cretaceous Glen Rose Formation. Prior to the

flood this entire area was mapped as the Upper Glen Rose Formation, however the gorge exposed the *Corbula* bed, which is a well-known marker bed between the upper and lower units. In addition to the *Corbula* bed, the *Salenia texana* zone is broadly exposed. The unweathered section of the latter classic marker horizon provides an unparalleled view of its entire vertical extent across the 50m (164ft) width of the canyon in this area. Faunal diversity in the *Salenia* Zone is extensive and essential in paleoenvironmental analysis of the Lower Glen Rose Formation. The contact between the Upper and Lower Glen Rose Formation was mapped utilizing GPS field data, topology, aerial photographs and LIDAR images. A Tablet PC running ArcPad software enabled capture of points from an integrated GPS unit, allowing data entry directly from the field. Point data included information on lithology, fauna, and location to be integrated into the digital map of the spillway area. The accuracy and ease of electronic data collection may have important applications for future digital mapping.

222 DIGITAL METHODS IN FIELD GEOLOGY: A CASE STUDY AT CANYON LAKE SPILLWAY, COMAL COUNTY, TEXAS.

Christian O. George*, Rebecca Comeaux, Elizabeth Dunn, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, and Ann Molineux, Texas Natural Science Center, The University of Texas at Austin, Austin, TX.

The 2002 flood of the Canyon Lake spillway in Comal County, Texas exposed a long section of the Cretaceous Glen Rose Formation. This was the first exposure of the Lower Glen Rose Formation in this area. This new example of classic marker horizons, such as the *Corbula* bed and the *Salenia* zone, presented an important opportunity to re-examine the biostratigraphy of this interval. To maximize our research we used several new digital tools in our fieldwork. This included a digital mapping tablet with integrated GPS receiver, preloaded with mapping software, digital topographic and geological datasets, and electronic data-entry forms. We also used a separate hand held GPS unit to link geographic information with digital images taken of the field area. Digital data collection allowed for unprecedented accuracy in specimen collection and mapping, and should prove to be a valuable technique in field geology.

226 INVERTEBRATES IN VERTEBRATES: A STUDY IN VERTEBRATE TAPHONOMY UTILIZING COMPUTED TOMOGRAPHY (CT).

Eric G. Ekdale*, Matthew W. Colbert, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, and Allan A. Ekdale, Department of Geology and Geophysics, University of Utah.

Vertebrate paleontology extends well beyond the examination of bones and teeth alone. Careful examination of matrix surrounding fossils gives us information on depositional settings, and on its post-depositional modifications, but matrix from within a bony cavity also can be informative. Once an animal dies and decomposes, the spaces within its skeleton, be they sinuses within a bone, or body cavities such as the rib cage, commonly are filled with sediment. Sedimentary structures, such as cross bedding, often are preserved within vertebrate skulls. Subsequently, this sediment infilling can be inhabited by invertebrate organisms, and preserve traces of their activity in the form of burrows. High resolution computed tomography (CT) of vertebrate skulls allows visualization of rich endocranial ichnofaunas without damaging the host fossils. The CT data of the preserved burrows and other sedimentary structures lets us determine and describe the post-depositional history of the animal remains. The cavities are confined spaces, and the morphologies of trace fossils within the vertebrate fossils often deviate from their expected form. Examples of this type of approach include three dimensional CT imagery of a fossil monkey (Miocene of Argentina), horse (Miocene of Nebraska), and sea turtle (Cretaceous of Alberta).

P59 EFFECTS OF ENGINEERING STRUCTURES ON A NATURAL LONGSHORE-CURRENT SYSTEM, BOLIVAR PENINSULA, TEXAS.

Angelique M. Forgas*, Donald E. Owen, Lamar University, Beaumont, TX.

Two engineering structures have affected the longshore-current system on Bolivar Peninsula east of Galveston: North Jetty and Rollover Pass. North Jetty was completed in 1894 and Rollover Pass in 1955. Prior to 1894, a significant part of the peninsula extended into Bolivar Pass, and the SW end of Bolivar Peninsula was experiencing an accretion rate of 3.4 m/yr, due to SW longshore drift along the peninsula according to Paine and Morton(1986). After construction of North Jetty, accretion rates of Bolivar Peninsula slowed considerably as sediment was forced to accumulate NE of North Jetty.

Construction of Rollover Pass altered the movement of sediment along the peninsula by diverting sand from the longshore system into Rollover Bay. Natural levees are being built in Rollover Bay from the diverted sediment. Rates of erosion along Bolivar Peninsula have been calculated from 1882-1982, using points along the peninsula from Sabine Pass to Bolivar Roads. The total area of erosion above sea level along Bolivar Peninsula was calculated to be 6005.5 m²/yr; the total area of accretion near the SW end was calculated to be 3564.2 m²/yr. Rates of beach erosion and accretion are being affected by sediment that is being lost from the longshore-transport system.

- P113 REVIVING THE TRADITION OF SOUTHWESTERN ASSOCIATION OF STUDENT GEOLOGICAL SOCIETIES (SASGS) FIELD TRIPS. James Westgate, Richard Ashmore, Donald Owen, Lamar University, Beaumont, TX.

The Southwestern Association of Student Geological Societies began a long-standing tradition of student-run and faculty-assisted geology field trips in 1960. University Geology clubs from Texas, Arkansas and Louisiana were invited to participate in these trips with the spirit of we'll show you ours, if you'll show us your geologic field areas of local expertise. Baylor University hosted the first SASGS trip. Subsequently, one Louisiana, three Arkansas and 16 Texas university geology clubs hosted 49 field trips. The last trip was sponsored by Baylor University in 2000. It is significant to note that Baylor University, the host of the 2007 Texas Academy of Sciences meeting, was one of the primary supporters of the SASGS field trip tradition during its reign of 40 years. Students and faculty benefited from great hands-on geologic experiences across a three state area. As part of the experience, student field trip planners learned the art of field logistics as they wrote guidebooks and made scholarly presentations to large groups of geologists. The Department of Earth and Space Sciences at Lamar University is inviting Geoscience departments across the state of Texas to help us revive the tradition of SASGS field experiences for the current generation of geology students. The growing enrollment of geoscience majors attests to the increasing interest in our discipline. Local universities know their local geology and how and where to see it better than anyone. SASGS is not just for the 20th Century anymore.

- P165 CAUSES OF TWO PHASES OF FOLDS IN THE DEVILS DEN AREA, BIG BEND NATIONAL PARK. Jonathan E. Dyess* and Joseph I. Satterfield, Angelo State University, San Angelo, TX.

The purpose of this project is to test models explaining causes of map-scale and outcrop-scale folds in the southern Rocky Mountains. Models include: forceful pluton emplacement, differential compaction, drag folding, tectonic plate convergence, and transpressional and transtensional plate interactions. To test models I made a 1:8,000 – scale geologic map of a fifteen km² area within Sierra del Carmen in the northern part of Big Bend National Park. I also measured and/or calculated axial planes, fold axes, half-wavelengths, and interlimb angles of folds. The map shows eight Cretaceous map units, three Cenozoic map units, and two deformation phases. D₁ folds have steep to subvertical, NNW-striking axial planes, subhorizontal fold axes, rounded hinges, half-wavelengths ranging from five cm to 0.5 km, and interlimb angles that average 93°. D₁ folds have similar orientations to folds measured at Muskog Spring and at Mariscal Mountain 60 km to the south. D₂ folds have subvertical, NW-striking axial planes, subhorizontal fold axes, rounded hinges, half-wavelengths ranging from 30 cm to 140 m, and an average interlimb angle of 122°. This sequence of events best fits the data: 1) NNW-striking map-scale and outcrop-scale D₁ folds deformed Cretaceous map units, 2) NW-striking D₁ thrust faults cross-cut first-phase map-scale folds, 3) Tertiary plutons intruded, 4) D₂ normal faults crosscut thrust faults, first-phase folds, and older Quaternary sediments. D₂ folds formed at the same time. Data suggest D₁ thrust faults and folds were caused by Laramide plate convergence, while D₂ normal faults and folds were caused by Basin and Range extension.

- P184 THE GEOCHEMISTRY OF BERYL AND ITS IMPLICATION FOR THE CLASSIFICATION OF GRANITIC PEGMATITES. Ana Collins*, Jackson School of Geosciences, University of Texas at Austin, Austin, TX, and Michael Wise, Department of Mineral Sciences, Smithsonian Institution, Washington, DC.

XRF and microprobe analysis were used in the search for geochemical signatures in beryl that would be diagnostic for the two different pegmatite types: LCT and NYF. Due to geochemical overlap, the classification of pegmatites cannot be based on mineralogy alone. Analysis of beryls from different pegmatite localities has revealed that there are distinct geochemical trends in beryls from LCT pegmatites versus NYF pegmatites. These trends may suggest differences in pegmatite differentiation and may aid in the classification of pegmatites and their relation to source granites.

MATHEMATICS

- 41 GENERALIZATION OF THE PASCAL MATRICES TO RECTANGULAR MATRICES. Johanna Ramirez, Texas Lutheran University, Seguin, TX.

Analysis of the properties of the Pascal matrices was done in order to determine if they apply to rectangular matrices.

- 54 DENSITY FUNCTION ESTIMATION USING A KERNEL ESTIMATOR BASED ON TRANSFORMED DATA.
E. D. McCune*, Department of Mathematics and Statistics, Stephen F. Austin State University, Nacogdoches, TX, and Sandra L. McCune, Department of Elementary Education, Stephen F. Austin State University, Nacogdoches, TX.

A new kernel estimator, based on transformed data, of a density function will be introduced. Results of computer simulations used to estimate bias reduction and asymptotic properties of the new estimator will be presented.

- 57 ANALYTIC APPROACH TO POLYGONAL AREA.
Elsie M. Campbell* and Dionne T. Bailey*, Angelo State University, San Angelo, TX.

The area of polygons can be computed analytically using the Cartesian coordinate system in a trivial way that is justified by the use of vectors and cross products. Collegiate-level mathematics can be reduced to an elementary algorithm which can be applied at the upper elementary school level. The algorithm will be verified and some applications of area will be considered.

SCIENCE EDUCATION

- 7 MEASURING ATTITUDES TOWARD STATISTICS IN BUSINESS STUDENTS.
Yeong Nain Chi, Rafael Otero, and Robert Rivera*, The University of Texas at Brownsville, Brownsville, TX.

Attitudes toward statistics would be one of critical factors influencing college students' motivation to enhance their learning experience, especially for business students in introductory statistics courses. The purpose of this study is to understand business students' attitudes toward statistics that enrolled in an introductory statistics course, only BUSIU 2341, at the University of Texas at Brownsville during the fall semester 2006, measured on a seven-point Likert-type scale based on the Survey of Attitudes Toward Statistics (SATS). The SATS survey is chosen because the subscales on the survey represent important attitudes that are related to student achievement. Also, this survey has been used in previous research and its reliability and validity indices have been empirically documented. Results showed that respondents held positive attitudes on the Affect, Cognitive Competence, and Value components, but held negative attitudes on the Difficulty component. Principal component analysis revealed the selected items could be condensed into four dimensions: "difficulty", "value", "interest", and "discipline". Statistical analysis indicated that correlations between the items were sufficient and that the reliability of the solution was satisfactory. Empirical results also found that gender, current academic status, previous mathematics background, experience with computer and statistics, expectation and confidence with statistics performance were the variables of interest in this study. Results of this study provided insight into the understandings of business students' attitudes toward statistics that can be used to frame scenarios for statistics education improvement purpose.

- 12 INTERNET-BASED ASTEROID SEARCH PROJECT FOR HIGH SCHOOL & COLLEGE STUDENTS.
J. Patrick Miller, Department of Mathematics, Hardin-Simmons University, Abilene, TX; Jeffrey W. Davis*, Honors Program, Hardin-Simmons University, Abilene, TX; Carlton R. Pennypacker, Hands-On Universe, Lawrence Berkeley National Laboratory; and Graeme L. White, Centre for Astronomy, James Cook University, Townsville, Australia.

Using professional deep-sky images along the ecliptic, students from five high schools searched for original discoveries of unknown asteroids. Four schools were in the United States (NC, UT, PA, VA) and the fifth in Poland. This pilot project was centered at Hardin-Simmons University (Abilene, TX), where the images were made available via the Internet. It was conducted in association with Hands-On Universe at the University of California, Berkeley. Images were provided by the Cerro Tololo Inter-American Observatory (Chile) and the Astronomical Research Institute (Charleston, IL).

- 116 THE PCHEM PROJECTS: PART 1 – RESEARCH OPPORTUNITIES IN THE PHYSICAL CHEMISTRY LABORATORY.
Alyx S. Frantzen*, Stephen F. Austin State University, Nacogdoches, TX.

Students enrolled in the second semester of physical chemistry at SFASU are required to design and carry out their own project. This involves the student writing a proposal that includes a project description, budget and a list of needed equipment. The students must work within these parameters and in a proscribed time period. At the end of the semester, each student presents a 20 minute oral presentation and a poster to the faculty as well as a formal paper presenting their results. Generally, the students individualize their experiments, utilizing techniques from thermodynamics and kinetics they learned

during the first semester of PChem. Although, they are given great latitude in designing their projects as long as the cost is kept within reason and the equipment is available. For many students who participate in the PChem Project, this is their first exposure to laboratory research. It introduces them to the thought and planning required in actually designing a research project. The design and results from several projects will be presented.

125 THE PCHEM PROJECTS: PART 2 – SLUMMING WITH THE BIOCHEMISTS.

Michele R. Harris* and Alyx S. Frantzen. Stephen F. Austin State University, Nacogdoches, TX.

Second semester physical chemistry students are required to design and carry out a short term research project. To emphasize the collaborative nature among the various areas in chemistry, students are encouraged to design projects that crossover into other areas of chemistry. One such collaborative research project with biochemistry investigated the activity and enzyme kinetics of two commercially available enzyme supplements, Rainbow Light® and Broad Spectrum®, which contained invertase and several other enzymes. The results demonstrated the enzyme supplements contained active invertase. The activity and kinetics of the enzyme supplements were compared to invertase that was purchased from Sigma Chemical Co.

250 EXEMPLARY SCIENCE TEACHING IN TAKS-TESTED SCIENCE CLASSROOMS.

Cherie A. McCollough, Texas A&M University – Corpus Christi, Corpus Christi, TX.

The current reform movement in education has two forces that appear contradictory in nature. The first is an emphasis on rigor and accountability that is assessed through high-stakes testing. The second is the recommendation to have student-centered approaches to teaching and learning. This mixed-methods research study investigated four exemplary urban high school science teachers in high-stakes (TAKS) tested science classrooms. Results from analysis of audio and/or videotaped classroom observations, teacher and student interviews and analysis of pre-/post-content tests and the Constructivist Learning Environment Survey (CLES) provided the main data sources. Results revealed that all participating teachers incorporated the elements How People Learn (HPL) theoretical framework (Bransford, Brown & Cocking, 2000) with significantly positive increases in student content knowledge. In addition, teachers exhibited similar strategies for managing tensions associated with HPL elements and high-stakes tests. For example, teachers used familiar analogies as relevant examples, incorporating prior knowledge. They used students' prior experiences and made them an integral part of the classroom content. Teachers established a climate of caring where students felt supported and motivated to learn while demonstrating mutual respect and negotiation strategies. Recommendations are provided including the increased development of student-centered curricula, using multiple test-criteria versus one single standardized test, and increased teacher training to assist in the creation of a climate of caring.

255 TEXAS SCIENCE EDUCATION SYMPOSIUM: THE T-STEM INITIATIVE: PREPARING STUDENTS FOR THE 21ST CENTURY WORKFORCE.
Kelvey Oeser, Texas High School Project

This session will provide an in-depth look into Texas' bold and forward-thinking new education program – the Texas Science, Technology, Engineering, and Math Initiative. The presentation will provide an overview of the rationale and goals of the initiative, a description of current grant programs and grantees, and information about upcoming grant opportunities.

256 TEXAS SCIENCE EDUCATION SYMPOSIUM: STAT SCIENCE TEKS REVISION COMMITTEE.

Kaycie* Sullivan, Texas Tech University Junction Outdoor School, Junction, TX and Kenn Heydrick, Science Teachers Association of Texas, Austin, TX.

Update on STAT science TEKS revision. Science Teachers Association of Texas (STAT) provided an online survey for all teachers to provide input on upcoming science TEKS revisions. This input will be provided to the State Board of Educators for possible use in developing new science TEKS. Hear how you can get involved in science education in the state of Texas.

257 TEXAS SCIENCE EDUCATION SYMPOSIUM: SYNERGIZING P-16 SCIENCE EDUCATION PARTNERSHIPS.

Carol Fletcher, Texas Regional Collaboratives for Excellence in Science Education, University of Texas at Austin, Austin, TX.

The TRC is an award-winning statewide network of P-16 partnerships that provide sustained and high intensity professional development to P-12 teachers of science across the state. This infrastructure of over 43 institutions of higher education col-

laborating with the Texas Education Agency, education service centers, school districts, and business partners, has a 15-year track record of designing and implementing exemplary science professional development. This presentation will address teacher and student data that demonstrates the success of the TRC and explain how teachers in your area can get involved.

- 258 TEXAS SCIENCE EDUCATION SYMPOSIUM: SCIENCE EDUCATION IN THE STATE OF TEXAS; UPCOMING CHANGES.
Irene Pickhardt, Texas Education Agency, Austin, TX.

Texas Science Update: A new year and new challenges! Rigor, Relevance and Accountability in science. Curriculum updates and new science expectations for high school students; getting students ready for college. TEKS, changes (4 years, IPC, etc.), updates, excitement and concerns in Texas Science Education.

- P26 CHEMISTRY CONNECTIONS: A NON-SCIENCE MAJORS COURSE UTILIZING A MODULAR APPROACH.
Kerry Bruns and Willis Weigand*, Southwestern University, Georgetown, TX.

Chemistry Connections is a new course offering for non-science majors. The course is designed so that topics are presented in a modular fashion, wherein each module is scheduled to last 3-4 weeks. Examples of modules are: basic chemistry, art and archeology, environmental chemistry, and geochemistry and natural resources. New laboratory exercises were developed for the course including an exercise using computer-controlled sensing devices to measure parameters of water quality (pH, conductivity, dissolved oxygen and turbidity). Field trips were planned for the art and archeology and geochemistry modules. Course design and instructor and student assessments will be presented.

- P65 MARSH MADNESS: A SCIENCE EDUCATION ADVENTURE FOCUSED ON WETLAND ENVIRONMENTS.
Robert D. Doyle, Melissa L. Mullins*, Baylor University, Waco, TX and Nora Y. Schell, City of Waco, Waco, TX.

The Center for Reservoir and Aquatic Systems Research (CRASR) at Baylor University and the City of Waco are developing an environmental education program (Marsh Madness) for public school students. Project funding is through a national GEAR UP grant, and the student cohort will participate from sixth through the twelfth grade. CRASR is a research and education partnership between Baylor University and the City of Waco, benefiting from multidisciplinary aquatic research occurring at Baylor and the City's applied aquatic management expertise. The program will utilize the recently constructed 174-acre Lake Waco Wetland and the associated Research and Education Center which houses classrooms, labs, and an interpretive visitors center. Project goals are to promote a land ethic among participating students and educators, to provide rigorous science content related to grade-appropriate targets, and to stimulate interest among students in a career in the environmental sciences by ongoing interactions with environmental professionals. A core program component will be Marsh Madness Days, half-day experiential learning visits to the wetland. Saturdays in the Swamp will be offered during the school year for in-depth teacher training.

SYSTEMATICS AND EVOLUTIONARY BIOLOGY

- 8 OBSERVATIONS ON *EXOPROSOPA ALBICOLLARIS* (DIPTERA: BOMBYLIIDAE): EMERGENCE AND BEHAVIOR IN A NEST AGGREGATION OF THE SAND WASP, *BEMBEVINUS NEGLECTUS* (HYMENOPTERA: CRABRONIDAE).
Michelle Richardson, St. Edward's University, Austin, TX.

Exoprosopa albicollaris is known to parasitize the sand wasp, *Bembecinus neglectus* (Hook and Palmer, unpubl.). In 2006, at Pedernales Falls State Park, and while studying mating behavior in this wasp I was able to obtain information on the behavior of this fly as both wasp and fly emerged in the study site. Fly pupae appeared at the surface between 0900 and 1130 hrs (CST) and very quickly eclosed from their pupal skin and almost immediately filled their wings. At times, male *B. neglectus* formed mating balls around these pupae, resulting in fly mortality. Upon eclosion the adult fly averaged 23 minutes ($n = 9$, $r = 6-46$ min) before leaving or moving from the emergence site. The flies generally do not move after eclosion unless disturbed by ants or male wasps. Fly behavior in the nesting aggregation will be reported and further a digital video will be shown exhibiting eclosion, attacks by ants and male wasps, as well as parasitism behavior.

- 18 OBSERVATIONS ON *PARATEMNOIDES NIDIFICATOR*, A SOCIAL PSEUDOSCORPION IN TRINIDAD, WEST INDIES.
Allan Hook, St. Edward's University, Austin, TX.

Pseudoscorpions (Arachnida: Pseudoscorpiones) are small, strictly solitary, predatory arachnids. However one species, *Paratemnoides elongatus* has been found to live in colonies and to forage cooperatively in Florida and Panama. *Paratemnoides nidificator* is known from Central and South America although its biology has not been reported. In Trinidad, we have been studying colonies of this social species that live in cracks, directly under a mercury vapor lamp. The lamp attracts insects at night that are then cooperatively captured and fed on by the pseudoscorpions. Information is provided on the types and abundances of arthropod prey, and on the movement of individuals between adjacent colonies. Attempts have been made to get these pseudoscorpions to accept artificial nests for observation and in order to obtain a male, which is necessary to be certain of species identification.

- 31 TALES FROM A UNIQUE MATING BEHAVIOR IN BUTTERFLIES.
Catalina Estrada* and Lawrence E. Gilbert. University of Texas at Austin, Austin, TX.

Mating behavior in butterfly males has evolved to maximize finding receptive virgin females, which have the highest reproductive value. One male strategy is to use emergence sites like the vicinity of larval host plants as searching locations. *Heliconius* butterflies exhibit an extreme example of this behavior, where males locate pupae and sit and wait on them, mating as females emerge. Using controlled experiments and chemical analysis we are studying cues used by *H. charitonia* males to find and recognize mates at this early stages of development. We have found that males visited more frequently food plants with larvae than plants alone or those holding other immature stages. Similarly, behaviors such as flying in front of the immature and searching plants and their surroundings were more common in plants with larval stages, suggesting perhaps that males recognize there the chance of present or future mating opportunities. Additional tests have also shown that males are likely using olfactory rather than only visual cues to locate plants and immatures, and to distinguish the sex of the pupa. If, as suggested by these behavioral tests, host plant are playing a major role in male mate-location in *Heliconius*, further research in the signals involved will help us to understand how a larval diet together with a mating system associated with that diet might have contributed to the host plant specialization, speciation, and the community dynamics within the genus.

- 34 TRADEOFFS ASSOCIATED WITH LEG REGENERATION IN STICK INSECTS (INSECTA: PHASMIDAE).
Tara L. Maginnis, St. Edward's University, 3001 South Congress Avenue, Austin, TX.

Phasmids are unusual among insects in that they regularly shed and regenerate legs lost to fouled molts or predation attempts. This process has profound consequences for these animals, and that the nature of leg regeneration tradeoffs differs among morphologies. In a wingless species, leg regeneration reduced fecundity. In a winged species, leg regeneration has no effect on fecundity. Instead, leg regeneration stunted wing growth and hindered flight performance. Furthermore, rates of leg regeneration are common in natural settings (~25% of animals), suggesting stick insects regularly experience these biologically relevant tradeoffs. Explicit consideration of the integrated nature of animal phenotypes, in this case the non-independence of developing traits such as legs and fecundity or legs and wings, can be used to explain evolutionary patterns in phasmids, and again reveals the cryptic role the developmental process can have on evolution.

- 35 LIGHT TRAP SURVEY OF THE FAMILY PSYCHODIDAE (DIPTERA) IN WICHITA FALLS, TEXAS.
James R. Todd, Roy C. Vogtsberger, and Michael M. Shipley, Midwestern State University, Wichita Falls, TX.

Moth flies are true flies (Diptera) in the family Psychodidae (subfamily Psychodinae) that live in moist environments and feed on decaying organic material. Moth flies were collected in light traps from May-September 2004 in rural, suburban, and urban settings in Wichita Falls, TX. They were identified by dissecting genitalia and arranging them dorsally for examination under a light microscope at 100X. The number of each moth fly species collected at each location was compared with temperature and precipitation. The following species and number collected were *Tinearia alternata* (Say) (80), *Tinearia lativentris* (Bérden) (62), *Psychoda pusilla* Tonnoir (40), *Psychoda thrinax* Quate (2), *Clogmia albipunctata* (Williston) (74), *Telmatoscopus superbus* (Banks) (2), *Paramormia furcata* (Kincaid) (59), *Australopericoma wirthi* (Quate) (43), *Brunettia nitida* (Banks) (1) and *Trichomyia nuda* (Dyar) (1). The greatest diversity of species was collected from the rural site. Temperature was more important than precipitation in correlating moth fly populations. Low wintertime average tempera-

tures (below 18 °C) suppress the population as a whole, while the intermediate average temperatures (18-27 °C) of spring and autumn favor the Psychodini species of *Tinearia alternata*, *Tinearia lativentris*, and *Psychoda pusilla*. Hot summertime average temperatures (27+ °C) favor *Clogmia albipunctata*, *Paramormia furcata*, and *Australopericoma wirthi*.

39 AUDITORY MORPHOLOGY OF THE HISPID COTTON RAT, *SIGMODON HISPIDUS*.

Craig I. White, The Geneva School, Winter Park, FL, and Kenneth T. Wilkins, Department of Biology, Baylor University, Waco, TX.

Sigmodon hispidus, the hispid cotton rat, is one of the most widespread species of mammals in North America. Accordingly, it also is one of the most intensively studied of these species. This species is the subject of hundreds of scientific papers and is mentioned in many more publications. Most research on this species pertains to its ecology, biogeography and systematics. Only a few papers examine aspects of the anatomy of this species. Until this project, none had investigated the anatomy of the ears of this species. This paper presents the first qualitative and quantitative description of external and middle-ear structures in *Sigmodon hispidus*. In a geographically-constrained sample of 30 individuals spanning much of the ontogenetic size range, we measured 11 features of the auditory bulla, the middle-ear ossicles, and the round window of the cochlea. We examined growth patterns and sexual dimorphism in these features.

61 EFFECTS OF ACUTE AND CHRONIC YOHIMBINE ON PACED MATING.

Lawrence Wampler*, Debra Hines, Julie Smith, Ricardo Castaneda, Margaret Wichman, Russell Frohardt, Fay Guarraci, St. Edward's University, Austin, TX.

The present study evaluated the effects of acute and chronic yohimbine administration on paced mating behavior in ovariectomized female rats. Yohimbine, a noradrenergic antagonist and mild stimulant, has been touted as a weight loss aid and an aphrodisiac. In Experiment 1, rats were tested for paced mating and general locomotive behavior following acute administration of yohimbine (i.p., 2 mg/kg). Rats in the yohimbine group spent more than twice the amount of time with the male than the control group during paced mating sessions, even though the sessions were half the length of time, on average. In Experiment 2 rats received chronic administration (6 days) of yohimbine or sterile water and were tested exactly as in Experiment 1. Yohimbine continued to result in significantly more time with the males relative to the control group. During Test 2 rats in the yohimbine group also showed significantly less proceptive behaviors (hops and ear wiggles) than the control group. Finally, in Experiment 3, rats received an additional seven days of yohimbine or water, and the yohimbine group continued to spend more time with the male, show lower rates of proceptive behaviors, and demonstrated an increase in locomotor activity relative to the control group. Although acute and chronic administration of yohimbine did not show significant effects on traditional measures of paced mating behavior at this dose (i.e., percentage of exits or contact return latencies), it did have a complex effect on other motivational measures of female sexual behavior.

73 DETAILS OF THE SKULL AND BRAINCASE OF *UROPELTIS WOODMASONI* (ALETHINOPHIDIA: UROPELTIDAE) AS REVEALED BY HIGH RESOLUTION COMPUTED TOMOGRAPHY.

Jennifer C. Olori, The University of Texas at Austin, Austin, TX.

High resolution computed tomography (CT) is a widely used tool for examining osteological features of fragile, rare, or small specimens. This technology was implemented to study the skull and braincase of *Uropeltis woodmasoni*, a tiny burrowing snake of the family Uropeltidae. The skull is tapered and pointed and exhibits a higher degree of temporal ossification than is found in other alethinophidian snakes. Nearly the entire occipital region, including the basioccipital, prootic, otooccipital, and supraoccipital, is fused with the parasphenoid to form a solid occipital complex. These features are most likely associated the fossorial habit of this species, and similar fusions are known in amphisbaenina squamates and gymnophionan amphibians. Relative to the overall size of the skull, the optic and otic regions are large, which is not expected in an animal that is thought to spend the majority of its life underground. These features may be related to miniaturization, which is also evidenced by loss of bones such as the supratemporal and post-orbital. In addition, *U. woodmasoni* exhibits a novel articulation between the braincase and quadrate and the quadrate and lower jaw that is not found in other snakes. In the ear region there is a relatively huge statolithic mass but no sign of a stapes other than a supposed footplate. Finally, the first endocast of any uropeltid or burrowing snake is described.

- 188 MORPHOLOGICAL VARIATION AND PHYLOGENETIC RELATIONSHIPS IN THE *CAIMAN CROCODILUS* COMPLEX (REPTILIA: ALLIGATORIDAE).
Jonathan R. Wagner, The University of Texas at Austin, Geol Science Dept. Austin, TX.

Uncertainty regarding the relationships of populations of the common caiman, *Caiman crocodilus*, has resulted in taxonomic instability and has hampered conservation planning. Many subspecies have been recognized, including *apaporiensis*, *chiapasius*, *crocodilus*, *fuscus*, and *yacare*. Of these, only *yacare* is widely accepted as valid, although some studies have supported distinction of *fuscus* (including *chiapasius*). Relationships among populations within the *Caiman crocodilus* complex were evaluated using new and previously published morphological data. Preliminary results indicate that there is substantial structure in the relationships of *Caiman crocodilus* populations, and the correspondence of this structure to geographical barriers suggests that a detailed phylogeny will be very informative with regard to the historical biogeography of the group. Analysis supports the distinction of *yacare* and *fuscus* relative to the other subspecies, and hints that *chiapasius* may be distinct from *fuscus*. At least two morphologically distinct populations appear to have been lumped into *Caiman crocodilus crocodilus*, a narrow-snouted Amazon form and a broader-snouted coastal group. The similarity of the latter to *yacare* and *fuscus* may explain the failure of previous statistical studies to support the distinctiveness of the latter. The limited molecular sequence data available for the group is congruent with these results. There is presently insufficient data to evaluate the distinctiveness of narrow-snouted *apaporiensis* relative to surrounding narrow-snouted *crocodilus*, nor to establish the relationships of populations inhabiting the Orinoco drainage. Further work will include gathering a broader morphological sample, including other extant and fossil caimans, and the generation of new molecular sequence data.

- 205 USE OF NUCLEAR INTRONS TO DETECT CONGRUENCE AMONG MITOCHONDRIAL AND MORPHOLOGICAL DATA SETS IN THE BONNETED BATS *EUMOPS GLAUCINUS* AND *EUMOPS FLORIDANUS* (CHIROPTERA: MOLOSSIDAE).
Molly M. McDonough* and Loren Ammerman, Angelo State University, San Angelo, TX.

Nuclear introns are not under the same selective pressures that are present in regions that do produce functional proteins; consequently introns acquire mutations at a faster rate. Because of this feature, the use of nuclear introns has been a constructive tool in the analysis of population level relationships among vertebrates. In this study, intron sequence variation was examined among and within 7 populations of the free-tailed bat *Eumops glaucinus* and its closest relative *E. floridanus* (Chiroptera: Molossidae). *Eumops glaucinus* is a species that exhibits population variation in morphology, karyotype, and mitochondrial DNA; therefore it is expected that this variation should be reflected in the nuclear DNA as well. The 3 nuclear introns amplified in this study include: myelin basic protein (MBP), glial fibrillary acidic protein (GFAP), and beta globin (BG). Sequences were aligned with Sequencher 4.6 software and analyzed in PAUP* version 4.0b10. Results indicate that the BG intron is not useful for detecting population difference in *Eumops* species. Results on the utility of MBP and GFAP introns for phylogenetic applications regarding molossid bats were also included.

- 219 ZOOGEOGRAPHICAL IMPLICATIONS OF RECENT RECORDS OF LAND SNAILS FROM NORTHERN COAHUILA, MEXICO.
Ned E. Strenth*, Department of Biology, Angelo State University, San Angelo, TX and Alfonso Correo-Sandoval, Laboratorio de Zoologia, Instituto Tecnológico de Cd. Victoria, Tamaulipas, Mexico.

The land snail fauna of the state of Coahuila in northern Mexico remains very poorly known and has historically received very little attention by professionals in this field of study. This appears particularly applicable to the large bend of northern Coahuila which lies just south of the Rio Grande and is bordered on the west by the Sierra el Carmen and Ciudad Acuna on the east. This region includes the northern slopes of the Sierra el Bonito range and the Canon el Colorado. Field studies conducted over the last ten years have resulted in a number of new state records. While most of these recent additions to the Coahuila state fauna are both relatively common and widespread species which are found in both Texas and Mexico, there are two species previously thought to be Texas endemics that are reported from outside their known range for the first time. One of these species, *Holospira goldfussi anacachensis*, is currently known only from five counties in southwestern Texas. The second species, *Euglandina singleyana*, is widespread in central Texas with a distribution extending to Val Verde and Terrell counties in the west. The presence of both of these species in this region of northern Coahuila appears supportive of a re-examination of proposals by 20th century malacologists relative to the isolation of the Texas fauna. Several zoogeographical models are proposed to account for these newly reported distributional ranges.

224 MOLECULAR IDENTIFICATION AND PHYLOGENY OF CRYPTIC AFRICAN SHREWS INFERRED FROM CYTOCHROME-B SEQUENCES.

Adam W. Ferguson* and Loren K. Ammerman, Angelo State University, San Angelo, TX.

Identification of small mammals is often difficult and sometimes not possible without viewing cranial or skeletal morphology. Certain species, such as members of the order Soricimorpha (shrews, moles, and allies) are often difficult to identify even with cranial and skeletal morphology. In inventories involving such species, known experts are often solicited to aid in identification. However, where closely related sibling species coexist, expert identification might not be sufficient enough for species recognition, proving problematic for inventories seeking to address biodiversity or species richness of a given area. African shrews of the subfamily Crocidurinae present a diverse shrew lineage with 150 species allocated to nine genera and are difficult to identify from morphology alone. As part of a mammalian biodiversity survey of the Shell Gabon Gamba Complex, Rabi Oilfield, Gabon, Africa, Texas Tech University biologists collected specimens and tissue samples from 90 shrews representing five putative genera in February and March 2002. The objective of this study was to use molecular techniques to analyze portions of the cytochrome-b gene from all 90 specimens to illustrate phylogenetic patterns and detect evolutionary cryptic species that might exist. Preliminary phylogenetic analyses indicate these shrews are not clustering by genus and that congruence between molecular identification and expert identification is high. The results of this study will provide a molecular validation of species identification based on morphology and a phylogenetic assessment of this complex group of African mammals.

248 THE PREVALENCE OF CESTODES IN RACCOONS (*PROCYON LOTOR*) FROM ARCHER AND WICHITA COUNTIES OF NORTH-CENTRAL TEXAS.

Samuel W. Kelly* and Norman Horner, Biology Department, Midwestern State University, Wichita Falls, TX.

Cestodes were collected and identified from 36 raccoons (*Procyon lotor*) in Archer and Wichita counties of Texas. Over a nine-month period, 2,327 cestodes were collected from the small intestine of the hosts. Raccoons displayed a 72.2% prevalence of total cestode species. Three different types of tapeworms were identified, including *Atriotaenia procyonis*, *Mesocestoides* spp., and immature species of Taeniidae. *A. procyonis* was the most prevalent taxon, being present in 58.8% of the males and 50% of the females. The number and species of cestodes were correlated against the sex, weight, location, age, season of capture, and incidence of other helminth infections of the hosts. Season of capture played a significant role in the total number and species of cestodes isolated from the host. A significant correlation was found between increasing host age and the number of cestodes present, as well as between cestode prevalence and intensity among differing raccoon age classes. Mixed infections of cestode species indicates that limited sympatry occurs among cestode species in raccoons. The seasonal difference in prevalence between *A. procyonis* and *Mesocestoides* spp. is probably due to their differing life-cycles and intermediate hosts, and demonstrates the seasonal shifting of foraging habits of *P. lotor* in north-central Texas.

P22 OCCURRENCE AND DISTRIBUTION OF GREGARINE PARASITES IN CENTRAL TEXAS DRAGONFLIES.

Jason L. Locklin* and Darrell S. Vodopich, Baylor University, Waco, TX.

Gregarines (Apicomplexa: Eugregarinorida) parasitize invertebrates, particularly annelids and arthropods. Many insect taxa are host to gregarine parasites but odonates and orthopterans are the most heavily infected. Once ingested, gregarines attach to the gut epithelium and reduce the host's ability to assimilate nutrients. Gregarines are usually non-lethal and, consequently, are poorly studied in odonate populations. Recent damselfly-gregarine studies, however, reveal broad infection-rate variation within damselfly populations and among species. The reported effects of high parasite loads in damselflies include reduced wing pigmentation intensity, modified behaviors associated with pre- and post-copulation activities, possible reduced longevity, and weakened resource-holding potential. In this preliminary study, we surveyed the gregarine parasite loads of common dragonfly species at two reservoirs in McLennan County, TX. Preliminary results indicate interspecific, intraspecific, and gender-specific variation in infection rates.

TERRESTRIAL ECOLOGY AND MANAGEMENT

38 REASSESSING A LIZARD SURVEY IN BIG BEND NATIONAL PARK.

Daniel J. Leavitt* and Christopher M. Ritzi, Department of Biology, Sul Ross State University, Alpine, TX.

A lizard survey conducted in Big Bend National Park, Brewster County, Texas from 1955 - 1960 then again in 1967 - 1969 was reinvestigated in the summers of 2005 and 2006. Using the original study quadrats and methods established by Degenhardt (1960), lizard/acre index, percent vegetative cover, and vegetative composition were compared to previous survey years. Based upon results of the first field season, a dietary overlap analysis upon the two most dominant lizards (*Aspidoscelis marmorata* and *A. septemvittata*) was added to assess competition between the two species. In order to compliment the dietary invertebrate component, we introduced a method of assessing abundance of termites (Isoptera) to add to this survey. Finally, we compare lizard/acre numbers to rainfall totals for all years of operation using datasets from historical and current surveys. Overall, there has been an increase in vegetative cover which has both negatively and positively affected lizard/acre indices.

52 ASSESSMENT OF WOODLAND BOUNDARY SHIFTS WITHIN BALCONES CANYONLANDS NATIONAL WILDLIFE REFUGE.

Darrel B. Murray* and Joseph D. White, Baylor University, Waco, TX.

Edges of woodlands are characterized as sharp to diffuse depending on the vegetation structure and can shift location over time due to many factors. Both natural and anthropogenic factors influence woodland edges, including topographic relief, incidence of fire and other disturbances, disease, climatic influences, animal use, and manual manipulation by humans. Mixed hardwood and Ashe juniper woodlands of the Balcones Canyonlands National Wildlife Refuge (BCNWR) provide critical habitat for the endangered Golden-cheeked Warbler. Habitat within the refuge is finite and assessing forest boundary shifts within the refuge is important for decisions regarding habitat management. Beginning in 1997, the refuge began juniper removal and prescribed burning to restore native grassland areas and reduce fuel loads to protect woodlands from catastrophic wildfires. Over time, changes in woodland edges due to these historic natural and anthropogenic factors have been documented. These changes can be quantified with the following parameters: edge geographic location, tree density, and tree species composition. These parameters have been used to assess historical shifts in woodland boundaries and more recent changes due to prescribed burning. Historical analysis using digitized aerial photographs taken in 1951 and 1980, along with more recent DOQ imagery from 1995 and 2004, indicate a shifting woodland boundary with a general trend toward the presence of more diffuse boundaries.

101 DOMINANCE AND FLOCKING BEHAVIOR IN WINTERING NORTHERN CARDINALS (*CARDINALIS CARDINALIS*).

Sheena K. Humbird* and Diane L.H. Neudorf, Sam Houston State University, Huntsville, TX.

We observed flocks of wintering Northern Cardinals (*Cardinalis cardinalis*) to determine the effects of temperature and time of season on flock size. We predict that flock sizes should increase when temperatures decrease because of the need for safety in numbers. A significant correlation was found between flock size and temperature indicating that Northern Cardinals exhibit safety in numbers. No correlation was found between season and flock size indicating that temperature is the key component in determining the size of flocks. The second hypothesis that we tested was that as flock size increases the number of aggressive encounters should also increase. This hypothesis predicts that the more individuals found in a small area around a feeder should result in the occurrence of higher numbers of aggressive interactions. The second hypothesis was rejected since no correlation was found between flock size and number of interactions. One possible reason could be that larger flocks form during colder temperatures which means that all of the individuals were attempting to gain the resources that they need and do not have time to spend on aggression. A positive correlation was found between the number of interactions and season which might be explained by the approach of the breeding season.

105 MODELING CENTRAL TEXAS FORESTS FOR FIRE HAZARD PREDICTION.

Mary A. Sides* and Joseph D. White, Department of Biology, Baylor University, Waco, TX.

Broad-scale estimation of relative leaf water content is important for fire management as a predictor of crown fire hazard. Mature central Texas forests are dominated by Ashe's juniper (*Juniperus ashei*) with a mixture of hardwood species (e.g. *Ulmus crassifolia*, *Quercus virginiana* var. *fusiformis*, *Q. buckleyi*), that provide critical habitat for endangered species such as

the golden-cheeked warbler (*Dendroica chrysoparia*). Because the juniper canopies are more likely to burn if their relative leaf water content is less than 60 percent, it is important to understand the factors that drive carbon and water fluxes for this species. In a representative central Texas forest stand near Waco, Texas, we have collected data on carbon and water budgets to calibrate the BIOME-BGC model. These data include annual leaf and stem biomass increments measured through repeated LAI-2000 measurements and band dendrometers, respectively. Water use data include hourly sap flux measurements from Granier probes, soil/leaf moisture measurements, and leaf water potentials. As the BGC model only predicts leaf water potential, field measurements of combined relative leaf water content and water potential were utilized to develop species specific relationships. Field measurements indicate that further calibration of the BIOME-BGC model will be necessary before this model will be a good predictor of carbon and water fluxes and leaf water potential for the subtropical forests of central Texas.

136 EFFECT OF THREE SOIL TYPES ON SEEDLING GROWTH OF *ZEА MAYS*.

Lauren Field*, Erika Muzljakovich, Matt Kerns and Herbert D. Grover. Department of Biology, Hardin-Simmons University, Abilene, TX.

In the spring of 2006 Hardin-Simmons University's Advanced Botany class performed a greenhouse experiment to determine the effects of three different soils on the growth of *Zea mays* (corn). The soils were excavated from a farm in southern Taylor County, Texas where soils in the Hamby, Vernon, and Rotan series occur within a quarter mile radius. The Hamby soils collected for our study were fine sandy loams with a pH in the surface horizon of 6.9. The Vernon soils collected (pH 8.4) were mostly clay with a high percentage of calcium carbonate. The Rotan soils (pH 8.2) were a clay loam that had been fertilized in previous years for agricultural use. Corn seedlings were grown in separate pots containing each of the individual soil types and in pots containing two-way and three-way mixtures consisting of equal proportions of the respective soil types. Total seedling mass was significantly greater for corn grown in pure Rotan soils compared to the Vernon or Hamby soils, largely due to increased shoot growth. Shoot mass was significantly greater for seedlings grown in Rotan soils compared to the other two soil types and was also significantly greater in Rotan soils compared to seedlings grown in either of the two-way soil mixtures containing Hamby soils. Soil chemical analyses confirmed that the nutrient status of the Rotan soils was more favorable for corn growth compared to the Vernon or Hamby soils. The implications of our findings to a companion study using sterilized soils to determine the potential contribution of mycorrhizal fungi to the observed results will also be discussed.

137 EFFECT OF SOIL STERILIZATION ON *ZEА MAYS* SEEDLINGS GROWN IN THREE SOIL TYPES.

Matt Kerns*, Erika Muzljakovich, Lauren Field and Herbert Grover. Department of Biology, Hardin-Simmons University, Abilene, TX.

Vesicular-arbuscular mycorrhizal (VAM) fungi exist in mutualistic associations with many plant taxa, aiding associated plants with water and nutrient absorption while the plants supply the mycorrhizae with carbohydrates. Many authors have shown that the degree to which plant growth is improved by mycorrhizal associations varies depending on the kinds of VAM present in the soil, which is in turn a function of soil type and soil nutrient status. In our study we grew *Zea mays* (corn) seedlings under greenhouse conditions in soils from the Rotan, Hamby, and Vernon series differing in texture, nutrient status, and management history. Corn seedlings were grown in separate pots containing either sterilized or non-sterilized soils of each of the respective soil types, and in a complete series of three-way mixtures of soils consisting of a one-third fraction of a non-sterilized soil, and one-third fractions of each of the other two soils that were sterilized. Total seedling growth was significantly greater for corn grown in non-sterilized compared to sterilized Vernon and Rotan soils, but was significantly greater in sterilized compared to non-sterilized Hamby soils. In pots containing three-way mixtures of soils, total seedling growth was significantly greater whenever a non-sterilized soil fraction was present, regardless of which type of non-sterilized soil was present. Our results are consistent with other studies attributing similar patterns in soil-plant growth interactions to differences in VAM communities in the soil. Results of studies now underway to further understand the contribution of VAM to our results will also be discussed.

- 151 A FIELD TRIAL OF MORNING VERSUS EVENING DISTANCE SAMPLING OF WHITE-WINGED DOVES IN TEXAS.
Michael F. Small*, Brian L. Pierce, John T. Baccus, Department of Biology, Wildlife Ecology Program, Texas State University – San Marcos, San Marcos, TX and T. Wayne Schwertner, Texas Parks and Wildlife Department, Upland Game Bird Program, Mason, TX.

We compared morning versus evening density estimates for White-winged Doves on the Edwards' Plateau of Texas using DISTANCE sampling point count methodology. We used three trials, replicated temporally, consisting of an inexperienced individual making observations with a second person recording data, an experienced individual making observations with a second person recording data, and an experienced individual making observations and recording data. Encounter rates and density estimates were similar for each morning and evening sampling period. Our results suggest the strict standardization of diel sampling period frequently used to reduce variation in population indices may be unnecessary to achieve accurate estimates of density for this species. Advantages of these findings include a doubling of daily sampling time and potentially greater convenience for surveyors. This combination of benefits should increase sample size, and subsequent power, for density estimates of this species.

- 152 SEXUAL SEGREGATION AND COMMUNITY COMPOSITION: A SEASONAL PERSPECTIVE ON THE BATS OF THE CHISOS MOUNTAINS, BIG BEND NATIONAL PARK.
Carson M. Brown* and Loren K. Ammerman, Angelo State University, San Angelo, TX

Big Bend National Park (BBNP) has been surveyed extensively for bats. However, the majority of netting efforts have focused on the lowlands. The upper drainages (1770 to 2190 m) of the Chisos Mountains host a biotic community that is unique to BBNP. Referred to as the Moist Chisos Woodlands (MCW), this habitat is typified by an Arizona cypress/pine/oak association. Using traditional mist netting methods, the MCW habitat was surveyed for bats in spring, summer, and autumn. Inconsistent with accepted trends, this high elevation bat community was more species rich than communities of the surrounding lowlands. Consistent with other high elevation surveys, a strong male bias was observed. For nine of the thirteen species recorded, > 70% of all captures were male. For five of those nine species, only males were captured: *Antrozous pallidus* (n = 58), *Myotis thysanodes* (n = 37), and *Tadarida brasiliensis* (n = 17), *Myotis yumanensis* (n = 4), and *Lasiorycteris noctivagans* (n = 1). Interestingly, *Mormoops megalophylla*, which was absent in spring, was the second most abundant species in summer. Further, all *M. megalophylla* captured were females, the majority of which were lactating. Understanding the occurrence of reproductive female *M. megalophylla* at high elevations may provide insight into the understanding of sexual segregation in bats. Lastly, there were notable species specific differences in relative abundance and sex ratios between seasons. These seasonal changes in community structure demonstrate the importance of multi-season surveys in obtaining more complete demographic data, and ultimately, understanding the community ecology of bats.

- 166 ECTOPARASITES AND OTHER ECTOSYMBIOTIC ARTHROPODS OF SMALL MAMMALS IN WESTERN IOWA.
Jonathan J. Storm and Christopher M. Ritzi*, Department of Ecology and Organismal Biology, Indiana State University, Terre Haute, IN and Department of Biology, Sul Ross State University, Alpine, TX.

Ectoparasites have largely been overlooked as an aspect of mammalian natural history across the country. This is particularly true for states west of the Mississippi River. In Iowa, studies reporting mammalian ectoparasites have been limited to a handful of accounts, most of which only reported one or two species for a particular host. In an attempt to resolve this issue, a preliminary study was undertaken in western Iowa to examine samples of 12 species of small mammals in order to identify their ectoparasitic communities. This was undertaken by collecting hosts by a variety of means (snap trap and museum collections), and examining host carcasses before preparation as museum specimens. Hosts were subjected to ectoparasitic washes, and the resulting washes vacuum filtered onto filter paper. Filters were examined for ectoparasites under magnification, with observed specimens being recovered with fine forceps and slide mounted in PVA for identification. Parasite prevalence and abundance values will be presented, along with all new host and state and county host locality records for small mammals in Iowa.

- 193 POSSIBLE HISTORIC CHANGES IN RELATIVE USE OF NATURAL AND ANTHROPOGENIC ROOSTS BY THE MEXICAN FREE-TAILED BAT (*TADARIDA BRASILIENSIS*).
Anne E. Merchant* and Kenneth T. Wilkins, Baylor University, Waco, TX.

Mexican free-tailed bat populations have historically experienced declines in natural roosts because of physical and ecological disturbances such as guano mining, pesticide poisoning, and cave tours. The objective of this project is to evaluate the probable significance of anthropogenic structures in an ecological context for *T. brasiliensis*. Natural and anthropogenic roosts show seasonality with several anthropogenic roosts providing adequate winter roosting conditions. We relate our findings to human population growth, highway construction, and environmental factors. Archival records, including newspapers, journals and oral histories, naturalists' papers, county records, faunal surveys, and museum specimens were examined; local residents and officials were consulted; and data collection occurred at current roost sites—both natural and anthropogenic—throughout the research area to determine nature of use (nursery, bachelor, transient) and population structure. Anthropogenic sites were located within foraging distance of natural cave roosts. In addition, we have recorded *T. brasiliensis* over-wintering in at least two central Texas anthropogenic structures, and are currently collecting records that show *T. brasiliensis* numbers in anthropogenic sites in line with numbers of prospective roost sites. The majority of anthropogenic structures in our research area are not used as nursery sites although the majority of natural roosts do serve as shelter during pup-rearing. Interestingly, there are frequent exceptions to roost use patterns, which may be illuminated through further examination of influencing factors.

- 204 RESPONSES OF CAROLINA WREN NESTLINGS TO PARENTAL ALARM CALLS.
Guadalupe Quiroz* and Diane L. H. Neudorf. Sam Houston State University, Huntsville, TX.

Many bird species emit alarm calls that may function to warn mates or offspring about the presence of a predator. As a survival strategy, nestlings should be able to discriminate among parental alarm calls and other environmental sounds. Nestlings should respond to parental alarm calls by crouching or staying quiet. Begging during parental alarm calls may lead predators to the nest. In this study we presented 6-day old Carolina Wren (*Thryothorus ludovicianus*) nestlings with playbacks of two types of parental alarm calls and a control call (Carolina chickadee *Poecile carolinensis* alarm call) we found that nestlings begged to the parental alarm calls and the control alarm call. Developmental constraints may be responsible for the inability of nestlings to recognize alarm calls and stop begging upon hearing them.

- 207 PRELIMINARY ANALYSIS OF THE TASTY CHICK HYPOTHESIS AS IT APPLIES TO BROODS OF THE AMERICAN BARN SWALLOW (*HIRUNDO RUSTICA ERYTHROGASTER*).
Beverly L. Cochran*, Jeffrey G. Kopachena, and Frank Miskevich, Texas A&M University – Commerce, Commerce, TX.

The Tasty Chick Hypothesis proposes that ectoparasites preferentially feed on chicks with the lowest immunocompetence levels. In heavily infested nests, female birds may be able to manipulate nestling immunocompetence by employing hatching asynchrony and manipulating sex ratios. The female could therefore produce a nestling with lower immunocompetence. These "tasty chicks" would then serve as lures for ectoparasites, thereby relieving the remaining chicks of ectoparasite load. The Tasty Chick Hypothesis thus makes two predictions: 1) The last hatched chick should have poorer body condition, lower immunocompetence, and have sex ratios biased towards male, and 2) in heavily infested broods, the older chicks should have better body condition, higher levels of immunocompetence, and have sex ratios biased towards female. In 2006, we tested the predictions of the Tasty Chick Hypothesis in a colony of American Barn Swallows (*Hirundo rustica erythrogaster*), naturally infested with the hematophagous swallow bug (*Oeciacus vicarius*). We collected data from 70 chicks at 15 nests and determined body condition and hatching order. Further, we assessed chick immunocompetence with a phytohemagglutinin injection assay (PHA test) and quantified the results using the Wing Web Index (WWI). To determine sex ratios, we used polymerase chain reaction (PCR) to amplify sex-linked alleles using the avian P8/P2 primer set. Preliminary results will be presented and discussed.

- 215 DISTRIBUTION, ABUNDANCE, AND HABITAT AFFINITIES OF OKLAHOMA MUSKRATS (*ONDATRA ZIBETHICUS*): NEW INSIGHT FROM TRAPPER REPORTS.

Brandon McDonald, Department of Biology, Midwestern State University, Wichita Falls, TX.

Distributional records of the muskrat (*Ondatra zibethicus*) are missing for much of Oklahoma. In the spring of 2005, I further investigated the status of Oklahoma muskrats by collecting surveys from Oklahoma fur trappers and United States Department of Agriculture wildlife technicians (government trappers). Surveyed individuals were asked to give county locations of muskrat sightings/ collections, as well as habitats in which the sightings or collections occurred. I received a total of 93 completed surveys, which yielded 188 reports of muskrats occurring in 63 counties. Muskrats were most often reported in farm pond habitats and least reported in marsh habitats. Muskrats were most reported in areas with favorable combinations of human population density, annual mean precipitation, abundance of major river drainage systems, and percent cover of tall-grass prairie and forested land cover.

- 223 NEW COUNTY RECORDS OF OKLAHOMA SMALL MAMMALS BASED ON REMAINS IDENTIFIED IN OWL PELLETS.

Brandon K. McDonald*, Biology Department, Midwestern State University, Wichita Falls, TX, Paul W. Wilson, 10004 E., Collinsville, OK, William Caire, Biology Department, University of Central Oklahoma, Edmond, OK.

Small mammal distributions in Oklahoma have been based on collecting efforts over the past 100 years. Although past methods have provided information on species present, distributional records for many species have remained incomplete. In 1999, a collection of remains from over 70,000 owl pellets was donated to the University of Central Oklahoma. This collection represented collecting efforts across the state from 1976 to 1999. Mammal remains thought to represent new county records were examined and identified using keys, species descriptions, photographs, and reference specimens. New records for 16 species were determined.

- 228 SEASONAL VARIATION IN DUNE VEGETATION ON SOUTH PADRE ISLAND, TEXAS.

Frank W. Judd*, Robert I. Lonard, K. Rod Summy, Department of Biology, University of Texas – Pan American, Edinburg, TX and Ruben Mazariegos, Department of Physics and Geology, University of Texas – Pan American, Edinburg, TX.

The composition and pattern of vegetation on South Padre Island is relatively well known compared with other barrier islands of the Texas coast, but there is no information on seasonal variation. We compared species richness, species importance and total cover of vegetation in the backshore and primary dunes at a dune protection area and an unprotected site at four dates between May 2004 and April 2005. Species composition and species richness showed little seasonal variation, but richness was lowest in winter. Species richness was 5 to 7 times greater in the backshore of the dune protection zone than in the unprotected area. Total cover ranged from a low of 1.2 % in the backshore of the unprotected area to a high of 62.4 % in the backshore of the protected area. Total cover was significantly greater in October than in January in the backshore zone of the unprotected area. There was no significant seasonal variation in percent cover in the primary dune zone at either site. The most important species were relatively similar among seasons, but *Croton punctatus* (beach croton) replaced *Heterotheca subaxillaris* (camphor weed) as the dominant species in the primary dunes of the unprotected site in January 2005.

- 249 ECOLOGICAL CHARACTERISTICS OF A COLONIZING POPULATION OF EASTERN SCREECH OWLS (*OTUS ASIO*) IN SUBURBAN TEMPLE, TEXAS.

Cherie A. McCollough, Texas A&M University – Corpus Christi, Corpus Christi, TX.

A newly colonized population of eastern screech owls in Temple, Texas, was compared with an older, established population in Waco, Texas, to test the null hypothesis that the two populations are alike in structural and reproductive features. Screech owl nest box population data and environmental data were collected concurrently over four consecutive years in similar wooded habitat. Comparisons were made between sites and among years. The Temple study site's initial poor productivity was attributed to inexperienced yearling females, with increased productivity expected over time. However, productivity did not improve as the yearlings matured. Environmental analysis suggested that the Temple site's younger suburban neighborhoods and larger, wooded ravine were more representative of the Waco site's rural, rather than suburban environment. Lacking suburban advantages that enhance screech owl populations, the Temple study site population remained less productive, less dense and less stable than its Waco counterpart refuting the null hypothesis.

- P17 PARENTAL PROVISIONING RATES TO NESTLINGS IN THE GENETICALLY MONOGAMOUS CAROLINA WREN.
Mallory J. Brodrick-Christian* and Diane L.H. Neudorf, Department Biological Sciences, Sam Houston State University, Huntsville, TX.

In a monogamous mating system both parents typically contribute to the care of their offspring but their level of investment in care may differ. We tested the hypothesis that because Carolina Wrens (*Thryothorus ludovicianus*) are socially and genetically monogamous, males should provide at least equal care to the offspring in the form of feeding rates. The feeding rates of males and females were monitored in one-hour bouts for two consecutive breeding seasons at four nestling ages (1-3 days, 4-6 days, 7-9 days, and 10-12 days). The overall feeding rates of males and females differed significantly for two years combined: 39% of total feeds by females, 61% by males. Females increased their rate of feeding from earlier to later nest stages but male feeding rates stayed consistently high over the four nestling stages. Males sang significantly more after feeding nestlings when females were not present than when females were present at the nest. In conclusion, male Carolina Wrens invest heavily in offspring care as demonstrated by their feeding rates to nestlings.

- P27 A META-ANALYSIS OF THE EFFECTS OF RISING CO₂ LEVELS ON THE NUTRITIONAL CONTENT OF STAPLE CROPS.
Brian Miller*, Holly Allen and Daniel Taub, Southwestern University, Georgetown TX.

CO₂ levels are rising globally, and are expected to continue rising. Plants respond to increased CO₂ levels by an allocative shift in growth. However, little is known about how this may alter the nutritional content of staple crops. We conducted a statistics-based survey, or meta-analysis of research literature comparing staple crops grown in ambient and elevated CO₂ levels to determine if CO₂ levels affected nutritional content. Significant changes in protein content were observed in soybean (-1%), barley (-15%), rice (-10%), potato (-14%) and wheat (-10%). Significant differences in the ratio of ambient to elevated CO₂ protein between certain experimental setups were observed in wheat and soy, with Open-Top Chambers having the largest CO₂ effect. These observed differences indicate that different experimental setups may model real-world situations with differing degrees of accuracy. Significant effects of pot size were observed in certain species; increased pot size decreased the effect of elevated CO₂. This indicates that studies that use pots may suffer from experimental bias. These results indicate that rising CO₂ levels may reduce the nutritional levels of staple crops, possibly resulting in increased occurrences of malnutrition. Additionally, there may be a need to re-examine certain research methods for the possibility of artifacts.

- P33 THE EFFECTS OF SURFACE TEMPERATURE ON THE ACITIVITY PATTERNS OF *BEMBECINUS NEGLECTUS* (HYMENOPTERA: CRABRONIDAE: BEMBECINAE).
Cameron Siddens, St. Edward's University, Austin, TX.

Male *Bembecinus neglectus* exhibit scramble competition polygyny, whereby males emerge before females and patrol the emergence area, characteristically landing and crawling over the surface so as to intercept females as they emerge. This ground patrolling behavior takes place mainly in the morning hours, tending to cease as surface temperatures increased, beginning at temperatures around 26.6°C and stopping at temperatures up to 54.4°C. This research investigated whether air temperature, surface temperature or time of day influences male mating behavior, specifically in the emergence area. By comparing ground and air temperatures and time of day with male population counts a correlation was found between these two variables. The relationship between surface temperature and the actual time spent by males in contact with the substrate was also examined. There was a significant correlation between time spent on the ground by the males and surface temperature.

- P70 EFFECT OF DISTURBANCE, POSITION OF OBSERVER, AND MOONLIGHT ON ANURAN CALL SURVEY EFFICIENCY.
Jose R. Granda* Benjamin A. Pierce and Jessica Hua, Southwestern University, Georgetown, TX.

Frog call surveys are being used widely to determine the presence and densities of anurans, but little research has been done on the accuracy and efficiency of this methodology. Approach to the survey site potentially disturbs calling amphibians. This factor was examined in 230 roadside call surveys along 23 routes. On each route, five of the ten surveys were randomly chosen as 10-minute surveys, which were divided into two 5-minute intervals. There was no significant difference in the number of species heard in the second 5 minutes in comparison to the first 5 minutes of a 10-minute survey, nor a significant difference in the number of species heard when comparing 5-minute surveys and the second 5 minutes of 10-

minute surveys. Position of the observer, which may influence accuracy, was examined in 110 roadside call surveys along 11 routes. The position of the observers during the call surveys did not have a significant effect on the number of species heard. Significantly greater numbers of species called during low moonlight in comparison to high moonlight. These results suggest that observers need not wait before beginning anuran call surveys and they do not need to change positions during the surveys. To maximize the number of species detected, call surveys should be conducted under conditions of low moonlight.

P71 SALINITY TOLERANCE OF TADPOLES FROM CENTRAL TEXAS.

Jessica Hua,* Benjamin A. Pierce, and Jose R. Granda, Southwestern University, Georgetown, TX.

Amphibians are generally considered to have limited tolerance to salinity but, surprisingly, little recent research has been done on the salinity tolerances of amphibians. This study investigated the effects of salinity on anuran larvae (tadpoles) found in central Texas. Results indicate that the lethal concentration for *Bufo nebulifer* is between 5 parts per thousand (ppt) and 10 ppt. For 10 ppt salinity, but not for 12.5 ppt, dry weight and survival time were significantly correlated. At 10 ppt and 12.5 ppt, there were significant differences among species in survival time: *Acris crepitans* was the most tolerant, followed by *Rana berlandieri*, and then *Bufo nebulifer*. Weight had no effect on tolerance among species. Growth rates were not significantly affected by sublethal concentrations of salinity. Sublethal concentrations of salinity had a significant effect on subsequent survival time at 12.5 ppt: tadpoles exposed to 5 ppt but not 1 ppt were significantly less tolerant than those exposed to control solution. The recognition that amphibians worldwide are declining emphasizes the need to better understand how these animals respond to environmental stressors such as salinity.

P72 CHARACTERIZATION OF AN INSECT POLLINATOR COMMUNITY IN A NORTHERN CHIHUAHUAN DESERT BOTANICAL GARDEN, CHIHUAHUAN DESERT RESEARCH INSTITUTE, JEFF DAVIS COUNTY, TEXAS.

Cynthia G. McAlister* and Christopher M. Ritzi, Department of Biology, Sul Ross State University, Alpine, TX.

In the early 1980s, the Chihuahuan Desert Research Institute (CDRI) established their Botanical Gardens which now cover approximately 200 m² (20 acres) of northern Chihuahuan desert landscape in the foothills of the Davis Mountains. The Gardens contain plant species native to the region, many of which are insect pollinated. Although current studies have suggested that generalization dominates plant-insect interactions, work on *Larrea tridentata* (creosote bush) shows a specialized assemblage of pollinating bee genera. A preliminary study, conducted mid-August to November 2006, revealed a diverse assemblage of insects foraging among the CDRI Gardens' flora, suggesting that the pollinator community is typically generalized. The current study proposes to describe the plant-insect pollination community of the CDRI Botanical Gardens. This will be accomplished by recording frequency and abundance of plants in flower and their insect visitors. Plant and insect specimens will be collected for identification and as voucher specimens. Frequency and abundance data will be used to construct a plant-insect community web from which inferences will be made about the degree of generalization of the plants, insects, and community overall. Also, a pollen reference collection will be established. Pollen will be collected from insect specimens and verified against the known reference collection. These data will be used to construct a pollen transport web that will help verify the role of the collected insects as pollinators. This information will further advance our understanding of the relationships between plants and their insect visitors in the northern Chihuahuan Desert.

P172 DOMINANCE OF FIRE-SENSITIVE SPECIES IN THE SMALL MAMMAL COMMUNITY OF A TALLGRASS PRAIRIE REMNANT.

Brianna N. Kirchner, Nicholas S. Green, Cathleen N. Early, Kenneth T. Wilkins, Baylor University, Waco, TX.

Research in tallgrass prairies has revealed that species of small mammals exhibit various responses to burning of the habitat. Rodent species that increase after fire are termed fire-positive, whereas those that decrease are fire-negative. We analyzed the small mammal community of Leonhardt Prairie, a 16.2 ha tallgrass remnant of Blackland Prairie in Falls County, Texas, owned by the Nature Conservancy of Texas to determine the relative prevalence of fire-negative species. We utilized trapping records for a 2-year period beginning 4 months after a controlled burn of part of the study area to compare mammal fauna in burned and unburned portions of our study site. We predicted that fire-negative species, such as *Sigmodon hispidus*, would dominate because Leonhardt Prairie has not experienced a regular disturbance regime (fire, grazing, mowing) for at least 20 years. Further study will examine community responses following a prescribed burn in 2007.

P189 RELATIONSHIP BETWEEN ARTIFICIAL STRUCTURES AND SURROUNDING HABITAT VARIABLES AS PREDICTORS OF POTENTIAL BAT DAY ROOSTS: COMPARISON STUDY OF PATTERNS IN INDIANA AND TEXAS.

Tara M. Poloskey* and Christopher M. Ritzi, Department of Biology, Sul Ross State University, Alpine, TX.

Bats, as volant animals, require specific macrohabitat conditions in a day roost as well as clear pathways for efficiency in navigation and locating roosts. To determine why bats utilize certain bridges as day roosts over others, we looked at vegetation and canopy cover as factors that may influence roost suitability. Vegetation and canopy cover could additionally provide cover from predators at certain levels, yet be a hindrance to flight in high amounts. In order to access the effect of these variables, 10 occupied bridges of similar construction were examined in both Texas and Indiana, to test similarity in variables in different habitats. To isolate these variables that encourage bat occupation, these bridges were compared against 10 unoccupied bridges of similar construction in Texas. Data collection consisted of 25m line transects radiating from the center point of each bridge according to the 8 compass directions. These transects measured vegetation height, type, and percent canopy cover. Percent cover was additionally measured using 4 visual cones extending at 45 degree angles from the roost site. Vegetation height and type were compared between bridges by assigning individual plants into height and type classes, and averaging frequencies of occurrence. A Chi-square goodness of fit test was used to determine significant differences in frequencies between bat roosts and control roosts, as well as between geographic areas.

P225 HELMINTH PARASITES OF RED-WINGED BLACKBIRDS (*AGELAIUS PHOENICEUS*) FROM SOUTHEAST TEXAS.

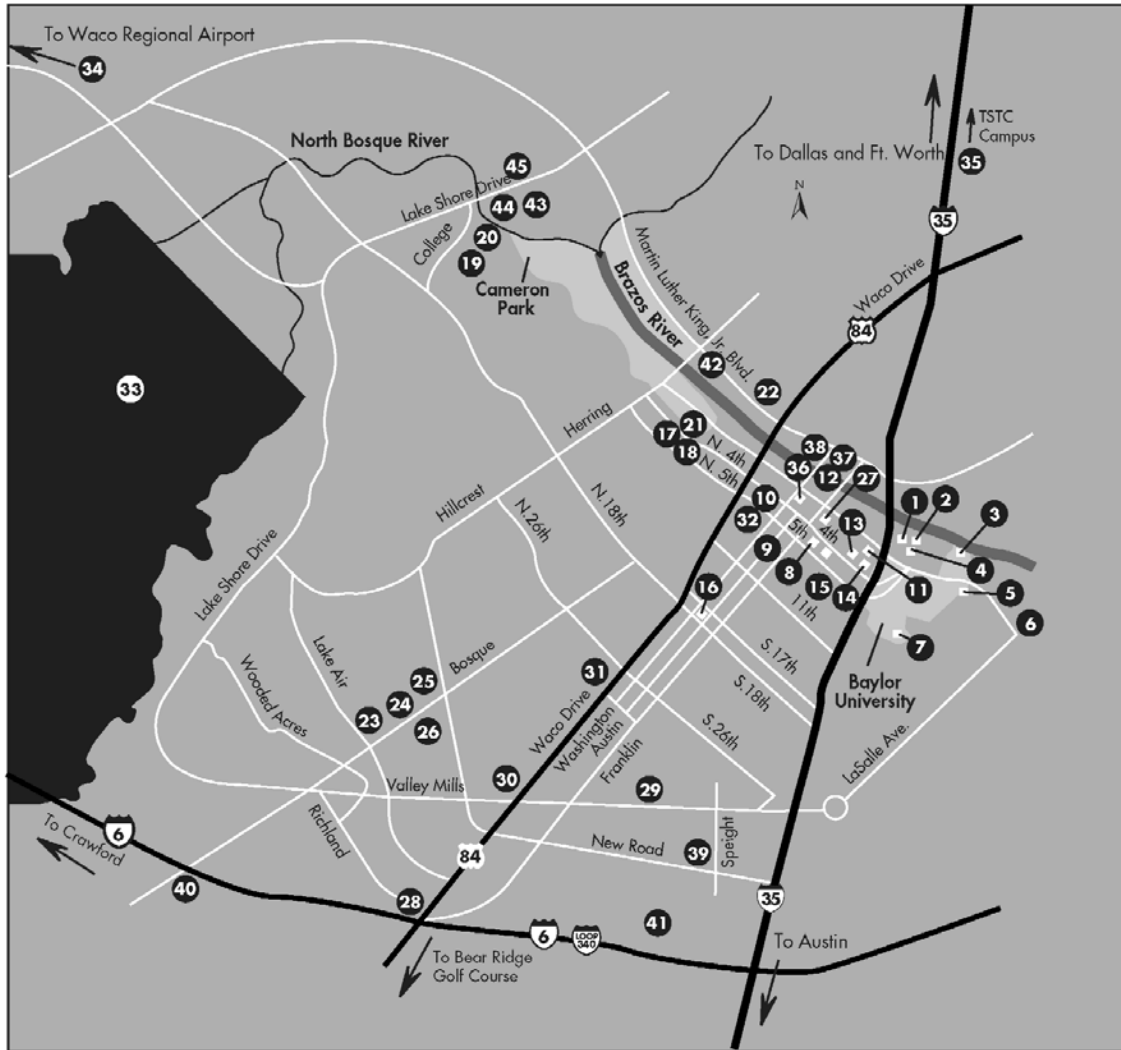
Cary Nunez*, Randall Yoder and Andrew Kasner, Department of Biology, Lamar University, Beaumont TX.

A total of 20 red-winged blackbirds (*Agelaius phoeniceus*) were collected by shotgun on October, 12 (n=8) and November, 9 (n=12) 2006. Birds were transported to the laboratory where they frozen. As time allowed, birds were thawed, weighed and necropsied. The digestive tract was removed and inspected for helminth parasites under the dissecting microscope. Three birds (15%) were infected with helminth parasites; one (5%) with Acanthocephala, one with cestodes, and one with nematodes. Parasite intensity ranged from 2-16 worms per infected individual. Identification of helminths is currently underway.

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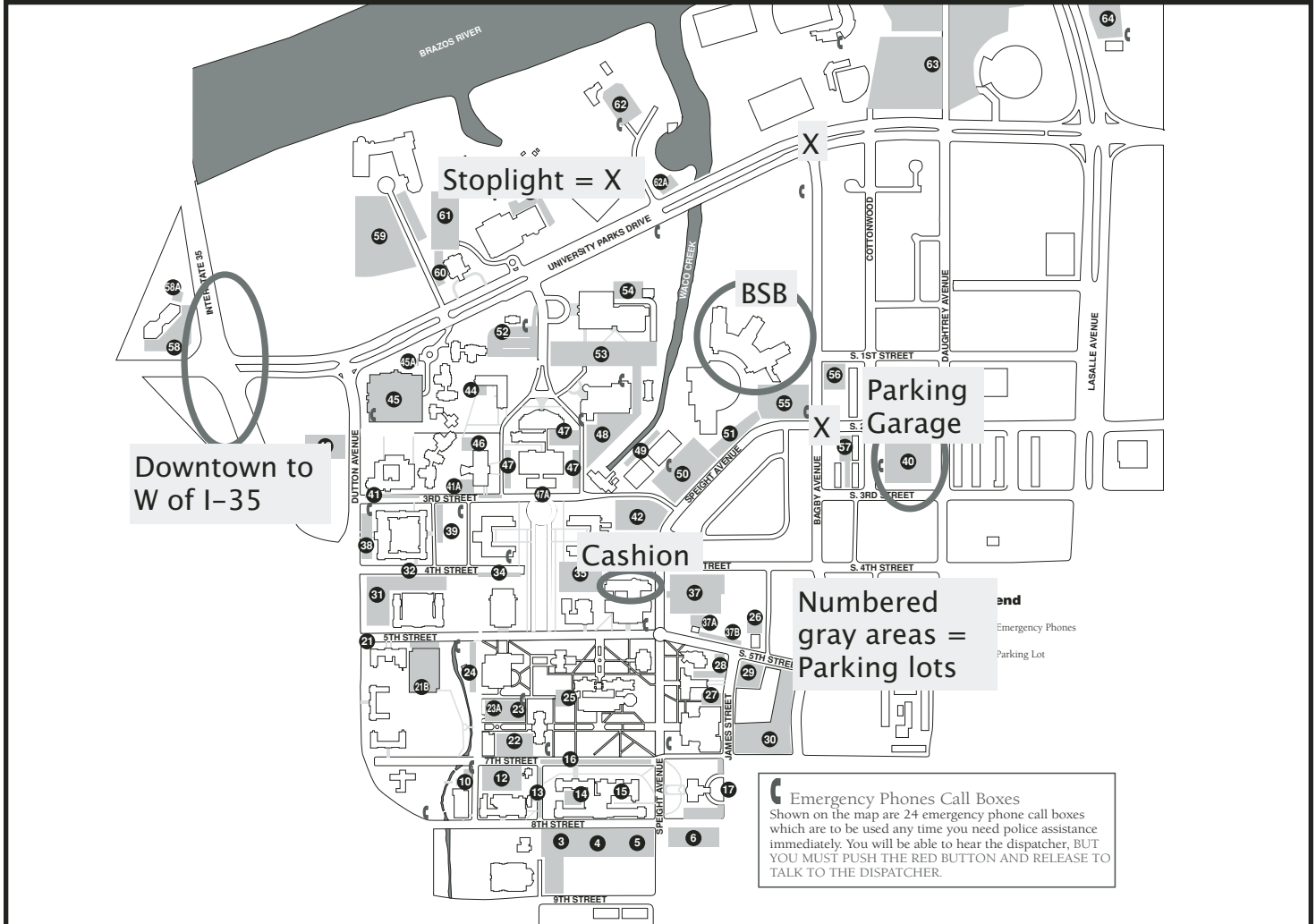
- 1 Tourist Information Center
I-35 at University Parks Dr.
800-WACO-FUN
254 750 8696
- 2 Texas Ranger Hall of Fame and Museum
I 35 at University Parks Dr.
254 750 8631
- 3 Mayborn Museum Complex
1218 S. University Parks Dr.
254 710 1160
- 4 Texas Sports Hall of Fame
1108 S. University Parks Dr.
254-756-1633
- 5 Martin Museum of Art
1401 S. University Parks Dr.
254-710-1867
- 6 Ferrell Center
1900 S. University Parks Dr.
254 710 1915
- 7 Armstrong Browning Library
700 Spelght
254 710 3566
- 8 Dr Pepper Museum
300 S. 5th St.
254-757-1024
- 9 Hippodrome Theatre
724 Austin Ave.
254-752-9797
- 10 McCulloch House
407 Columbus Ave.
254-756-2828

- 11 Texas Playhouse Theater
201 S. I-35
254-754-1898
- 12 Suspension Bridge
Washington Ave and
University Parks Dr.
- 13 Hoffmann House
810 S. 4th St.
254-753-5166
- 14 Earle-Napier-Kinnard House
814 S. 4th St.
254-756-0057
- 15 Fort House
503 S. 4th St.
254 756 4161
- 16 Cooper House
1801 Austin Ave.
254 754 0315
- 17 Earle-Harrison House
1901 N. 5th St.
254-753-2032
- 18 Nell Pape Garden Center
1705 N. 5th St.
254-752-2667
- 19 McLennan Community College
1400 College Dr.
254-299-8000
- 20 Art Center Waco
1300 College Dr.
254-752-4371
- 21 Cameron Park Zoo
1701 N. 4th St.
254 750 8400

- 22 East Terrace House
100 Mill St.
254-756-4104
- 23 Waco Civic Theater
1517 Lake Air Dr.
254-776-1591
- 24 H.O.T. Fair and Coliseum
41 Bosque Blvd.
254-776-1660
- 25 Lion's Park
1716 N. 42nd St.
254 772 3541
- 26 The Market Place
4700 Bosque Blvd.
- 27 River Square Center
213 Mary St.
- 28 Richland Mall
I Hwy. 84 @ I Hwy. 6
- 29 Floyd Casey Stadium
150 Bear Run Dr.
- 30 Westview Village
Valley Mills @ Waco Dr.
- 31 Lee Lockwood Library and Museum
2801 W. Waco Dr.
254 752 1618
- 32 Masonic Grand Lodge of Texas
715 Columbus Ave.
254-753-7395
- 33 Lake Waco
- 34 Waco Regional Airport
7909 Airport Rd.
254 750 8656

- 35 Texas State Technical College
3801 Campus Dr.
254-799-3611
- 36 Waco Convention Center
100 Washington Ave.
254-750-5810
- 37 Martin Luther King, Jr. Park
100 Martin Luther King Jr. Blvd
- 38 Bledsoe-Miller Park
300 Martin Luther King Jr.
Blvd.
- 39 Red Men Museum and Library
4521 Spelght Ave.
254-756-1221
- 40 Bosque Square Shopping Center
7524 Bosque Blvd.
- 41 Cottonwood Creek Golf Course
5200 Bugby Blvd.
254-752-2474
- 42 Spirit of the Rivers Paddleboat
1620 Lake Brazos Parkway
254 755 7797
- 43 Waco Water Park
901 Lakeshore Dr.
254 750 5980
- 44 Waco Regional Tennis Center
900 Lake Shore Dr.
254-753-7675
- 45 Riverbend Ball Park
1001 Lake Shore Dr.
254-753-6322

BAYLOR UNIVERSITY Campus Map



Emergency Phones Call Boxes
Shown on the map are 24 emergency phone call boxes which are to be used any time you need police assistance immediately. You will be able to hear the dispatcher, BUT YOU MUST PUSH THE RED BUTTON AND RELEASE TO TALK TO THE DISPATCHER.

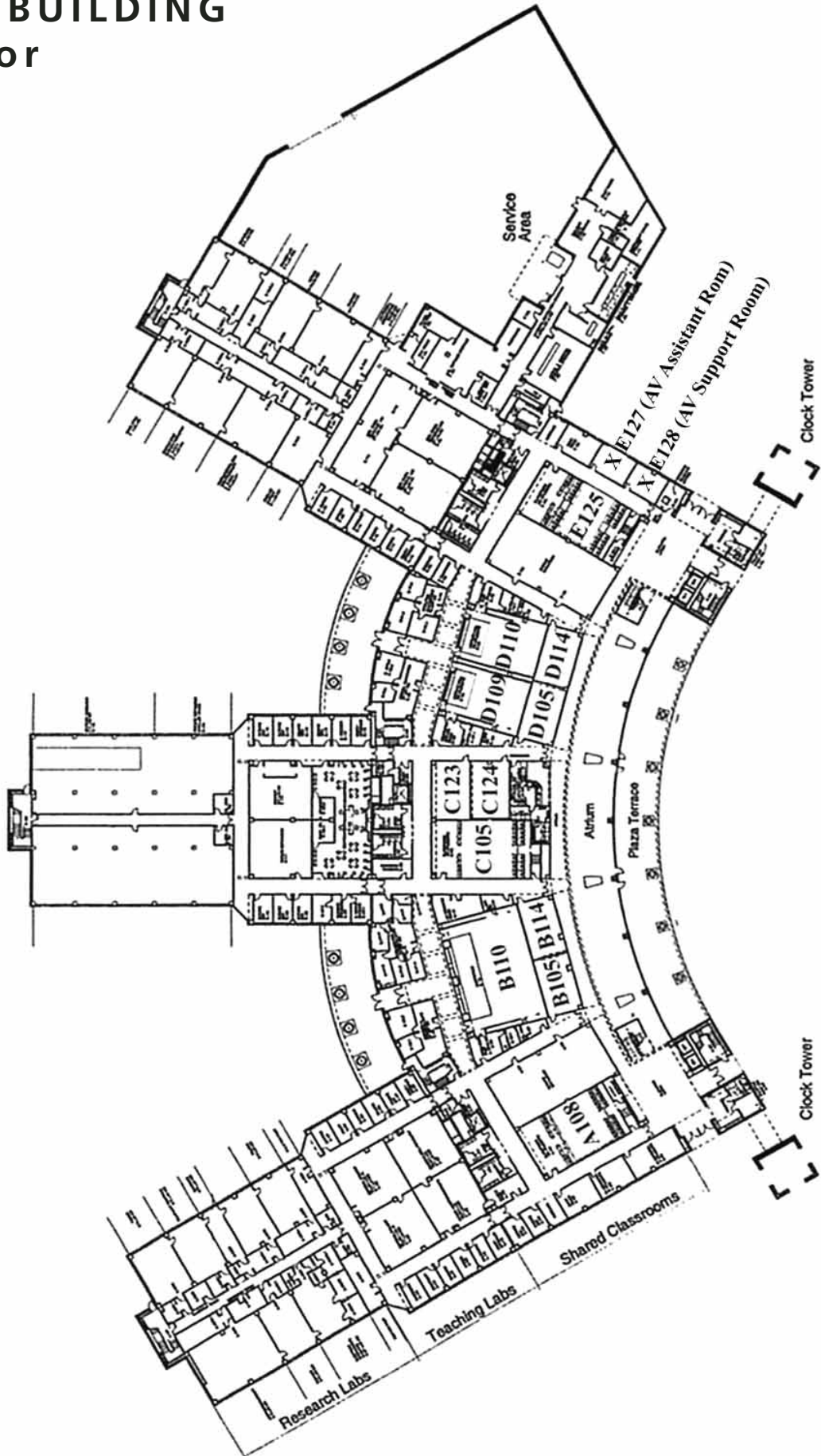
Parking Lots

S = Student Parking F-E = Faculty or Employee L = Law

3.	S	Baylor and 8th St.	27.	F-E	E of Waco Hall	44.		Rogers Loading
4.	S	1400 8th St.	28.	F-E	S and W of Bobo BSM Center	45.	S-F-E-Visitor	Dutton Parking Garage
5.	S	NW Corner Speight and 8th St.	29.	F-E	SW Corner of 5th St. and James	46.		Castellew Loading
6.	S-F-E	SW Corner Speight and 8th St.	30.	S	Back of Seventh and James Church	47.	F-E	Around Moody Library
10.	F-E	Back of Mary Gibbs Jones Bldg.	31.	S-Reserved	Around Penland Hall	47A.	S	3rd St. in front of Moody Library
12.	F-E-S-Reserved	Back of Collins Hall	32.	S-Reserved	4th St. from Dutton to Blockade	48.	S-F-E	McCrary Music Bldg.
13.	S	700 Baylor	34.	F-E-Visitor	Back of Marrs McLean Gym	49.	F-E	N of Goebel Bldg. and Russell Gym-Loading
14.	Reserved	Between Alexander and Dawson Halls	35.	F-E	Back of Morrison Constitution Hall	50.	S	S of Russell Gym
15.	Reserved-Timed	Between Memorial and Allen Halls	36.	F-E-Visitor	W Side between SR Science Bldg. and Speight	51.	F-E	SLC
16.	S-Timed	7th St. from Baylor Ave. to Speight	37.	F-E	Speight Parking Garage 1st floor	52.	Visitor-F-E	Front of Wiethorn Visitors Center
17.	F-E-Visitor	S and W of Armstrong Browning	37.	S	Speight Parking Garage 2nd, 3rd, & 4th floor	53.	S-F-E-Visitor	W of Hooper-Schaefer Fine Arts Center
21.	S-Reserved	5th St. from Dutton to M.P. Daniel	37A.	F-E	Behind Literacy Mission on S. 5th St.	54.	F-E	E of Hooper-Schaefer Fine Arts Center
21B.	Reserved-Timed	5th St. Parking Garage	37B.	F-E	1500 Blk. Speight	55.	S-F-E	McLane Student Life Center
	F-E	1st Fl. Bookstore	38.	S	Front North Russell Hall	56.	F-E	1st St. & Bagby
	S	Upper levels	39.	S-Timed	Loading Zone/Disabled	57.	S	Baylor Plaza I Residents Only
22.	F-E	Between Neill Morris and Pat Neff Halls	40.	S-F-E	East Side Garage (40 - 2nd Fl. F-E)	58.	F-E-S-Visitor	Robinson Tower
23.	F-E	Between M.P. Daniel and Pat Neff Hall	41.	S-Reserved	3rd St. from Dutton to Barrier	58A.	F-E	Robinson Tower Garage
23A	Visitor	Between M.P. Daniel and Pat Neff Hall	41A.	F-E	Disabled/15 minutes	59.	F-E-L-Visitor	Umphrey Law Center
24.	F-E-Timed	N of Bill Daniel Student Center/Disabled	42.	S	E Side between SR Science Bldg. and Speight	60.	Reserved	Alumni Center
25.	Reserved	W of Carroll Science Bldg. (Disabled, 15 min. parking)	43.	S	Across from Truett	61.	Visitor	Mayborn Museum Complex
26.	S-F-E	5th St. & Hopkins - Art Annex				61A.	F-E	Behind Museum
						62.	S-F-E	Marina Pool

SCIENCE BUILDING

First Floor



SCIENCE BUILDING

Second Floor

