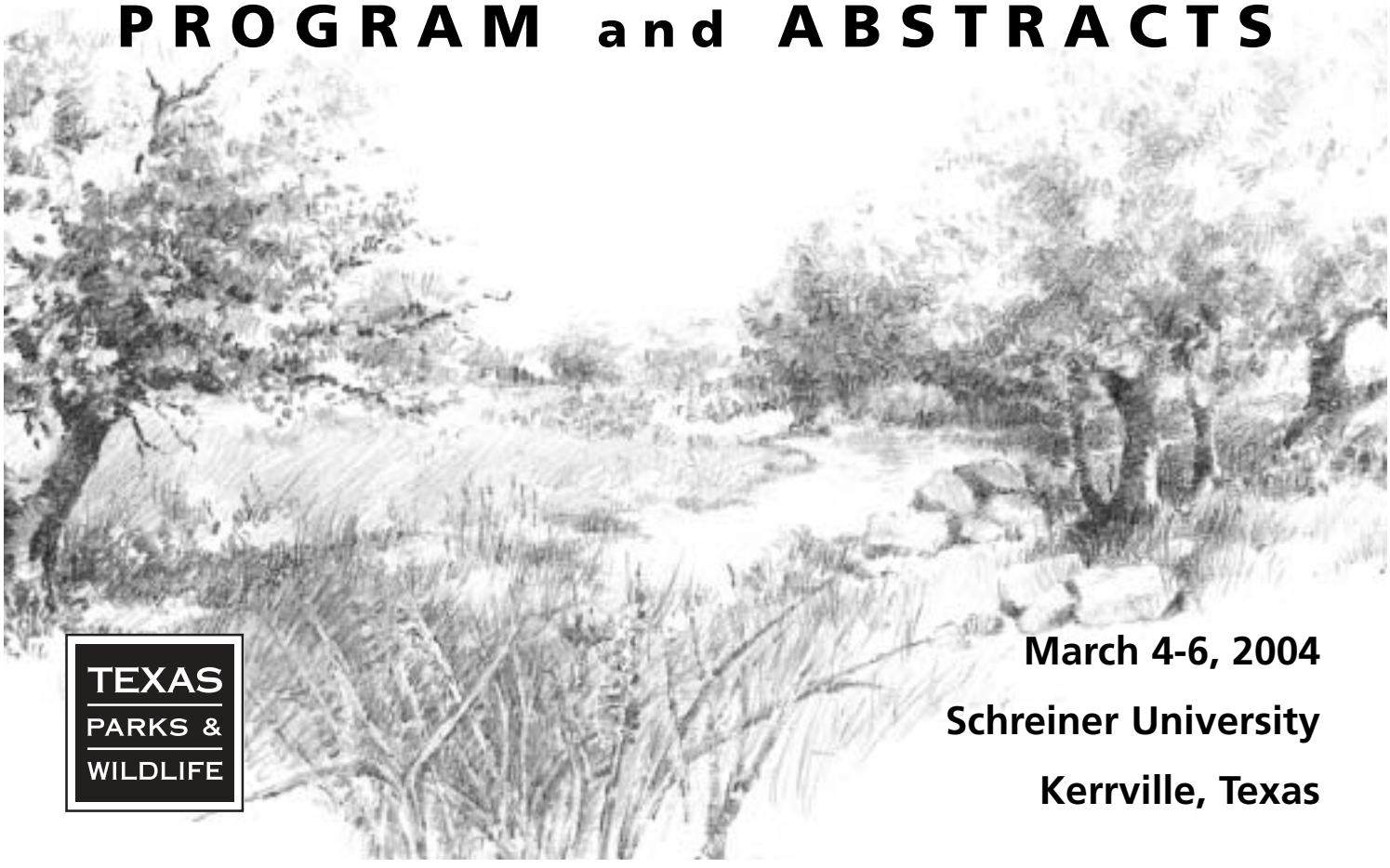
107th Annual Meeting of the Texas Academy of Science

PROGRAM and ABSTRACTS



TEXAS PARKS & WILDLIFE

March 4-6, 2004

Schreiner University

Kerrville, Texas

2004 PROGRAM CHAIR

Dr. John A. Ward

PROGRAM EDITORS

Ruben J. Vela

Melissa Parker

Ronald R. Smith

Michael Buckner

Chris Hunt

PROGRAM SPONSOR

Texas Parks and Wildlife Department

CS BK R0400-477 (2/04)

SCHEDULE OF EVENTS

TIME	EVENT	LOCATION
THURSDAY – MARCH 4, 2004		
2:00 – 5:00 pm	Board Meeting	Y.O. Resort Hotel
5:00 – 7:00 pm	Registration	Y.O. Resort Hotel
6:00 – 8:00 pm	Social Hour	Y.O. Resort Hotel
FRIDAY – MARCH 5, 2004 • All on Schreiner University Campus		
7:00 – 5:00 pm	Registration	Back of Dining Hall
7:00 – 8:30 am	Breakfast	Dining Hall
8:00 – 5:00 pm	Exhibits	Dietert Hall 102
8:00 – 5:00 pm	Poster Sessions	First Floor of Trull Science
8:00 – 10:00 am	Paper Sessions	Weir Bldg. and Cailloux Hall
10:00 – 10:30 am	Break for Refreshments & Poster Sessions	First Floor of Trull Science
11:00 – 11:50 am	**Presentation by 2004 Outstanding Texas Science Educator**	Dietert Auditorium
10:30 – 11:50 pm	Paper Sessions	Weir Bldg. and Cailloux Hall
11:50 – 12:00 pm	Sectional Business Meetings	Weir Bldg. and Cailloux Hall
12:00 – 1:15 pm	Lunch	Cailloux Activity Center
1:15 – 1:45 pm	Texas Academy of Science Business Meeting	Dietert Auditorium
1:45 – 2:30 pm	**2004 Distinguished Scientist Lecture**	Dietert Auditorium
2:40 – 5:20 pm	Paper Sessions	Weir Bldg. and Cailloux Hall
5:20 – 5:45 pm	All Section Chairs Meeting	Room 201 – Wier Bldg.
6:00 – 7:00 pm	Social Hour	Cailloux Activity Center
7:00 – 9:00 pm	Banquet	Cailloux Activity Center
9:00 – 11:00 pm	Social with cash bar	Cailloux Activity Center
SATURDAY – MARCH 6, 2004 • All on Schreiner University Campus		
7:30 – 8:30 am	Coffee, juice and cookies	Bottom Floor of Weir Bldg.
8:00 – 12:00 pm	Poster Sessions	First Floor of Trull Science
8:00 – 10:00 pm	Paper Sessions	Weir Bldg.
9:00 – 1:00 pm	Ecology Field Trip (see below)	
10:00 – 10:30 am	Break	First Floor of Trull Science
10:30 – 12:00 pm	Paper Sessions	Weir Bldg.

ECOLOGY FIELD TRIP: Departs at 9:00 am Saturday. The group will travel by van and will leave from the campus parking lot next to Moody and Trull Science Buildings. Estimated time of return is 1:00 pm.

Advance registration is required and there will be a $5.00 charge to cover mileage expenses.

Contract Robert Holloway, Schreiner University, 2100 Memorial Blvd, Kerrville, TX 78028 830-792-7250, Bholloway@schreiner.edu

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FUTURE ACADEMY MEETINGS

2005 108th meeting . . . . . University of Texas - Pan American, Edinburg, TX

ACKNOWLEDGEMENTS FROM THE PROGRAM CHAIR

Although I didn't know it at the time, planning for this meeting started over two decades ago when I first became involved with the Texas Academy of Science as a faculty member at Incarnate Word College in San Antonio. In those days my contribution was submitting abstracts with my students. This is the stage where most enter the process, so I want to acknowledge the presenters first. Without you there would be no meeting this year. From there I went to Brooke Army Medical Center as a research physiologist at about the same time I was the Section Chair for Computer Science. Then as now, Section Chairs recruited presenters, scheduled sessions and kept speakers on time.

As a member of the Board of Directors, I gained an appreciation for those who keep the activities and finances of the Academy on track and provide the infrastructure that gives continuity to the organization. Executive officers progress from Vice President, Damon Waitt, who organizes the awards, President Elect, John Ward, who prepares the program, President, John Seiben, who chairs the Board, and Immediate Past President, Larry McKinney who recruits the future officers. Each stage supports those who go before and nurtures those who follow and each officer empowers the organization with a new set of attributes. Much of the success of this meeting is the result of the efforts of my fellow officers.

I want to offer special recognition to SGT Ruben Vela, who assisted in editing the program, Melissa Parker and Texas Parks and Wildlife Department, who designed and printed the program, Fred Stephens and his associates at Schreiner University who hosted this year's meeting, and Dovalee Dorsett and Patricia Milligan at Baylor University who hosted the web site.

Finally, I want to thank my colleagues at Brooke Army Medical Center and the US Army Institute of Surgical Research who agreed to present a Trauma Symposium within the Biological Sciences Section. Given the current situation at home and abroad, I felt there would be an interest among Academy members in what military medical research is doing to help our men and women in uniform.

John A. Ward

ACKNOWLEDGEMENTS FROM THE LOCAL HOST

Hosting the 107th Annual Meeting of the Texas Academy of Science has been the result of a great deal of effort and cooperation. The Local Host Committee wishes to thank the Kerrville Convention and Visitors Bureau for helping with registration and name tags. The Plant Operations office help with the planning and set up for the convention was vital. The support of the Jon Fitzgerald and his crew of the Marriott Corporation was greatly appreciated. Finally, the Committee wishes to thank the administration of Schreiner University for their flexibility and assistance in making it possible to hold this conference on the Schreiner campus.

Chair: Fred Stevens

Diana Comuzzie
Jennifer Sadow
Bob Holloway
Milton Wilson
Dan Brown
Cynthia Uhte-Johnson
Daniel Horrell
Paula Repka
Chazz Andrikanich
Heather Atteberry
Margie Diaz
Chris Hernandez
Monica Johnson
Chasity Kahlig
Jaimie Maher
Kristen Morton
Annelise Munoz
Matt Walden

LETTER OF WELCOME FROM THE TAS PRESIDENT

Welcome to Schreiner University and the 107th Annual Meeting of the Texas Academy of Science. It seems so recently that we were greeting each other in Nacogdoches, but the seasons have changed, the moon has waxed and waned, the tides have flooded and ebbed, and once more we have orbited our sun.

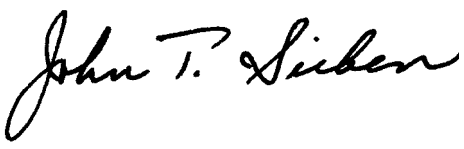
As my year as your President draws to a close, I want to share with you my reflections on what makes this Academy great. First, intentions are important. I like the objectives of the Academy. In the December 1886 edition of Texas Farm and Ranch, the objectives of the Academy of Science of Texas were listed. They were: the mutual improvement of its members, recording (for Texans) Texas natural history before the native species are removed and the land forms altered, and to promoting science and the teaching of science. A fourth objective was "fortifying our people against the false analysis of minerals and mineral waters." The final stated objective was to build scientific expertise in Texas, "thus doing away with the hitherto humiliating inquiry made of other seats of science outside our own state."

These objectives hold up well for today's Academy, though "fortifying our people against the false analysis of minerals and mineral waters" requires a bit of explanation. In the 1870s Sour Lake Texas was a popular destination for people seeking the reputed curative powers of Sour Lake. An 1871 analysis of the Sour Lake waters indicated that the waters were simultaneously acidic and basic. The above objective is apparently a reaction to that report and expresses a desire to educate Texans in scientific matters, so that they will not be easy victims for purveyors of false claims.

Intentions without accomplishments are hollow. How are we doing? TAS remains dedicated to improving our members. This is reflected in the networking that occurs among our members, the opportunity to share with colleagues recent scientific work, and the encouragement, through example and cash support, of young Texas scientists. The Texas Journal of Science continues to record scientific observations of Texans, many of them about the flora, fauna, and landforms of Texas. The outstanding collection of Texas universities and state agencies engaging in science have put an end to our humiliation concerning a lack of expertise within our state. The number of Texans who have been awarded Nobel prizes or hold membership in the National Academy of Sciences is further evidence that Texas more than holds its own in the world of science. Texas and Texans are world renowned in science. Admittedly the Academy is but one many influences that have contributed to the success of science in Texas but the Academy is an important voice for science in Texas and has been true to its goals since the 1880s. That's an enviable record, and one that makes me proud of this organization. With the continued dedication of its members the academy will deliver on its objectives well into the future.

I will leave you with this considerable challenge, from Dr. Franklin L. Yoakum one of the founders of the Academy. "The president wishes it announced to the public, that through the various branches of the Academy of Sciences of Texas can be furnished to enquirers the true technical name, Natural History, and use of every specimen of nature living or dead."

Good luck and best wishes,



John T. Sieben
President

THE CITY OF
KERRVILLE, TEXAS

PROCLAMATION

WHEREAS, The Texas Academy of Science has served the scientific and educational communities for over one century;

WHEREAS, The Texas Academy of Science represents active scientists from a variety of institutions of higher education, numerous governmental agencies, and scientists employed in the private sector;

WHEREAS, The Texas Academy of Science serves undergraduate and graduate students enrolled in science programs throughout the State of Texas;

WHEREAS, The Texas Academy of Science provides an opportunity for scientists and students to share the findings of their original research at their annual conference;

WHEREAS, The Texas Academy of Science recognizes and promotes excellence in the endeavors of Texas scientists, college science students and Texas science educators; and,

WHEREAS, The Texas Academy of Science will hold their 107th annual conference in Kerrville on the campus of Schreiner University.

NOW THEREFORE, I, Stephen P. Fine, Mayor of the City of Kerrville, do hereby proclaim March 5, 2004 as

"TEXAS ACADEMY OF SCIENCE DAY"

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the City of Kerrville to be affixed hereto, this the 18th day of December, 2003.

Stephen P. Fine, Mayor

LETTER OF WELCOME FROM THE PRESIDENT, SCHREINER UNIVERSITY

December 2, 2003

To members of the Texas Academy of Science:

As the date above indicates, I am writing this in the waning days of 2003, well before you gather on the Schreiner University campus in March. But it is not too early to pen this official welcome to our campus, because I know that Fred Stevens and your board have been planning this event for many months. So welcome to Schreiner! We are pleased that you have selected our campus for your 107th conference.

Any group that is gathering for the 107th time has established a distinguished record of service. From the twenty-one years that I spent at Lamar University, I know of your work. When I came to Schreiner in 1999, I was pleased to learn how closely knit our science faculty are to TAS and how vigorously our students participate in TAS research presentations. Organizations like yours keep the fabric of faculty interchange, continuous learning and high standards strong. You honor us by your presence.

By the time you arrive on campus, we anticipate that renovations on our Moody Science Building will be complete. Combined with the Trull Science facilities completed two years ago, they will provide a home for our School of Science and Mathematics and excellent facilities for some of our strongest academic programs. We are glad to have you at Schreiner to help celebrate that progress as you conduct your business and exchange ideas.

Sincerely,

Tim Summerlin
President

2004 DISTINGUISHED SCIENTIST

Dr. John C. Pérez
Texas A&M University – Kingsville

Dr. John C. Pérez received his Ph.D. in bacteriology from Utah State University in 1972. He received his master's in zoology at Mankato State University and his bachelor's in molecular and genetic biology at the University of Utah and the College of Eastern Utah. He was hired as assistant professor to teach microbiology at Texas A&I University-Kingsville in 1972, now know as Texas A&M University-Kingsville. He was named a Regents professor in 1999, the third A&M-Kingsville professor to ever receive the prestigious system-wide award. Dr. Pérez is also an Adjunct Professor of the Graduate Faculty at Texas A&M University and Adjunct Professor in the Institute of Biosciences and Technology (IBT) at The Texas A&M University System Health Science Center at Houston.

Dr. Pérez' research career has focused around animals that have a natural resistance to snake venom and venoms that are important in biomedical research. He is the founding Director of the Natural Toxins Research Center (NTRC) and has served in this position since the NTRC was established in 2000. The mission of the NTRC is to provide global research, training and resources that will lead to the discovery of medically important toxins found in snake venoms. The NTRC has a large research collection of venomous snakes (450), and an Internet database with locality data and venom HPLC, ET profiles, and enzymatic activities of venom fractions that can be accessed by researchers worldwide. Dr. Pérez has brought more than 20 million dollars into the University for research. The most recent was a $2.5 million research grant from the National Center for Research Resources (NCRR) at the National Institutes of Health (NIH) to support biomedical research on natural toxins. The venom research conducted at Texas A&M-Kingsville has been conducted with undergraduate and master level students. These students have presented papers at professional meetings, published in professional journals and have gone on to obtain professional degrees. Dr. Pérez and his students were the first to report that the Gray Woodrat, Neotoma micropus, had a natural resistance to snake venoms. Dr. Pérez and students have published more than 30 papers in international professional journals dealing with venom and animals that have a natural resistance.

Dr. Pérez has been the recipient of numerous teaching, research, and mentoring awards at the local and national level. He was selected as one of the top 10 professors by the Cap and Gown Honor Society at Texas A&I University, in 1974, selected as one of the outstanding citizens of Kingsville by the Kingsville-Bishop Record News in 1976, received the Distinguished Research Award in 1979, presented by Texas A&I Faculty and the Alumni Association, nominated by Texas A&I University in 1984 for the Professor of the Year Award sponsored by the Council for the Advancement and Support of Education (CASE), received the Olan Kruse Science Faculty Award at Texas A&I University in 1992, received a second Olan Kruse Science Faculty Award in 1997, the first recipient of an Undergraduate Institution Mentoring Award sponsored by the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) in 1998, selected as the Koch Industries Outstanding Educator in 1999, and Regents Professor of the Texas A&M System 1999.

2004 OUTSTANDING TEXAS EDUCATOR

Mrs. Gail Bromiley-McGee

Gail Bromiley-McGee is a biology teacher at Carnegie Vanguard High School. Carnegie is the gifted and talented high school in the Houston Independent School District. Mrs. Bromiley-McGee teaches both pre-advanced placement and advanced placement biology.

Mrs. Bromiley-McGee's philosophy about teaching science is that you have to make it real. She tries to relate each concept to experiences that students have had and she works hard to make science meaningful. She considers it a bonus if her science students go on to pursue a career in science, but her goal is to produce students with a solid science background who can make informed decisions throughout life.

Mrs. Bromiley-McGee is an active contributor to the science curriculum for the Houston Independent School District. She just completed updating the district's biology curriculum, called Project CLEAR. She was responsible for writing the model lessons, designed to ensure that teachers in the district have consistent, meaningful activities and lab experiences for their students.

Professional development is a priority for Mrs. Bromiley-McGee. With the ever-changing nature of biology and science, it is essential to stay current in the field. Mrs. Bromiley-McGee has participated in the MD Anderson Summer Workshops for High School Science Educators. As part of their Master Teacher program, they offered graduate level courses taught by prestigious faculty members of The University of Texas Health Science Center Graduate School of Biomedical Sciences. Mrs. Bromiley-McGee challenges the members of the Texas Academy of Science to offer these opportunities to assist science teachers in their communities to remain current in their field.

2004 TAS FELLOWS

Dr. Tom Atchison

Dr. Tom Atchison, Stephen F. Austin State University, has been instrumental in helping to revive the Mathematics Section of the TAS over a several year period. He also made it possible for SFA to contribute considerable funds to help defray costs at the last meeting of TAS. He has served on the Board of Directors of the Academy and has been nominated for thetas presidency in the past. As Dean of the College of Sciences and Mathematics he has always been a staunch supporter of the Academy and encourages faculty to attend and present papers at our annual meeting.

Dr. Alice Hempel

Dr. Alice Hempel, Texas A&M University-Kingsville, is a hugely supportive member of the Texas Academy of Science. Dr. Hempel is an active member of the Texas botanical community serving as curator of the TAMUK Herbarium and contributing to our knowledge of Texas' plants through research and education. Dr. Hempel's dedication to the Academy is exemplified by her longstanding support of the Botany section, her regular participation in the annual conference, and her longstanding commitment to student research.

Dr. Michael Looney

Dr. Michael Looney, Schreiner University, attended San Antonio College and St. Mary's University in San Antonio, Texas. At St. Mary's he majored in chemistry and received bachelors and masters degrees. In December 1996 he was awarded a doctor of arts degree in chemistry by Middle Tennessee State University. He chose the doctor of arts degree rather than the doctor of philosophy degree to show his life-long commitment to teaching. In 1997 Looney became the dean of the school of science and mathematics. In June 2001 he became the provost and vice president for academic affairs at Schreiner. Looney's research interests are in the area of analytical chemistry using forensic, environmental, and consumer samples. He has published regularly in the Texas Journal of Science.

Dr. Fred Stevens

Dr. Fred Stevens, Schreiner University, has been an active member in the Academy for quite some time and has made contributions not only in science but also more recently as the Executive Secretary of the Academy. Fred has been an active teacher at Schreiner University as a major part of their Biology program for more than 20 years. He has served as Department Chair and also in other higher administrative positions and has shone brightly as the Executive Secretary of the Texas Academy of Science.

DISTINGUISHED SERVICE TO THE ACADEMY

Jimmy T. Mills, Ph.D., Professor, St. Edward's University, Collegiate Academy Counselor 1994-2004

After serving several years as an assistant to the Collegiate Academy Counselor, Dr. Jimmy Mills of St. Edward's University was placed in charge of overhauling the entire undergraduate student judging process in June of 1994. The success of this program over the last ten years represents a progression of solid improvement with the number of Collegiate Academy presentations steadily increasing over the years. During this year's meeting there are over sixty Collegiate Academy presentations and posters. The coordination of the judging process for this many student presentations represents an enormous task and responsibility and the success of this program is in direct response to the dedication, attention to detail, and professionalism exhibited by Dr. Mills. His support over the years to the Academy and to the St. Edward's University Collegiate Chapter is greatly appreciated and will be sorely missed. On behalf of the membership of the Academy, the Board, and the numerous students that have benefited from your efforts – Thank You.

Dovalee Dorsett, Ph.D., Professor of Quantitative Business Analysis, Baylor University Board of Development Chair 2000-2003

Dr. Dovalee Dorsett's name is almost synonymous with the words "Texas Academy of Science." She epitomizes the Academy's mission: to encourage excellence in science and in science education and to stimulate communication between scientists and the citizens of Texas. She is a well-published and well-respected mathematician and statistician who has been active in the Academy for over fifteen years. She has served as Chair and Vice-chair of the Mathematics Section, held the office of Academic Director from 1993-1996, was elected to serve as the Vice President in 1996, and served as the Texas Academy of Science President from 1998-1999. From 2000-2003, she chaired the Board of Development, and during this period she was responsible for raising funds to support Academy activities. Dr. Dorsett created the Academy's web page, hosted the 1995 Annual Meeting, and was elected as a Fellow 1992. She has represented the Academy well to her colleagues in science and to legislators of the state of Texas, and she has served as a remarkable model for young researchers and women in science. It is with great regret that the Board of Directors recognizes Dr. Dorsett's retirement from the position of Board of Development Chair. She has made notable contributions to this organization and set a standard, which will be difficult to reach. The Board and the Academy members say, "Thank you, Dr. Dorsett, for your tireless efforts on our behalf. Your myriad accomplishments have enhanced the Texas Academy of Science."

2003-2004 TEXAS ACADEMY OF SCIENCE

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http://hsb-faculty.baylor.edu/dorsett/directors.htm

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http://hsb-faculty.baylor.edu/dorsett/officers.htm

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SYSTEMATICS AND EVOLUTIONARY BIOLOGY

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2004
PROGRAM AGENDA

Codes appearing with the presentation time indicate the following:

#	Student entering competition
?	Abstract failed to indicate
C	Collegiate Academy member
S	Senior Academy member
G	Graduate Student Academy member
*	Presenting author

ANNOUNCEMENTS

The Trauma Symposium will be presented during the Biological Science Section Session, Friday, March 5 from 2:40 – 4:20 p.m. in Weir 201.

The Ecology Field Trip departs at 9:00 am Saturday. The group will travel by van and will leave from the campus parking lot next to Moody and Trull Science Buildings. Estimated time of return is 1pm. Advance registration is required and there will be a $5.00 charge to cover mileage expenses. Contract Robert Holloway, Schreiner University, 2100 Memorial Blvd, Kerrville, TX 78028 830-792-7250 Bholloway@schreiner.edu

DISCLAIMER

Despite the best efforts of the editors, some errors and misspellings will likely be found in this program. Every attempt was made to correct obvious typos and such, but aside from those corrections, abstracts appear just as submitted.

Anthropology

Session I

Friday Morning, March 5 • Cailloux 112

8:40 S	1	PALEOINDIAN PRESENCE IN NORTHWESTERN CHIHUAHUA, MEXICO Alan L. Phelps, El Paso, TX
9:00 ?	2	JORNADA MOGOLLON OR JORNADA CASAS GRANDES? A DIACHRONIC PERSPECTIVE ON TRANSREGIONAL CONTACTS BETWEEN PREHISTORIC POPULATIONS OF FAR WEST TEXAS AND NORTHERN CHIHUAHUA Myles R. Miller, Geo-Marine, Inc.
9:20 S	3	THE EL CAIDO SITE: HISTORIC ROCK ART ALONG THE TEXAS BORDERLANDS Joe Labadie, Archeologist, National Park Service, Amistad NRA
9:40S	4	NON-DESTRUCTIVE RADIOCARBON DATING Marvin W. Rowe* & Karen L. Steelman, Department of Chemistry, Texas A&M University
10:00		**Break/Posters**
10:30 G#	5	RADIOCARBON DATING AND ANCIENT MODIFICATION OF PEYOTE Karen L. Steelman* & Marvin W. Rowe, Department of Chemistry, Martin Terry, Department of Biology and Phil Dering, Department of Anthropology, Texas A&M University
10:50 S	6	FRESHWATER SHELL ISOTOPES AND HOLOCENE PALEOCLIMATIC RECONSTRUCTION IN SOUTH-CENTRAL TEXAS David O. Brown, Anthony & Brown Consulting, Volente, TX
11:10 S	7	THE ARCHAEOLOGY OF THE CAMINO REAL DE TIERRA ADENTRO: EARLY SPANISH SETTLEMENTS IN NUEVO MÉXICO Roy B Brown, Dept. of Soc. & Anthro.
11:30 S	8	THE THERMODYNAMICS AND BROAD SIGNIFICANCE OF HYDROGEN SATURATION OVENS Richard T. Stark, The University of Texas at Austin
11:50		**Sectional Business Meeting**
12:00		**Lunch, Cailloux Activity Center**
1:15		**TAS Business Meeting, Dietert Auditorium**
1:45		**Distinguished Scientist Lecture, Dietert Auditorium**
5:20		**All section chairs meeting, Dietert Auditorium**
6:00		**Social Hour, Cailloux Activity Center**
7:00		**Banquet, Cailloux Activity Center**
9:00		**Social with cash bar, Cailloux Activity Center**

Biological Sciences
Session I
Friday Morning, March 5 • Weir 201

8:20 C#	9	DETECTING VIRULENT *YERSINIA ENTEROCOLITICA* IN PROCESSED PORK USING PCR Jafa Armagost* and William J Mackay, Edinboro University of Pennsylvania, Edinboro, PA
8:40 G#	10	EFFECTS OF ENVIRONMENTAL PARAMETERS ON DISTRIBUTIONS OF OLIGOTROPHIC BACTERIA ALONG AN ELEVATIONAL GRADIENT AT BIG BEND NATIONAL PARK James H. Campbell*, Randall M. Jeter, and John C. Zak, Department of Biological Sciences, Texas Tech University, Lubbock, TX
9:00 C#	11	TISSUE CULTURE AND TRANSFORMATION ANALYSIS OF *CONYZA CANADENSIS* Pamela A. Scheiber, William J. Quinn, and Fidelma A. O'Leary, St. Edward's University, Austin, TX
9:20 G	12	ENTEROTOXIN A PRODUCTION BY AN ATYPICAL STAPHYLOCOCCAL ISOLATE Suzanne M. Tomlinson, Crosby Jones, Kimberly Dybdahl, and Loren Ammerman, Department of Biology, Angelo State University, San Angelo, TX
9:40 G#	13	COMPLETION OF TRUNCATED GENE SEQUENCE OF THE hcf3 LOCUS OF MAIZE AND EXPRESSION OF ITS GENE PRODUCT Sijiong Mou* and William Cook, Midwestern State University, Wichita Falls, TX
10:00		**Break/Posters**
10:30 C#	14	ISOLATION AND COMPARISON OF SELECTED PLANT EPSPS CODING REGIONS TO BETTER UNDERSTAND THE EVOLUTION OF GLYPHOSATE RESISTANCE Wilfried Foadey and Fidelma A. O'Leary, St. Edward's University, Austin, TX, Gregory Heck, Chris Hubmeier, and Marianne Malven, Monsanto Company, St. Louis, MO
10:50 C	15	ISOLATION OF A LOW MOLECULAR WEIGHT PROTEIN INHIBITING TUMOR CELL (T24) ADHESION TO FIBRONECTIN FROM THE VENOM OF *BOTHROPS COLOMBIENSIS* (MAPANARE) Elda E. Sánchez*, Jacob A. Galán, Gonzalo López, Jr., John C. Pérez, Natural Toxins Research Center, Texas A&M University-Kingsville, Kingsville, TX, and Alexis Rodríguez-Acosta, Instituto de Medicina Tropical, Universidad Central de Venezuela, Caracas, Venezuela
11:10 G#	16	SEROPOSITIVE RATES FOR FIVE ZOONOTIC DISEASES IN AN EAST TEXAS POPULATION Paula Wallace*, Peter King, and Robert Wiggers, Stephen F. Austin State University, Nacogdoches, TX
11:30 C#	17	THE EFFECT OF HYPEROXIA ON THE pH OF INSECT LARVAE HAEMOLYMPH Cherice Anderson, Howard Payne University, Brownwood, TX
11:50		**Sectional Business Meeting**
12:00		**Lunch, Cailloux Activity Center**
1:15		**TAS Business Meeting, Dietert Auditorium**
1:45		**Distinguished Scientist Lecture, Dietert Auditorium**

Biological Sciences
Session II
Friday Afternoon, March 5 • Weir 201

2:40 SP 18 PRE-HOSPITAL DIAGNOSTIC ULTRASOUND: FEASIBLY OF REMOTE ASSESSMENT AND TRIAGE FOR CARDIAC AND TRAUMA PATIENTS
Terry Bauch, MD*, Paul Garrett, MD; Christofer Strode, MD; Sheri Boyd, MD; and Jim Bulgrin, BSEE; and Bernard Rubal, PhD. Brooke Army Medical Center, Fort Sam Houston, TX

3:00 SP 19 CAPTURE AND ANALYSIS OF PREHOSPITAL TRAUMA VITAL SIGNS
Jose Salinas, Victor Convertino, and John B. Holcomb, U.S. Army Institute of Surgical Research, Fort Sam Houston, TX

3:20 S 20 HEMORRHAGIC SHOCK DATA MINING PROJECT
John A. Ward*, Brooke Army Medical Center, Fort Sam Houston, TX, and Jill L. Sondeen, Eric J. Ansorge, John B. Holcomb, US Army Institute of Surgical Research, Fort Sam Houston, TX

3:40 SP 21 LOWER BODY NEGATIVE PRESSURE AS A MODEL TO STUDY PROGRESSION TO ACUTE HEMORRHAGIC SHOCK IN HUMANS
Victor A. Convertino and William H. Cooke. US Army Institute of Surgical Research, Fort Sam Houston, TX

4:00 SP 22 HYPOTENSIVE RESUSCITATION AFTER HEMORRHAGE
Jill L. Sondeen, John B. Holcomb, US Army Institute of Surgical Research, Fort Sam Houston, TX

4:20 S 23 ASPECTS OF EGGSHELL FORMATION IN BIRDS AND CROCODILIA
Francis R. Horne, Biology Department, Texas State University, San Marcos, TX

4:40 S 24 DOMAINS OF EPH-A4 MEDIATING DISSOCIATION OF CADHERIN ADHESION COMPLEXES
Jon B Scales, Midwestern State University, Wichita Falls, TX

5:00 ? 25 NEUROTOXIC VENOM COMPONENT ANALYSIS IN *CROTALUS MITCHELLII* AND *CROTALUS TIGRIS*
Randy L. Powell 1*, Carl S. Lieb 2, Eppie D. Rael 2, and John C. Perez 1. (1) Natural Toxins Research Center, Texas A&M University, Kingsville, TX (2) Department of Biological Sciences, Laboratory for Environmental Biology, University of Texas, El Paso, TX

5:20 All section chairs meeting Dietert Auditorium

6:00 Social Hour, Cailloux Activity Center

7:00 Banquet, Cailloux Activity Center

9:00 Social with cash bar, Cailloux Activity Center

Biological Science Posters

P1 C# HELMINTH PARASITE COMMUNITIES IN BLUEGILL SUNFISH (*LEPOMIS MACROCHIRUS*) FROM A CONSTRUCTED POND IN SOUTHEAST TEXAS
Aaron H. Taylor* and H. Randall Yoder, Department of Biology, Lamar University, Beaumont, TX

P2 G THE IMPACTS OF SIMULATED INCREASED NITROGEN DEPOSITION ON SOIL FUNGAL FUNCTIONAL DIVERSITY AND MICROBIAL BIOMASS IN THE CHIHUAHUAN DESERT AT BIG BEND NATIONAL PARK
Heath Grizzle* and John C. Zak, Dept. of Biological Sciences, Texas Tech University, Lubbock, TX

P3 G NEUTRALIZATION OF VENOMS FROM TWO SOUTHERN PACIFIC RATTLESNAKES (*CROTALUS HELLERI*) WITH COMMERCIAL ANTIVENOMS AND ENDOTHERMIC ANIMAL SERA
Jacob A. Galán*, Elda E. Sánchez, John C. Pérez, Natural Toxins Research Center (NTRC), Texas A&M University-Kingsville and Alexis Rodríguez-Acosta,Universidad Central de Venezuela, Instituto de Medicina Tropical, Caracas, Venezuela

P4 G ISOLATION AND IDENTIFICATION OF TWO NOVEL PERCHLORATE-RESPIRING BACTERIA FROM A BIOREACTOR
James H. Campbell*, Joseph E. Faust, Randall M. Jeter, Department of Biological Sciences, Texas Tech University, Lubbock, TX, Lokesh Padhye, Audra Morse, and Andrew Jackson, Department of Civil Engineering, Texas Tech University, Lubbock, TX

P5 G CHARACTERIZATION OF THE CODING SEQUENCE OF THE HCF108 LOCUS OF *ZEA MAYS L*
Jennifer M. Heitmeyer, Midwestern State University, Wichita Falls, TX

P6 G GROWTH RESPONSES OF THE OBLIGATE OLIGOTROPHIC BACTERIUM *AGROMONAS OLIGOTROPHICA* TO NUTRIENT ADDITIONS
Joseph E. Faust*, James H. Campbell, Randall M. Jeter, and John C. Zak, Department of Biological Sciences, Texas Tech University, Lubbock, TX

P7 G PARTIAL PURIFICATION OF A FIBRINOLYTIC ENZYME FROM POOLED VENOM OF *AGKISTRODON PISCIVORUS LEUCOSTOMA*
Rosemary Ramirez*, Dr. John C. Perez, Natural Toxins Research Center (NTRC), Texas A&M University-Kingsville, Kingsville, TX

P8 G AN ECOLOGICAL ASSESSMENT OF THREE FAMILIES OF COLEOPTERA FROM THE CHIHUAHUAN DESERT OF WEST TEXAS
Stephanie M. Middleton*, Department of Biology, Midwestern State University, Wichita Falls, TX; Greg H. Broussard, Department of Entomology and Plant Pathology, Oklahoma State University, Stillwater, OK; and Michael M. Shipley, Department of Biology, Midwestern State University, Wichita Falls, TX

P9 S BIOMINERALIZATION OF EGGSHELLS IN AMERICAN ALLIGATORS
Francis R. Horne, Biology Department, Southwest Texas State University, San Marcos, TX

P10 G IN VITRO HAEMORRHAGIC ACTIVITY INHIBITION USING SOUTH AMERICAN OPOSSUM (*Didelphis marsupialis*) LIVER SPHEROID CULTURE
Luis M. Salgueiro-Tosta.*, John C. Pérez, Natural Toxins Research Center (NTRC), Texas A&M University-Kingsville, TX, and Francisco A. Rodríguez-Acosta, Instituto de Medicina Tropical. Universidad Central de Venezuela, Caracas, Venezuela

Botany
Session I
Friday Morning, March 5 • Weir 221

8:00 G# 26 AN INVESTIGATION OF RUST RESISTANCE IN FIVE INDIANGRASS (*Sorghastrum nutans* L. Nash) VARIETIES
John D. Matula* and Josephine Taylor, Stephen F. Austin State University, Nacogdoches, TX

8:20 G# 27 EFFECTS OF SEED PREDATION BY CURCULIO WEEVILS ON POST OAK (*QUERCUS STELLATA*) SEED GERMINATION AND SEEDLING GROWTH
Wendi K Moran*, Herbert D. Grover, Nancy Neble, and Rocky McAdams, Department of Biology, Hardin-Simmons University, Abilene, TX

8:40 S 28 TEXAS OAK WILT INFORMATION PARTNERSHIP
Damon E. Waitt*, Lady Bird Johnson Wildflower Center, Austin, TX

9:00 S 29 A VEGETATIVE KEY FOR THE IDENTIFICATION OF GRASSES (POACEAE) OF THE BALCONES CANYONLANDS OF TEXAS
Karl Hagenbuch and David E. Lemke*, Department of Biology, Texas State University, San Marcos, TX

9:20 S 30 CHARACTERIZATION OF A *THELYPTERIS* HYBRID FROM WALKER COUNTY, TEXAS
Tracy E. Willis and Joan E. N. Hudson* Department of Biological Sciences, Sam Houston State University, Huntsville, TX

9:40 S 31 SPECTRAL PATTERNS OF UV REFLECTANCE IN DIFFERENT PLANT SPECIES OF THE CONCHO VALLEY FLORA
Kremena G. Gineva*, Bonnie B. Amos and David Bixler, Angelo State University, San Angelo, TX

10:00 Break/Posters

11:50 Sectional Business Meeting

12:00 Lunch, Cailloux Activity Center

1:15 TAS Business Meeting, Dietert Auditorium

1:45 Distinguished Scientist Lecture, Dietert Auditorium

5:20 All section chairs meeting, Dietert Auditorium

6:00 Social Hour, Cailloux Activity Center

7:00 Banquet, Cailloux Activity Center

9:00 Social with cash bar, Cailloux Activity Center

Botany Posters

P11 S DEVELOPMENT OF WINGED CORK IN *ULMUS CRASSIFOLIA* NUTT
Ann E. Rushing* and Sonja M. Skrovanek, Department of Biology, Baylor University, Waco, TX

P12 C POTENTIAL PHYTOXIC MODE OF ACTION FOR A *RAMALINA DILACERATA* SECONDARY METABOLITE
Helen Vo*, Howard Vo*, and J.G. Romagni, University of St. Thomas, Biology Deptartment, Houston, TX

P13 S FLORA AND ECOLOGY OF NATURAL AND CONSTRUCTED WETLANDS ALONG THE LEON RIVER IN THE WESTERN CROSS TIMBERS, COMANCHE CO., TEXAS
Jeffrey S. Brister* and Allan D. Nelson, Tarleton State University, Stephenville, TX

P14 S BEYOND THE FENCE LINE: DISTRIBUTION OF *OPHIOGLOSSUM POLYPHYLLUM* (OPHIOGLOSSACEAE) WITHIN WEST TEXAS
Ryan A. Livingston, Paul A. Schlicting, Sheri J. Carlson, Patricia R. Manning, and James C. Zech, Department of Biology, Sul Ross State University, Alpine, TX

Chemistry
Session I
Friday Morning, March 5 • Weir 211

8:20 G# 32 SYNTHESIS AND X-RAY DIFFRACTION OF ALKALI AND ALKALINE EARTH METAL ORTHONITRATES
Richard H. Langley and Christine A. Strouse*, Department of Chemistry, Stephen F. Austin State University, Nacogdoches, TX

8:40 C# 33 GADOLINIUM-DOPED CERIUM OXIDE FILMS FROM GADOLINIUM AND CERIUM ALKOXIDE PRECURSORS
Derrick Smith*, Texas Southern University, Houston, TX, and David M. Hoffman, Sherrika Daniel, Jun Guan, and Jean-Sebastien Lehn, Department of Chemistry and Center for Materials Chemistry at University of Houston, Houston, TX

9:00 G# 34 TIME DEPENDENCE OF THE SPECTRA OF METHYLENE BLUE/CALCIUM-HECTORITE CLAY MINERAL SUSPENSIONS
Dustin S. Barnes and Alyx S. Frantzen, Stephen F. Austin State University, Nacogdoches, TX

9:20 G# 35 ENTHALPY OF HYDRATION OF MONTMORILLONITE CLAYS THROUGH CALORMINETRIC METHODS
Jason H. Cole* and Alyx S. Frantzen Department of Chemistry, Stephen F. Austin State University, Nacogdoches, TX

9:40 S 36 FRUSTRATED INTERCALATION IN MONTMORILLONITE CLAYS
E.J. Acosta, Y. Deng, G.N. White, J.B. Dixon, K.J. McInnes, S.A. Senseman, E.E. Simanek, Texas A&M University, College Station, TX and A.S. Frantzen*, Stephen F. Austin State University, Nacogdoches, TX

10:00 Posters

10:30 G# 37 DETERMINATION OF ARSENIC IN DRINKING WATER USING HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY
Charlotte A. Smith* and Yuanjian Deng, Department of Chemistry, Texas Southern University, Houston, TX

10:50 G# 38 SPECIATION AND DETERMINATION OF CHROMIUM(III) AND (VI) WITH HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
Wenluo Zhang* and Yuanjian Deng, Department of Chemistry, Texas Southern University, Houston, TX

11:10 G# 39 HEATS OF COMBUSTION OF COAL SAMPLES
Jennifer C. Rohrer*, Alyx S. Frantzen, Department of Chemistry, Stephen F. Austin State University, Nacogdoches, TX

11:30 S 40 CONFORMATIONAL EFFECTS ON THE PHOTOCHEMISTRY OF BICYCLIC OXIRANES
Rick C. White*, Katherine M. White, and Benny E. Arney, Department of Chemistry, Sam Houston State University, Huntsville, TX

11:50 Sectional Business Meeting

12:00 Lunch, Cailloux Activity Center

1:15 TAS Business Meeting, Dietert Auditorium

1:45 Distinguished Scientist Lecture, Dietert Auditorium

Chemistry
Session II
Friday Afternoon, March 5 • Weir 211

2:40 S	41	THERMAL 2PI+2PI DIMERIZATION OF 1-VINYLCYCLOPROPENES TO TRANS-1, 2-DIVINYLTRICYCLO[3.1.0.0(2,4)]HEXANES: A CASE OF SEQUENTIAL CONICAL INTERSECTIONS Benny E. Arney, Jr.*, Molly Gutierrez, Department of Chemistry, Sam Houston State University, Huntsville, TX
3:00 G	42	RESOLUTION OF 2,2'-DIHYDROXY-1,1'-BINAPTHYL SULFIDE VIA DIASTEREOMERIC PHOSPHATES Christina R. Zeigler* and John B. Sapp, Department of Chemistry and Environmental Toxicology, Texas Southern University, Houston, TX
3:20 C#	43	SYNTHESIS OF NEW FLUORINATED DERIVATIZING AGENTS FOR CARBONYL COMPOUNDS J. T. Mayo, Andria Kowis, W. N. Tinnerman and Thomas B. Malloy, Jr., Department of Chemistry, University of St. Thomas, Houston, TX
3:40 G#	44	LIQUID CHROMATOGRAPHIC ANALYSIS OF POLYMER-BOUND N-(4-HYDROXYPHENYL) RETINAMIDE Xianyi Cao and Chun Li, Department of Diagnostic Radiology, Division of Diagnostic Imaging, University of Texas M. D. Anderson Cancer Center, Houston, TX, and Jianxin Lin* and Yuanjian Deng, Department of Chemistry, Texas Southern University, Houston, TX
4:00 C#	45	GC/MS APPLICATIONS IN THE UNDERGRADUATE ORGANIC LAB: DEUTERIUM EXCHANGE IN ISOMERIC ACYCLIC C-7 KETONES Mariam Abdul-latif*, Sibyl Abraham*, W. N. Tinnerman, and Thomas B. Malloy, Department of Chemistry & Physics, University of St. Thomas, Houston, TX
4:20 C	46	CALCULATION OF THE ENERGIES ASSOCIATED WITH ENANTIOMERS OF 2,2'-DIHYDROXY 1,1'-BINAPHYL SULFIDE Yonas Gebremichael* and John B. Sapp, Department of Chemistry, Texas Southern University, Houston, TX
4:40 C#	47	PARTIAL PURIFICATION AND CHARACTERIZATION OF A POTENTIAL RUBREDOXIN FROM ANABAENA 7120 Annie Mancha*1, Conrad R. Fjetland2, Mary Kopecki-Fjetland1, 1Department of Chemistry and Biochemistry, St. Edward's University, Austin, TX; 2 Department of Chemistry and Biochemistry, University of Texas at Austin, Austin, TX
5:00 C#	48	PROTON INTERACTIONS WITH GAS TARGETS Emiliano Garcia*, David Bixler, Angelo State University Physics Department, San Angelo, TX
5:20		**All section chairs meeting, Dietert Auditorium**
6:00		**Social Hour, Cailloux Activity Center**
7:00		**Banquet, Cailloux Activity Center**
9:00		**Social with cash bar, Cailloux Activity Center**

Chemistry Posters

P15 C# ELECTRON AND CHEMICAL IONIZATION MASS SPECTROMETRY CHARACTERIZATION OF SECONDARY METABOLITES EXTRACTED FROM LICHENS
Claudia Oviedo, Rannieri Cocciani, Joanne G. Romagni and Thomas B. Malloy. Department of Chemistry and Department of Biology, University of St. Thomas, Houston, TX

P16 C AGRICULTURAL, MIMA MOUND, AND FOREST SOIL ANALYSIS FROM SHELDON LAKE STATE PARK
Daniel Haddock* and Scott Slough, University of Houston-Downtown, Houston, TX

P17 C# TRYPTIC MAPS BY CAPILLARY ELECTROPHORESIS
Daniel Horrell* and Robert Holloway, Schreiner University, Kerrville, TX

P18 C THE REDUCTION OF QUINONES
D. Ponds, Texas Southern University, J. Miller, Brookhaven National Labratory, A. Funston, Brookhaven National Labratory, A. Cook, Brookhaven National Laboratory

P19 S SYNTHESIS OF THIOPHENE AND DITHIOPHENE COMPOUNDS
Sarah A. Mankin*, Christopher E. Hobbs*, Donna K. Howell, Angelo State University, Department of Chemistry and Biochemistry, San Angelo, TX

P20 C# THE ALZHEIMER'S ALUMINUM CHOLESTEROL LINKAGE
Emily Colyer, Howard Payne University, Brownwood, TX

P21 C 1,2-ALKYL MIGRATIONS IN 1,3-DIRADICALS
Katherine M. White* Benny E. Arney, Kim S. Mangus, Phil W. Livanec, and Rick C. White, Department of Chemistry, Sam Houston State University, Huntsville, TX

P22 S EFFECTORS OF MUSHROOM TYROSINASE ACTIVITY
Sabrina Jones* and Mary F. Plishker, Sam Houston State University, Huntsville, TX

P23 C# COMPARISON OF ACRYLAMIDE CONTENT IN SNACK CHIPS VIA HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
Soumaly Rattanasavanh*, Jonathan Wagner, Nick Flynn, Angelo State University, Chemistry and Biochemistry Dept, San Angelo, TX

P24 C# ISOLATION OF APP: TITRATION OF ACETOMETAPHINE, ASPERTANE, AND MSG
Jessica Rodriquez*, Howard Payne University, Brownwood, TX

P25 C# SEQUENTIAL SIMPLEX OPTIMIZATION OF A GC SEPARATION OF HEXANE, CHLOROFORM, AND 2-METHYL-2-PENTENE
Shirmeen Lakhani*, John A. Palasota, and William N. Tinnerman, II, Department of Chemistry & Physics, University of St. Thomas, Houston, TX

Computer Science
Session I
Friday Morning, March 5 • Weir 120

10:00 **Break/Posters**

11:50 **Sectional Business Meeting**

12:00 **Lunch, Cailloux Activity Center**

1:15 **TAS Business Meeting, Dietert Auditorium**

1:45 **Distinguished Scientist Lecture, Dietert Auditorium**

Computer Science
Session II
Friday Afternoon, March 5 • Weir 120

2:40 C# 49 EVALUATION OF SOFTWARE BASED FIREWALLS
James D. Pringle* and James McGuffee, St. Edward's University, Austin, TX

3:00 C# 50 ROBOT TEAMWORK
John J. Pearce* and Mary Z. Last, St. Edward's University, Austin, TX

3:20 C# 51 PACKET SNIFFING OVER WIRELESS CONNECTIONS
Raul Hinojosa* and James McGuffee, St. Edward's University, Austin, TX

3:40 C# 52 CRYPTOGRAPHY AND ENCRYPTION: IMPLEMENTING THE BLOWFISH ALOGRITHM
Shaun Encarnacion*, Jerry Garcia, Mary Last, and James McGuffee, St. Edward's University, Austin, TX

5:20 **All section chairs meeting, Dietert Auditorium**

6:00 **Social Hour, Cailloux Activity Center**

7:00 **Banquet, Cailloux Activity Center**

9:00 **Social with cash bar, Cailloux Activity Center**

Conservation and Management
Session I
Friday Morning, March 5 • Weir 006

10:00 **Break/Posters**

11:50 **Sectional Business Meeting**

12:00 **Lunch, Cailloux Activity Center**

1:15 **TAS Business Meeting, Dietert Auditorium**

1:45 **Distinguished Scientist Lecture, Dietert Auditorium**

Conservation and Management
Session II
Friday Afternoon, March 5 • Weir 006

2:40 G	53	CHARACTERIZATION OF SECTION 404 PERMIT PLANS IN THE UPPER TEXAS COAST April A. T. Conkey, Wildlife & Fisheries Sciences, Texas A&M University, College Station, TX
3:00 G#	54	PHENOTYPIC PLASTICITY CAN AFFECT THE SUCCESS OF FISH LIVING AMONG DIFFERENT HABITAT TYPES Clifton B. Ruehl, Texas A&M University
3:20 S	55	AQUIFER-DEPENDENT FISHES OF THE EDWARDS PLATEAU REGION Robert J. Edwards*, Department of Biology, University of Texas-Pan American, Edinburg, TX, Gary P. Garrett, HOH Fisheries Science Center, Texas Parks and Wildlife Department, Ingram, TX, and Nathan L. Allan, Austin Ecological Services Field Office, U.S. Fish and Wildlife Service, Austin, TX
3:40 G#	56	ACCURACY ASSESSMENT OF SATELLITE IMAGERY USED IN DELINEATING GROUNDCOVER FOR THE PURPOSE OF IDENTIFYING GOLDEN-CHEEKED WARBLER HABITAT AT CAMP BULLIS, TEXAS Susan Ann Harris, M.S. The University of Texas at San Antonio, 2003 Supervising Professor: Dr. Stephen C. Brown
5:20		**All section chairs meeting, Dietert Auditorium**
6:00		**Social Hour, Cailloux Activity Center**
7:00		**Banquet, Cailloux Activity Center**
9:00		**Social with cash bar, Cailloux Activity Center**

Environmental Science
Session I
Friday Morning, March 5 • Weir 110

8:20 C#	57	AN ANALYSIS OF WASTEWATER TREATMENT PROCESSES: EVALUATING AMMONIA-NITROGEN, *E. COLI* AND TOTAL SUSPENDED SOLIDS, AND TRIHALOMETHANES Kathy Dial*, Rafael Gonzales, Jr., and Eloy Hernandez with Dr. Alakananda Chauduri, Dr. Edward Gonzalez, and Donna Wilkes, Department of Chemistry, University of the Incarnate Word, San Antonio, TX
8:40 S	58	ECOLOGICAL AND HYDROLOGICAL STUDIES OF THE SAN ANTONIO RIVER AT THE UNIVERSITY OF THE INCARNATE WORD, SAN ANTONIO, TEXAS Dr. Bonnie McCormick* and Dr. William F. Thomann, University of the Incarnate Word, San Antonio, TX
9:00 S	59	NATURAL SOURCES OF POOR WATER QUALITY IN STREAMS OF EAST TEXAS E.B. Ledger*, Geology and Environmental Science, Stephen F. Austin State University eledger@sfasu.edu, and Kathy Judy, Blinn College
9:20 S	60	ENVIRONMENTAL WATER QUALITY CHARACTERIZATION OF THE TEXAS COAST FROM NATIONAL COASTAL ASSESSMENT DATA James D. Simons, Texas Parks and Wildlife Department, Corpus Christi, TX, and Laura Lessin, Texas Water Development Board, Austin, TX
9:40 S	61	NATURAL SOURCE OF ARSENIC IN EAST TEXAS LAKE SEDIMENTS Kathy Judy*, Department of Geology, Blinn College, Bryan, TX, E.B. Ledger, and Chris A. Barker, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

10:00		**Break/Posters**
10:30 ?#	62	ASSESSMENT OF VOLATILE ORGANIC COMPOUNDS IN INDOOR PARKING FACILITIES OF HOUSTON, TEXAS Gabriel.A.Kristanto*, Bobby Wilson. Department of Chemistry, Environmental Toxicology, Texas Southern University, Houston, TX
10:50 G	63	INDENTIFICATION AND INTERPRETATION OF CONCENTRATIONS OF ATMOSPHERIC ORGANIC COMPOUNDS IN HARRIS COUNTY, TEXAS Felicia L. Conley*, Renard L. Thomas, and Bobby L. Wilson. Department of Chemistry, Environmental Toxicology, Texas Southern University, Houston, TX
11:10 C	64	AN ASSESSMENT OF IN-VEHICLE VOCS DURING RUSH HOUR COMMUTES IN HOUSTON METROPOLITAN AREAS Siobhan L. Tarver*, Tara N. Gainey, Felicia L. Conley, and Bobby L. Wilson. Environmental Research Technology Transfer Center (ERT2C), Texas Southern University, Houston, TX
11:30 S	65	15 YEARS OF OBSERVATIONS OF UV, OPTICAL DEPTH, THE OZONE AND WATER VAPOR COLUMNS AND TREE RINGS AT GERONIMO CREEK OBSERVATORY Forrest M. Mims III, Geronimo Creek Observatory, Seguin, TX
11:50		**Sectional Business Meeting**
12:00		**Lunch, Cailloux Activity Center**
1:15		**TAS Business Meeting, Dietert Auditorium**
1:45		**Distinguished Scientist Lecture, Dietert Auditorium**

Environmental Science
Session II
Friday Afternoon, March 5 • Weir 110

2:40 C	66	PRELIMINARY ANALYSIS OF SENSITIVE SOIL CONTAMINATION IN SOUTHERN BRAZORIA COUNTY USING INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY (ICP-MS) Katoria R. Tatum*, Douglas M. Willis and Bobby Wilson. Environmental Research Technology Transfer Center (ERT2C), Texas Southern University, Houston, TX
3:00 G#	67	A REVIEW OF THE TOXIC METABOLITES FROM *STACHYBOTRYS* SPECIES Veronica M. Amaku*, Olufisayo Jejelowo, John Sapp, Mofolorunsho Enigbokan, Tyronne Felder, Joseph Jones and Bobby Wilson. Center of Excellence for Biotechnology & Environmental Health, Texas Southern University, Houston, TX
3:20 C	68	DETERMINATION OF VOCs IN NEW AND NEWLY RENOVATED BUILDINGS AT TEXAS SOUTHERN UNIVERSITY Ahtavea Castellanos*, Felicia Conley, and Bobby Wilson. Environmental Research Technology Transfer Center (ERT2C), Texas Southern University, Houston TX
3:40 C	69	PROHIBITED EXOTIC SPECIES ASSOCIATED WITH TEXAS ASIAN-AMERICAN COMMUNITIES Jaimie E. Maher, Schreiner University, Kerrville, TX, and Robert G. Howells, Texas Parks and Wildlife Department, Ingram, TX.
4:00 S	69A	INDUCED TOLERANCE AND THE POTENTIAL TO USE SUNFLOWERS FOR PHYTOREMEDIATION OF ARSENIC Kirk V. Cammarata*, Laura C. Markley, and Katherine Sippel, Texas A&M University-Corpus Christi, Corpus Christi, TX

5:20 **All section chairs meeting, Dietert Auditorium**

6:00 **Social Hour, Cailloux Activity Center**

7:00 **Banquet, Cailloux Activity Center**

9:00 **Social with cash bar, Cailloux Activity Center**

Environmental Science Posters

P26 S MICROBIAL ANALYSIS OF MARS SIMULANT SOIL
Dipal Patel*, Poonam Gulati and Penny Morris-Smith, University of Houston-Downtown, Houston, TX

P27 C DIVERSITY OF *FUSARIUM* SPECIES IN COASTAL PRAIRIE SOILS AT SHELDON LAKE STATE PARK
Leslie G. Cook and Philip C. Lyons, University of Houston-Downtown, Houston, TX

P28 C# IMPACT AND CONCENTRATION DETERMINATION OF MERCURY IN SANDHILL CRANES (*GRUS CANADENISIS*)
Leslie Patterson*, Howard Payne University, Brownwood, TX

P29 S THE FUTURE OF TEXAS AIR: AUSTIN AND OZONE
Lynn Kirby, Jane Thomson, Jasmine Thum, Chloe Tuck and Amanda Villarreal, Kealing Magnet School, Austin, TX

P30 G AEROSOL OPTICAL THICKNESS MEASUREMENTS OF THE SKY AT SAN MARCOS AND SEGUIN, TEXAS, DURING SUMMER OF 2003
Muhammad Tauhidur Rahman*, Brandy Bagnall, Julie Westerlund, Texas State University - San Marcos, San Marcos, TX, Lans Martin, Seguin High School, Seguin, TX, and Forrest M Mims III, Geronimo Creek Observatory, Seguin, TX

P31 S AMMONIA EXTRACTION FROM SWINE URINE
Paul A. Loeffler*, Cody Craig, and Sarah Spikes, Department of Chemistry, Sam Houston State University, Huntsville, TX

P32 S EVALUATION OF MICROBIAL COMMUNITIES, SOIL PROPERTIES AND ANIMAL AND PLANT DIVERSITY PRIOR TO RESTORATION OF COASTAL TALL GRASS PRAIRIE
Philip C. Lyons, Lisa D. Morano, Poonam Gulati, Scott Slough, and Deanna McCullough, University of Houston-Downtown, Houston, TX

P33 S ISOLATION AND CHARACTERIZATION OF FUNGI FROM COASTAL PRAIRIE SOILS AT SHELDON LAKE STATE PARK
Leslie G. Cook, Blythe Parham, Linu Mathew, Stephanie Cabrera, and *Philip C. Lyons, University of Houston-Downtown, Houston, TX

P34 C THE DISTRIBUTION OF THE DIFFERENT DUNG BEETLES THROUGHOUT AN URBAN AREA
Rebecca M Ashdown, Texas Lutheran University.

P35 S THE EFFECT OF CITYWIDE RECYCLING PROGRAMS AS A MEANS OF REDUCING RELIANCE ON LANDFILLS
Tricia M. Jarrott*, Sir VanLawrence Franks, Antonio Gomez, Raymond Selby, Kealing Junior High School, Austin, TX

P36 C# ANTIDEPRESSANTS AS EMERGING AQUATIC CONTAMINANTS: INDIVIDUAL AND MIXTURE EFFECTS ON SELECT MICROORGANISMS. Temidayo Fadelu*, Elizabeth A. Glidewell, Rene D. Massengale and Bryan W. Brooks, Departments of Biology and Environmental Studies, Baylor University, Waco, TX.

P36A G# RAPID MSE AND HPLC METHOD OF BENZO(a)PYRENE IN FISH. Mohamed H. EL-Saeid*, Biomarkers and Environmental Toxicology Laboratory, Chemistry Department, Texas Southern University, Houston, TX

Freshwater and Marine Science
Session I
Friday Morning, March 5 • Weir 212

8:00 G#	70	BACTERIAL CARBON SUBSTRATE UTILIZATION PATTERNS AT THE SEDIMENT-WATER INTERFACE B.W. Christian, Center for Reservoir and Aquatic Systems Research, Department of Biology, Baylor University, Waco, TX
8:20 G#	71	SPATIAL AND TEMPORAL VARIATION IN BIOGENIC SILICA RESUSPENSION WITHIN A POLYMICTIC RESERVOIR Christopher T. Filstrup, Center for Reservoir and Aquatic Systems Research, Department of Biology, Baylor University, Waco, TX
8:40 C#	72	EPIPHYTE LOAD ON ARTIFICIAL SEAGRASS BLADES IN THE LOWER LAGUNA MADRE, TX Leonardo Saldana and Hudson DeYoe, Biology Dept. University of Texas Pan American, Edinburg, TX
9:00 G	73	USE OF TISSUE NUTRIENT CONTENT OF THE MACROALGA *LAURENCIA POITEAUI* TO DETECT EUTROPHICATION IN THE LOWER LAGUNA MADRE, TX Onur Dundar* and Hudson DeYoe, Biology Dept. University of Texas Pan American, Edinburg, TX
9:20 C#	74	TRACE METALS IN EPIPHYTES ASSOCIATED WITH *THALASSIA TESTUDINUM* LEAVES Yoshiaki Yoshida*, Juan Reynoso, Thomas Whelan III, Maria CottaGoma, Hudson DeYoe, University of Texas-Pan American, Edinburg, TX
9:40 G#	75	SPATIAL TRENDS IN PERIPHYTON NUTRIENT STATUS: EXAMINATION ALONG A DIFFERENTIAL NUTRIENT DEPLETION GRADIENT IN A FRESHWATER MARSH Thad Scott*, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX, Robert Doyle, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX, and Tom Conry, City of Waco, Waco, TX
10:00		**Break/Posters**
10:30 G#	76	MACROPHYTE COMMUNITY CHANGE IN THE SAN MARCOS AND COMAL RIVER Robin Swindle* and Robert Doyle, Baylor University Center for Reservoir and Aquatic System Research, Waco, TX
10:50 C#	77	HYDROGEN SULFIDE IN PORE WATERS OF A *THALASSIA TESTUDINUM* MEADOW IN THE LOWER LAGUNA MADRE David Camacho, Thomas Whelan III, Hudson DeYoe, and Maria CottaGoma, University of Texas-Pan American, Edinburg, TX
11:10 C#	78	PHYSIOLOGICAL RESPONSES OF *THALASSIA TESTUDINUM* TO TRACE METAL EXPOSURE Maria CottaGoma*, Thomas Whelan III, David Camacho, and Hudson DeYoe, University of Texas-Pan American, Edinburg, TX
11:30 G	79	RIPARIAN RESPONSE TO HYDROLOGIC FLUX IN THE DOWNSTREAM REACH OF AN IMPOUNDED 2nd ORDER STREAM Jacquelyn R. Duke* and Dr. Joseph D. White, Baylor Univ. Biology Dept., Dr. Peter Allen, BU Geology Dept. and Dr. Ranjan Muttiah, TEAS
11:50		**Sectional Business Meeting**
12:00		**Lunch, Cailloux Activity Center**
1:15		**TAS Business Meeting, Dietert Auditorium**
1:45		**Distinguished Scientist Lecture, Dietert Auditorium**

Freshwater and Marine Science
Session II
Friday Afternoon, March 5 • Weir 212

2:40 G# 80 IMPROVEMENTS IN WATER QUALITY FOLLOWING RENOVATION OF A WATER SUPPLY RESERVOIR
Matthew M. Chumchal*, University of Oklahoma, Norman, OK, Ray W. Drenner, Texas Christian University, Fort Worth, TX, David H. Marshall, Jennifer L. Owens and Mark R. Ernst, Tarrant Regional Water District, Fort Worth, TX

3:00 S 81 TEXAS TIDAL STREAM AQUATIC LIFE USE ATTAINABILITY
Cindy H. Contreras*, David Buzan, Grace Chen, Ph.D., Greg Conley, Winston Denton, Josh Harper, Kay Jenkins, Nathan Kuhn, Steven Mitchell, Dan Moulton, Ph.D., Melissa Mullins, Smiley Nava, Janet Nelson, Chad Norris, Cherie O'Brien, Pat Radloff, Ph.D., Michael Ratcliff, Margaret Scarborough, James Tolan, Ph.D., Michael Weeks, and Adam Whisenant; Resource Protection Division, Texas Parks and Wildlife Department, Austin, TX

3:20 S 82 TOXIC CONTAMINANT CHARACTERIZATION OF ESTUARINE SEDIMENT AND ORGANISMS ON THE TEXAS COAST
Charles R. Smith*, Texas Parks and Wildlife Department (TPWD), Austin, TX, James D. Simons, TPWD, Corpus Christi, TX, Pamela Hamlett, TPWD, San Marcos, TX, David M. Klein, TPWD, San Marcos, TX, and Gary Steinmetz, TPWD, San Marcos, TX

3:40 S 83 COMPARISON OF EPIPYTIC DIATOM COMMUNITIES ON MARINE SEA GRASS *HALODULE WRIGHTII* IN THE LOWER LAGUNA MADRE BELOW SEWAGE EFFLUENT WITH AND WITH OUT WETLANDS
Hudson DeYoe, Dept. of Biology University of Texas-Pan American, Edinburg, TX, and Cheryl Allen Gilpin*, Phycologist, Environmental Consulting and Photomicroscopy Services, San Marcos, TX

4:00 S 84 PLANKTONIC NITROGEN FIXATION IN LAKE WACO: HOT SPOTS AND HOT MOMENTS
Robert Doyle, Baylor University Center for Reservoir and Aquatic Systems Research, Waco, TX, and Tom Conry, City of Waco, Waco, TX

4:20 S 85 AQUATIC PLANT GROWTH RESPONSES TO WATER WITH LOW CO2 CONCENTRATIONS
Cynthia Gorham-Test*, BIO-WEST, Inc.; Edmund Oborny, BIO-WEST, Inc., Kristine Dennis Parkerson; Paula Powers, USFWS National Fish Hatchery and Technology Center; Randy Gibson, USFWS National Fish Hatchery and Technology Center

4:40 S 86 BACTERIA SOURCE TRACKING IN COASTAL TEXAS WATERS USING PULSE FIELD GEL ELECTROPHORESIS
Roy L. Lehman* and Joanna B. Mott, Center for Coastal Studies, Texas A&M University-Corpus Christi, Corpus Christi, TX

5:00 ? 87 TWO YEAR PHYTOPLANKTON SPECIES DISTRIBUTION ANALYSIS OF FT. COBB RESERVOIR, OKLAHOMA EVALUATING TECHNIQUES FOR CONTROLLING TOXIC BLUEGREEN CYANOBACTERIA
James Fairchild, Research Ecologist, USGS, Columbia, MO, and Cheryl Gilpin*, Phycologist, Environmental Consulting and Photomicroscopy Services, San Marcos TX

5:20 All section chairs meeting, Dietert Auditorium

6:00 Social Hour, Cailloux Activity Center

7:00 Banquet, Cailloux Activity Center

9:00 Social with cash bar, Cailloux Activity Center

Freshwater and Marine Science
Session III
Saturday Morning, March 6 • Weir 101

8:00 S 88 METAL PARTITIONING BETWEEN *THALASSIA TESTUDINUM* AND SEDIMENT IN THE LOWER LAGUNA MADRE, TEXAS
Thomas Whelan III*, Jorge Espinoza, Xiomara Villarreal, and Maria CottaComa, University of Texas-Pan American, Edinburg, TX

8:20 S 89 EFFECT OF DRIFTING SEAWEED ON SEAGRASS SURVIVAL IN THE LAGUNA MADRE, TX
Hudson DeYoe, David Camacho, Thomas Whelan III, and Joseph Kowalski. Center for Subtropical Studies, University of Texas-Pan American, Edinburg, TX

8:40 S 90 SEASONAL LEAF CHLOROPHYLL DYNAMICS IN *HALODULE WRIGHTII* (SHOAL GRASS)
Joseph L. Kowalski* and Terry C. Allison, University of Texas-Pan American, Department of Biology, Edinburg, TX

9:00 S 91 A LOWER RIO GRANDE BENTHIC INDEX OF BIOLOGICAL INTEGRITY
Brad Henry, Department of Biology, University of Texas-Pan American, Edinburg, TX

9:20 S 92 IDENTIFICATION OF A TEXAS OPHIACTID BRITTLE STAR USING MOLECULAR TECHNIQUES
Ana B. Christensen, Biology Department, Lamar University, Beaumont, TX, and Eric F. Christensen, USDA-ARS

9:40 S 93 MAPPING OF OYSTER REEFS AND ANTHROPOGENIC IMPACTS IN LAVACA BAY, TEXAS
Josh Harper* and James Simons, Texas Parks and Wildlife Department, Corpus Christi, TX, Tim Dellapenna and Jason Bronikowski, Texas A&M University, Galveston, TX, William Sager and Mary Patch, Texas A&M University, College Station, TX

10:00 Break/Posters

10:30 S 94 DISTRIBUTION AND ECOLOGICAL IMPACT OF ASIAN CLAM IN TEXAS
Alexander Y. Karatayev*, Lyubov E. Burlakova, Stephen F. Austin State University, Nacogdoches, TX; Robert G. Howells, Texas Parks and Wildlife Department, Ingram, TX; Brian D. Sewell, and Rhonda L. Mood, Stephen F. Austin State University, Nacogdoches, TX

10:50 S 95 FRESHWATER MUSSELS OF THE SAN MARCOS-BLANCO RIVER BASIN: HISTORY AND STATUS
Robert G. Howells*, Texas Parks and Wildlife Department, Ingram, TX, and Paula Power, U.S. Fish and Wildlife Service, San Marcos, TX

11:10 S 96 FACTORS LIMITING DISTRIBUTION OF FRESHWATER MUSSELS IN TEXAS PONDS
Lyubov E. Burlakova*, Alexander Y. Karatayev, Stephan F. Austin State University, Nacogdoches, TX; and Robert G. Howells, Texas Parks and Wildlife Department, Ingram, TX

11:30 S 97 NESTING SUCCESS AND ECOLOGY OF SNOWY PLOVER (*CHARADRIUS ALEXANDRINUS*) IN NUECES COUNTY, TEXAS: PRELIMINARY RESULTS
Michelle R. Kolar* and Kim Withers, Center for Coastal Studies, Texas A&M University-Corpus Christi, Corpus Christi, TX

Freshwater and Marine Science Posters

P37 S AN ANNOTATED CHECKLIST OF FRESHWATER CLADOCERANS FROM TEXAS, U.S.A.
Carlos Lopez* Departamento de Biologia. Facultad Experimental de Ciencias. Universidad del Zulia. Apdo. 526. Maracaibo 4011-A. Venezuela. Presently Visiting Research Professor, Limnology Laboratory. Department of Biology, Baylor University, Waco, TX and Owen Lind. Limnology Laboratory. Department of Biology, Baylor University, Waco, TX

P38 S CLADOCERANS (ANOMOPODA AND CTENOPODA) FROM RESERVOIRS IN CENTRAL TEXAS, U.S.A.
Carlos Lopez* Departamento de Biologia. Facultad Experimental de Ciencias. Universidad del Zulia. Apdo. 526. Maracaibo 4011-A. Venezuela. Presently Visiting Research Professor, Limnology Laboratory. Department of Biology, Baylor University, Waco, TX and Owen Lind. Limnology Laboratory. Department of Biology, Baylor University, Waco, TX

P39 G MARINE DIATOM EPIPHYTES IN THE LOWER LAGUNA MADRE, TEXAS
Cheryl Allen Gilpin, Phycologist, Environmental Consultating, Photomicroscopy Services

P40 C DETECTION OF ASCORBATE PEROXIDASE ACTIVITY IN *AIPTASIA PALLIDA*
Bui, D., Tran, M.K., Tran, M., and Romagni, J.G., The University of St. Thomas, Houston, TX

P41 C GENETIC EVALUATION OF *HALODULE BEAUDETTEI* DIVERSITY ALONG THE SOUTH TEXAS GULF COAST USING A RANDOMLY AMPLIFIED POLYMORPHIC DNA PROCEDURE
Joyce E. Parker*, Krista L. Storey, Patrick D. Larkin, Department of Physical and Life Sciences, Texas A&M University-Corpus Christi, and Beau Hardegree, Texas Parks and Wildlife Department, Resource Protection Division, Natural Resources Center, Texas A&M University-Corpus Christi

P42 G EFFECT OF SMECTITE AND KAOLINITE CLAYS ON PHOSPHORUS UPTAKE BY STREAM PERIPHYTON
June E. Wolfe, III*, TAES/Blackland Research Center, Temple, TX, and Owen T. Lind, Baylor University Biology Department, Waco, TX

P43 C THE ROLE OF SIGNALING IN THE SYMBIOTIC *AIPTASIA PALLIDA*
Ly Huynh*, Nida Chhotani, University of St. Thomas, Houston, TX

P44 S LONG-TERM CHANGES IN ASSEMBLAGES OF LARVAL DRAGONFLIES (ODONATA: ANISOPTERA) IN THE GUADALUPE RIVER BASIN
Mark P. Gustafson*, G. Williams, H. Davis, and D. Henrichs. Texas Lutheran University, Seguin, TX

P45 ? COMMUNITY STRUCTURE AND FUNCTION OF MITIGATED VS. NATURAL SEAGRASS BEDS ALONG THE SOUTH TEXAS COAST
Michael Mahala*, Greg Stunz, and Elizabeth Smith, Texas A&M University-Corpus Christi, Corpus Christi, TX

P46 ?# SPATIAL VARIABILITY IN TEXAS FRESHWATER FISH DIVERSITY
Molly Dillender*, William Dailey and André M. Landry, Jr., Texas A&M University, Galveston, TX

P47 S VARIATION OF FLIGHT ACTIVITY BEHAVIOR FOR TWO GENERA OF CENTRAL TEXAS DRAGONFLIES
Thomas Chiu, Darrell S. Vodopich, and Sharon A. Conry*, Baylor University, Waco, TX

P48 C INDUCTION AND REALIZATION OF SUPEROXIDE DISMUTASE (SOD) ISOZYMES IN *APTASIA PALLIDA*
Fullerton, S.*, Le, T., Rajan, J., and Romagni, J. University of St. Thomas, Dept. of Biology, Houston, TX

P49 C IDENTIFYING GENETIC DIVERSITY AND GENE FLOW AMONG POPULATIONS OF *THALASSIA TESTUDINUM* BY A RANDOM AMPLIFIED POLYMORPHIC DNA (RAPD) PROCEDURE
Stephanie R. Salinas*, Elizabeth Quevedo1, Beau Hardegree2 and Patrick D. Larkin1. 1Department of Physical and Life Sciences, 1Texas A&M University-Corpus Christi, 2Texas Parks and Wildlife Department, Resource Protection Division, Natural Resources Center, Texas A&M University-Corpus Christi.

Geology and Geography
Session I
Friday Morning, March 5 • Weir 111

8:20 G	98	MAMMALIAN DIVERSITY AS A PALEOCLIMATIC INDICATOR IN HALL'S CAVE, KERR COUNTY, TEXAS Christian O. George* and Dennis R. Ruez, Jr., Jackson School of Geosciences, The University of Texas at Austin, Austin, TX
8:40 G	99	NEW PALEONTOLOGICAL INVESTIGATIONS AT CATHEDRAL CAVE, NEVADA Christopher N. Jass, Department of Geological Sciences, The University of Texas at Austin, Austin, TX
9:00 S	100	FORENSIC APPLICATIONS OF PALYNOLOGY H. Steven Dittrich, Geoscience Data Management, Inc., Plano, TX
9:20 S	101	FIRST RECORD OF THE MONSTER CROCODILE *DEINOSUCHUS* IN MEXICO James Westgate* and Jeffrey Pittman, Department of Geology, Lamar University, Beaumont, TX; Dana Cope, Department of Sociology and Anthropology, College of Charleston, Charleston, S. C.; and R. B. Brown, Instituto Nacional de Antropologia E Historia, Chihuahua, MX
9:40 S	102	TWISTED IN TEXAS: MEASURING TIGHT FOLDS ON THE FIRST DAY OF FIELD CAMP Chris A. Barker* and R. LaRell Nielson, Dept. of Geology, Stephen F. Austin State University, Nacogdoches, TX
10:00		**Break/Posters**
10:30 S	103	THE WALKER LANE, NEVADA AND TEXAS LINEAMENT: SIMILAR TRANSTENSIONAL FAULT ZONES Joseph I. Satterfield, Department of Physics, Angelo State University, San Angelo, TX
10:50 C	104	IMAGING SHALLOW STRUCTURE OF THE SAN ANDREAS FAULT WITH SEISMIC REFRACTION DATA Kori Brown*, Texas Southern University Mentor: Robert Clayton, California Institute of Technology
11:10 S	105	APPLICATION OF POLARIZATION MICROSCOPY TO PROCESS MINERALOGY: PRINCIPAL ASPECTS AND EDUCATIONAL CONSEQUENCES Volker W. Göbel, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX
11:30 S	106	HYDROGEOMORPHIC ANALYSIS OF MUCK WETLANDS AT GUS ENGELING WILDLIFE MANAGEMENT AREA, ANDERSON COUNTY, TEXAS Carol A. Thompson, Tarleton State University, Stephenville, TX
11:50		**Sectional Business Meeting**
12:00		**Lunch, Cailloux Activity Center**
1:15		**TAS Business Meeting, Dietert Auditorium**
1:45		**Distinguished Scientist Lecture, Dietert Auditorium**
5:20		**All section chairs meeting, Dietert Auditorium**
6:00		**Social Hour, Cailloux Activity Center**
7:00		**Banquet, Cailloux Activity Center**
9:00		**Social with cash bar, Cailloux Activity Center**

Geology and Geography Posters

P50 ? ASSESSMENT OF AIRBORNE AND SATELLITE MULTISPECTAL IMAGERY FOR CROP IDENTIFICATIONIN IN SOUTH TEXAS
Daniel Salazar*, Kenneth R. Summy, Christopher R.Little, Ruben A. Mazariegos, The University of Texas-Pan American, Edinburg, TX, and James H. Everitt and M. Rene Davis, USDA Agricultural Research Service, Weslaco, TX

P51 G# A SUB-SURFACE SURVEY OF NORTH EASTERN BRAZIL: THE RECONCAVO BASIN
Bradley Melton* and Philip Rabinowitz, Department of Geology and Geophysics, Texas A&M University, College Station, TX

P52 G ANALYTICAL GIS AND REMOTE SENSING TECHNIQUES APPLIED TO GEOLOGIC FIELD MAPPING: AN EXAMPLE FROM THE NORTHEASTERN LLANO UPLIFT, BURNET COUNTY, TEXAS
Jace Morris*, Jacob McKinney, and Volker W. Göbel, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

P53 C# USING REMOTELY SENSED DATA TO MEASURE SURFACE AREA LOSS AND DETERMINE SURFACE MINERALOGY: WALKER LAKE, WESTERN GREAT BASIN, MINERAL COUNTY, NEVADA
Jacob W. McKinney, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

Mathematics

Session I

Friday Morning, March 5 • Weir 120

8:20 C# 107 A STUDY OF OSCILLATION AND STABILITY IN DIFFERENTIAL AND DIFFERENCE EQUATIONS VIA DIAGRAMS
Lorie A. Perez, Cynthia L. Romano, and Willie E. Taylor, Texas Southern University

8:40 C# 108 RECONSTRUCTING CONVEX POLYHEDRONS IN THREE-SPACE
Mary H. Avery* and David Naples, St. Edward's University, Austin, TX

9:00 C# 109 LINEAR DIFFERENTIAL OPERATORS AND LINEAR DIFFERENTIAL EQUATIONS
William F. Bryant, Jr., and Willie E. Taylor, Texas Southern University

9:20 S 110 VARIATIONS ON SOLAR ENERGY
Ali Amir-Moez, Texas Tech University, Lubbock, TX

9:40 S 111 APPLICATIONS OF GRAPHICAL REPRESENTATION FOR INVERSE FUNCTIONS
David R. Cecil, Office of the College of Arts & Sciences, Texas A&M University-Kingsville, Kingsville, TX

10:00 Break/Posters

10:30 S 112 SOLVING OPTIMIZATION PROBLEMS USING PRECALCULUS METHODS
Elsie M. Campbell*, Angelo State University, Dionne T. Bailey*, Angelo State University

10:50 S 113 A NET AND OPEN-FILTER PROCESS OF COMPACTIFICATION OF ANY ARBITRARY TOPOLOGICAL SPACE
Hueytzen J. Wu, Texas A&M-Kingsville, and Wan-Hong Wu, UT-Health Sciences Center at San Antonio

11:10 S 114 THE VANDERMONDE CONVOLUTION
Philip S. Morey, Jr., Texas A&M University–Kingsville., Kingsville, TX

11:30 C 115 THE PERFECT RATIONAL CUBOID
Raul A. Cabezas*, St. Edward's University, Austin, TX and Michael P. Saclolo, St. Edward's University, Austin, TX

11:50 Sectional Business Meeting

12:00 Lunch, Cailloux Activity Center

1:15 TAS Business Meeting, Dietert Auditorium

1:45 Distinguished Scientist Lecture, Dietert Auditorium

5:20 All section chairs meeting, Dietert Auditorium

6:00 Social Hour, Cailloux Activity Center

7:00 Banquet, Cailloux Activity Center

9:00 Social with cash bar, Cailloux Activity Center

Mathematics Posters

P54 C# SPUTNIK 1957 AND TIMSS-R 1999: DANGER OR OPPORTUNITY?
Iris R. Royal, University of The Incarnate Word, Department of Mathematics, San Antonio, TX

Physics and Material Science
Session II
Friday Afternoon, March 5 • Weir 211

5:00 C# 48 PROTON INTERACTIONS WITH GAS TARGETS
Emiliano Garcia*, David Bixler, Angelo State University Physics Department, San Angelo, TX

5:20 All section chairs meeting, Dietert Auditorium

6:00 Social Hour, Cailloux Activity Center

7:00 Banquet, Cailloux Activity Center

9:00 Social with cash bar, Cailloux Activity Center

Physics and Material Science Posters

P55 STRUCTURAL CHARACTERIZATION OF A GROUP III-V SEMICONDUCTOR SUPERLATTICE
Daniel A. Brenes*, University of Houston-Downtown, Rebecca L. Forrest, University of Houston-Downtown, Jerry R. Meyer, Naval Research Laboratories, Washington, DC, and Donna Stokes, University of Houston

Science Education
Session I
Friday Morning, March 5 • Weir 109

8:40 G#	116	DISRIMINANT ANALYSIS OF NON-COGNITIVE VARIABLES THAT AFFECT STUDENT PERFORMANCE IN AN ENTRY-LEVEL COLLEGE BIOLOGY COURSE Jimmy Hand, Texas State University-San Marcos
9:00 S	117	ASSESSING THE IMPACT OF A MULTIDISCIPLINARY SCIENCE INSTITUTE FOR TEACHERS OF SAN ANTONIO AREA PUBLIC SCHOOLS Alakananda Ray Chaudhuri* and William F. Thomann, University of the Incarnate Word, San Antonio, TX
9:20 S	118	DENDROECOLOGY AS A VEHICLE FOR MULTIDISCIPLINARY SCIENCE TEACHING Frank F. Willingham, Tomball College, Tomball, TX
9:40 S	119	LEARNING MATH IN SCIENCE CLASS AND SCIENCE IN MATH CLASS Judith E. Beauford, Ph.D., University of the Incarnate Word, San Antonio, TX
10:00		**BreakPosters**
10:50		**Distinguished Educator**
11:50		**Sectional Business Meeting**
12:00		**Lunch, Cailloux Activity Center**
1:15		**TAS Business Meeting, Dietert Auditorium**
1:45		**Distinguished Scientist Lecture, Dietert Auditorium**

Science Education
Session II
Friday Afternoon, March 5 • Weir 109

2:40 G	120	DISCOVERING PLATE BOUNDARIES: A DATA-RICH CLASSROOM EXERCISE Alison T. Henning* and Dale S. Sawyer, Rice University, Houston, TX
3:00 S	121	ASSESSING INQUIRY LEARNING IN THE COLLEGE SCIENCE CLASSROOM R. Russell Wilke, Angelo State University – Dept. of Biology; William J. Straits, Appalachian State University – Dept. of Curriculum and Instruction
3:20 S	122	THE TEXAS SECONDARY SCIENCE SAFETY PROFILES OF 1991, 2001 & 2003 Sandra S. West* Texas State University-San Marcos, TX
3:40 S	123	INTEGRATED TEACHER PREPARATION FOR SECONDARY MATHEMATICS AND SCIENCE Judith E. Beauford, Ph.D., University of the Incarnate Word, San Antonio, TX
5:20		**All section chairs meeting, Dietert Auditorium**
6:00		**Social Hour, Cailloux Activity Center**
7:00		**Banquet, Cailloux Activity Center**
9:00		**Social with cash bar, Cailloux Activity Center**

Science Education Posters

P56 S INVESTIGATING TIMELINES AS A MEASURE OF ACADEMIC ENGAGEMENT: AN INITIAL EXPLANATION FOR STUDENT SUCCESS IN THE UHD SCHOLARS ACADEMY
Scott Slough, Phil Lyons*, Lisa Morano, Poonam Gulati, Deanna McCullough, and Suzette Mouchaty, University of Houston-Downtown, Houston, TX

P57 S ACTIVITIES TO ENHANCE MICROBIOLOGY EDUCATION
Poonam Gulati, University of Houston-Downtown, Houston, TX.

Systematics and Evolutionary Biology

Session I

Friday Morning, March 5 • Weir 101

8:20 C# 124 MOLECULAR AND PHYLOGENETIC ANALYSIS OF THE CYANOBACTERIAL ORDER OSCILLATORIALES BASED ON SEQUENCE ANALYSIS FROM THE 16S – 23S RIBOSOMAL RNA INTERNAL TRANSCRIBED SPACER REGION
Patricia Hayes*, Department of Biology, St.Edwards University, Austin, Texas; Jerry Brand, Department of Molecular Cell and Developmental Biology, University of Texas, Austin, Texas; Jimmy Mills, Department of Biology, Austin, Texas and David Nobles, Botany Department, University of Texas, Austin, TX

8:40 C# 125 MOLECULAR ANALYSIS OF SELECTED STRAINS OF CYANOBACTERIA IN THE ORDER OSCILLATORIALES
Regina Loya* and Jimmy T. Mills, St. Edward's University, Austin, TX

9:00 C# 126 COMPARISON OF INTERNAL TRANSCRIBED SPACER (ITS) REGIONS OF THE 16s-23s rRNA GENE IN SELECTED POPULATIONS OF THE CYANOBACTERIUM NOSTOC; A CORRELATION WITH ENVIRONMENTAL FACTORS
Samantha Ramirez* and Jimmy T. Mills, St. Edward's University, Austin, TX

9:20 G# 127 ANALYSES OF THE SMALL SUBUNIT RIBOSOMAL DNA OF TEN SPECIES OF *STACHYBOTRYS* USING PCR TECHNIQUE
Veronica Amaku*, Olufisayo Jejelowo, Texas Southern University, Houston, TX, Tamas Torok, Gary Andersen, Terry Hazen, Lawrence Berkeley National Laboratory, Berkeley, CA and Oliver Rojas, Houston Community College System, Houston, TX

9:40 C# 128 GASTROINTESTINAL HELMINTHS OF RAFINESQUE'S BIG-EARED BAT, *CORYNORHINUS RAFINESQUII* (CHIROPTERA: VESPERTILIONIDAE), FROM SOUTHWESTERN ARKANSAS
Angela D. Burns*, Chris T. McAllister, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX; and Charles R. Bursey, Department of Biology, Pennsylvania State University-Shenango Valley Campus, Sharon, PA

10:00 Break/Posters

10:30 S 129 A SURVEY ON COCCIDIAN PARASITES (APICOMPLEXA: EIMERIIDAE) FROM SELECT BATS (CHIROPTERA) OF ARKANSAS, MISSISSIPPI, OKLAHOMA, AND TEXAS
Chris T. McAllister*, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX; Steve J. Upton, Department of Biology, Ackert Hall, Kansas State University, Manhattan, KS; and Zachary D. Ramsey, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX

10:50 S 130 DISTORTED SEX RATIOS IN NATURAL POPULATIONS OF *ARMADILLIDIUM VULGARE* FROM CENTRAL TEXAS
Benjamin A. Pierce. Department of Biology, Baylor University, Waco, TX

11:10 S 131 NOTEWORTHY RECORDS OF *SCYTONOTUS GRANULATUS* (DIPLOPODA: POLYDESMIDA), WEST OF THE MISSISSIPPI RIVER
Chris T. McAllister*, Department of Biology, Texas A&M University, Texarkana, TX; Rowland M. Shelley, North Carolina State Museum of Natural Sciences, Raleigh, NC; and Zachary D. Ramsey, Department of Biology, Texas A&M University, Texarkana, TX

11:30 C# 132 NEW GEOGRAPHIC DISTRIBUTION RECORDS FOR *THEATOPS POSTICUS* (CHILOPODA: SCOLOPENDROMORPHA: CRYPTOPIDAE), FROM OKLAHOMA
Michelle L. Cameron*, Chris T. McAllister, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX; and Rowland M. Shelley, North Carolina State Museum of Natural Sciences, Raleigh, NC

11:50 Sectional Business Meeting

12:00 Lunch, Cailloux Activity Center

1:15 TAS Business Meeting, Dietert Auditorium

1:45 Distinguished Scientist Lecture, Dietert Auditorium

Systematics and Evolutionary Biology
Session II
Friday Afternoon, March 5 • Weir 101

2:40 C# 133 NEW GEOGRAPHIC DISTRIBUTION RECORDS FOR THE FLIER, *CENTRARCHUS MACROPTERUS* (PERCIFORMES: CENTRARCHIDAE), FROM SOUTHWESTERN ARKANSAS
Stephanie F. Barclay*, Chris T. McAllister, Department of Biology, Texas A&M University, Texarkana, TX; and Henry W. Robison, Department of Biology, Southern Arkansas University, Magnolia, AR

3:00 G# 134 AN EXAMINATION OF THE LAND SNAIL GENUS *PRATICOLELLA* (GASTROPODA: PULMONATA) AND THE UTILITY OF GEOGRAPHIC MODELING OF SPECIES DISTRIBUTIONS IN SNAIL SYSTEMATICS
Kathryn E. Perez*. Department of Biological Sciences, University of Alabama, Tuscaloosa, AL

3:20 S 135 A DIGITAL MOVIE OF *BEMBECINUS NEGLECTUS* BEHAVIOR (HYMENOPTERA: SPHECIDAE)
Allan Hook, Dept. of Biology, St. Edward's University, Austin, TX

3:40 C# 136 AN ETHOLOGICAL STUDY OF THE ENTRANCE OPENING BEHAVIOR OF *BEMBECINUS NEGLECTUS* (HYMENOPTERA:SPHECIDAE)
Sofia Angelo* and Florence Kajoina, Dept. of Biology, St. Edward's University, Austin, TX

4:00 C# 137 FREQUENCY, DURATION, TYPES AND TEMPORAL ASPECTS OF MATING BALLS IN *BEMBECINUS NEGLECTUS* (HYMENOPTERA: SPHECIDAE)
Florence Kajoina* and Sofia Angelo, Dept. of Biology, St. Edward's University, Austin, TX

4:20 S 138 THE BIOLOGICAL CONTROL OF RED IMPORTED FIRE ANTS BY PHORID PARASITOIDS IN CENTRAL AND SOUTH TEXAS; ESTABLISHMENT AND EXPANSION OF POPULATIONS
Richard J.W. Patrock and Lawrence E. Gilbert. Brackenridge Field Laboratories, Section of Integrative Biology, University of Texas at Austin, Austin, TX

4:40 G 139 EVALUATION OF A POTENTIAL HYBRID ZONE BETWEEN *NEOTOMA MICROPUS* AND *NEOTOMA FLORIDANA* USING MOLECULAR TECHNIQUES
J. Delton Hanson*, Robert J. Baker, Rober D. Bradley. Department of Biology, Texas Tech University, Lubbock TX

5:20 **All section chairs meeting, Dietert Auditorium**

6:00 **Social Hour, Cailloux Activity Center**

7:00 **Banquet, Cailloux Activity Center**

9:00 **Social with cash bar, Cailloux Activity Center**

Systematics and Evolutionary Biology Posters

P58 S PHYLOGENETIC RELATIONSHIPS AMONG TAXA OF THE MIMOSOIDEAE
Fatima Sultana, Philip C. Lyons, Suzette Mouchatty, and Deanna S. McCullough*, University of Houston-Downtown

Terrestrial Ecology and Management
Session I
Friday Morning, March 5 • Cailloux 219

8:20 C# 140 *QUERCUS BUCKLEYI* OVERSTORY RECRUIMENT IN UNDISTURBED COMMUNITIES OF CENTRAL TEXAS
John Gregory Penn and William J. Quinn, St. Edward's University, Austin, TX

8:40 C# 141 THE RESPONSE OF HERBACEOUS SPECIES TO SEASON OF PRESCRIBED FIRE IN A TEMPERATE SAVANNA IN CENTRAL TEXAS
Mark T. Simmons* and Steve Windhager, Lady Bird Johnson Wildflower Center, Austin, TX

9:00 S 142 QUANTIFYING MESQUITE AND JUNIPER INVASION IN SOUTHERN TAYLOR COUNTY, TEXAS
Herbert D. Grover*, Wendi Moran, Cyndi Pfau, Marylin Angell, and Nancy Neble, Department of Biology, Hardin-Simmons University, Abilene, TX

9:20 C# 143 PRELIMINARY RESULTS OF THE 2003 OUACHITA MOUNTAINS BAT BLITZ, WEST-CENTRAL ARKANSAS
Zachary D. Ramsey*, Chris T. McAllister, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX; D. Blake Sasse, Arkansas Game and Fish Commission, Little Rock, AR; and David A. Saugey, U.S Forest Service, Jessieville, AR

9:40 S 144 THE 2003 DILEMMA FOR LEPIDOPTERA AND GRIZZLY BEARS IN THE GREATER YELLOWSTONE ECOSYSTEM: EL NIÑO OR LA NIÑA?
Karölis Bagdonas, Department of Biological Sciences, Sam Houston State University, Huntsville, TX

10:00 **Break/Posters**

10:30 G 145 OCCURENCE OF MEDIUM- AND LARGE-SIZED MAMMALS AT HIGHWAY UNDERPASSES ALONG INTERSTATE 35 IN TEXAS
Kimberly D. Jarrett*, and Kevin J. Gutzwiller, Biology, Baylor University, Waco, TX; Jose Guardiola, Institute of Statistics, Baylor University, Waco, TX; Lisa Zygo, Center for Applied Geographic and Spatial Research, Baylor University, Waco, TX; J.J. Bolton, Waco, TX

10:50 G 146 EFFECTS OF AN INVASIVE SPECIES, RED IMPORTED FIRE ANTS (*SOLENOPSIS INVICTA*), ON SURVIVORSHIP OF SMALL MAMMALS IN NATIVE TALLGRASS PRAIRIE
Cathleen N. Early* and Kenneth T. Wilkins, Dept. of Biology, Baylor University, Waco, TX

11:10 S 147 USER-FRIENDLY BENEFIT-COST ANALYSIS
John D. Merrifield, University of Texas at San Antonio

11:50 **Sectional Business Meeting**

12:00 **Lunch, Cailloux Activity Center**

1:15 **TAS Business Meeting, Dietert Auditorium**

1:45 **Distinguished Scientist Lecture, Dietert Auditorium**

5:20 **All section chairs meeting, Dietert Auditorium**

6:00 **Social Hour, Cailloux Activity Center**

7:00 **Banquet, Cailloux Activity Center**

9:00 **Social with cash bar, Cailloux Activity Center**

Terrestrial Ecology and Management Posters

P59 C NEST VIGILANCE BY MALE CAROLINA WRENS DURING INCUBATION
Guadalupe Quiroz *, University of Houston-Downtown, Houston, TX, and Diane L. Neudorf, Sam Houston State University, Huntsville, TX

Threatened or Endangered Species

Session I

Friday Morning, March 5 • Weir 006

8:00 S 148 ENVIRONMENTAL CONTROLS OF NATIVE FISHES, OTHER BIOTA, AND AMBIENT WATER QUALITY IN TEN MAJOR SPRING SYSTEMS OF TEXAS
Clark Hubbs, Professor Emeritus, The University of Texas at Austin, Department of Zoology, Austin, TX

8:20 G 149 DIFFERENTIAL GROWTH RATES DUE TO VARIABLE PROTEIN DIET IN ENDANGERED TURTLES
Nicole M. Burpo, Texas State University, Biology Dept., San Marcos, TX

8:40 S 150 DIMINISHED SPRING FLOWS IN THE SAN SOLOMON SPRING SYSTEM, TRANS-PECOS, TEXAS, AND EFFECT ON HABITAT OF ENDANGERED FISH SPECIES AND OTHER RARE AQUATIC SPECIES OF CONCERN
Raymond C. Mathews, Jr.*, Cindy Ridgeway, Barney Austin, Ali Chowdhury, Brent Christian, Doug Coker, Richard Smith, and Will Watson, Texas Water Development Board, Austin, TX

9:00 S 151 LIFE HISTORY TRAITS AND THE EFFECTS OF DISTURBANCE ON *THYMOPHYLLA TEPHROLEUCA* (ASHY DOGWEED), A NARROW TEXAS ENDEMIC
Darren P. Dodson* and Paula S. Williamson, Department of Biology, Southwest Texas State University, San Marcos, TX

9:20 S 152 SOUTH TEXAS AMBROSIA, *AMBROSIA CHEIRANTHIFOLIA*: HISTORICAL PERSPECTIVE, CURRENT STATUS, AND FUTURE MANAGEMENT
Jim Sinclair* and Dr. Alice Hempel, Texas A&M University-Kingsville

9:40 G 153 STATUS OF BLACK BEARS IN TEXAS
John H. Young*, David Holdermann, Texas Parks and Wildlife Department, Austin, TX

10:00 **Break/Posters**

10:30 G# 154 A POSSIBLE CAUSE OF THE DISPARITY IN THE SEX RATIO OF ADULT HOUSTON TOADS
Todd M. Swannack*, Department of Wildlife and Fisheries Sciences, Texas A&M University and Michael R. J. Forster, Department of Biology, Texas State University-San Marcos

10:50 G 155 OCELOT AND BOBCAT SPATIAL PATTERNS RELATIVE TO ROADS IN SOUTHERN TEXAS
John H. Young*, Jan E. Janecka †, Steven Webb †, Linda L. Laack ††, and Michael E. Tewes †, *Texas Parks and Wildlife Department, Austin, TX, †Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, Kingsville, TX, ††U.S. Fish and Wildlife Service, Laguna Atascosa NWR, Rio Hondo, TX

11:50 Sectional Business Meeting

12:00 Lunch, Cailloux Activity Center

1:15 TAS Business Meeting, Dietert Auditorium

1:45 Distinguished Scientist Lecture, Dietert Auditorium

5:20 All section chairs meeting, Dietert Auditorium

6:00 Social Hour, Cailloux Activity Center

7:00 Banquet, Cailloux Activity Center

9:00 Social with cash bar, Cailloux Activity Center

ABSTRACTS

ANTHROPOLOGY

1 PALEOINDIAN PRESENCE IN NORTHWESTERN CHIHUAHUA, MEXICO
Alan L. Phelps, El Paso, TX

The Paleoindian presence in northwestern Chihuahua, Mexico has been addressed by DiPeso (1974), Aveleyra (1967) and Phelps (1990). None dealt with the subject to any great extent. Since the publication of Phelps' two articles, a number of Paleoindian projectile points have been discovered in the El Barreal region and near the village of Samalayuca, both in northwestern Chihuahua. Although very little evidence of any extended residence in the areas has been discovered (two small sites appear to have been occupied for an extended period of time), the presence of the projectiles suggests the Paleoindians were in what is now northwestern Chihuahua for hunting purposes. The possibility still exists that the projectiles may have been recovered by later Indians, but the quantity and types of points suggest otherwise; only excavation can prove or disprove the theory. This presentation will locate and type the Paleoindian projectile points and discuss the two sites that appear to have been occupied for a period of time.

2 JORNADA MOGOLLON OR JORNADA CASAS GRANDES? A DIACHRONIC PERSPECTIVE ON TRANSREGIONAL CONTACTS BETWEEN PREHISTORIC POPULATIONS OF FAR WEST TEXAS AND NORTHERN CHIHUAHUA
Myles R. Miller, Geo-Marine, Inc.

The Trans-Pecos region of far West Texas has often been subsumed within the Jornada Mogollon culture region. However, a closer examination of archeological evidence spanning several millennia of contact between far West Texas and northern Chihuahua suggests that, for much of the Archaic and Ceramic Eras, generic aspects of material culture, settlement, and regional spheres of influence were much closer between these regions than has previously been recognized. It is likely that the origin of several aspects of Jornada Mogollon material culture and symbolic ritual were derived from the Casas Grandes regions to the south rather than the Mogollon region to the west. Several lines of archeological data will be presented in support of this argument.

3 THE EL CAIDO SITE: HISTORIC ROCK ART ALONG THE TEXAS BORDERLANDS
Joe Labadie, Archeologist, National Park Service, Amistad NRA

The rock art images at the El Caido rock art site in northwestern Coahuila, Mexico show no clear iconographic similarities to any of the known Spanish Colonial period sites in the Lower Pecos River region of southwest Texas and Northern Mexico. The majority of the pictographs at the site fall securely within a stylistic grouping known as the Late Northwestern Plains Biography style which date the site to sometime near the close of the 19th century. Althought not done by locals, the pictographs and petroglyphs at the El Caido site offer several clear and unique insights into some aspects of the material culture of the Plains Groups that once traversed the region.

4 NON-DESTRUCTIVE RADIOCARBON DATING
Marvin W. Rowe* & Karen L. Steelman, Department of Chemistry, Texas A&M University

We describe a non-destructive technique for obtaining radiocarbon dates on perishable organic archaeological artifacts using plasma oxidation and accelerator mass spectrometry. Plasma oxidation is a very gentle, low-temperature (40 to 150 Celcius), advantageous alternative to combustion for rare and precious archaeological artifacts because the sample is unaffected. No visible change or alteration was observed for fragile artifacts after plasma exposure. Radiocarbon results from previously dated artifacts and radiocarbon standards, as well as several materials from an inferred single event (a naturally mummified infant burial from Hinds Cave, Texas), were used to establish accuracy and precision of the method. We tested different pretreatments including (1) no treatment; (2) a water wash; (3) base wash; and (4) an acid-base-acid wash sequence normally used prior to dating. Statistical agreement was observed in all cases. Results are promising that plasma oxidation can be used to produce accurate non-destructive radiocarbon dates.

5 RADIOCARBON DATING AND ANCIENT MODIFICATION OF PEYOTE
Karen L. Steelman* & Marvin W. Rowe, Department of Chemistry, Martin Terry, Department of Biology & Phil Dering, Department of Anthropology, Texas A&M University

Peyote, a small globular cactus uniquely native to the Chihuahuan Desert of northeastern Mexico and adjacent Texas, is currently used throughout North America for medicinal and ceremonial purposes among indigenous populations. But peyote has been documented at only two archaeological sites: Shumla Caves in southwest Texas and shelter CM-79 near Cuatro Cienegas, Coahuila, Mexico. Dates for the three individual samples from Shumla Caves were statistically indistinguishable and we determined a mean age of 5195 ± 20 radiocarbon years BP. An age of 835 ± 35 radiocarbon years BP for a specimen from the Cuatro Cienegas site. Unexpectedly, the Shumla Caves peyote specimens were found to have been altered in ancient times. Our radiocarbon dates on excavated peyote documents its use for 6,000 calendar years.

6 FRESHWATER SHELL ISOTOPES AND HOLOCENE PALEOCLIMATIC RECONSTRUCTION IN SOUTH-CENTRAL TEXAS
David O. Brown, Anthony & Brown Consulting, Volente, TX

This paper examines patterns of stable isotopes of oxygen and carbon measured in mussel shells from excavated Holocene contexts at the Richard Beene Site (41BX831) as proxy indicators of past environments. Although freshwater shell isotope studies have some limitations for precise paleoenvironmental reconstruction, they nonetheless provide an independent source of data for the interpretation of past climates and environments that can be used to refine and/or validate data from other sources. A total of 34 samples of mussel shell, 32 from six different components at the Richard Beene site and two from the modern Medina River near McDonna, were analyzed for stable isotopic ratios for both 18O and 13C. The results suggest that most of the shells were secreted at temperatures within a few degrees of the modern average. One set of samples from 4135 BP exhibits extreme d18O values that may reflect a slightly different environment than today.

7 THE ARCHAEOLOGY OF THE CAMINO REAL DE TIERRA ADENTRO: EARLY SPANISH SETTLEMENTS IN NUEVO MÉXICO
Roy B Brown, Dept. of Soc. & Anthro., U.T.E.P., El Paso, TX

The Camino Real de Tierra Adentro was the major axis that linked northern New Spain to the viceregal capital in Mexico City. Blazed by explorers and adventurers chasing the twin mirages of fame and fortune, it became the backbone of the colonial administration as merchants and miners headed north dreaming of untold wealth, missionaries searched for souls to serve God, and bureaucrats and soldiers sought to weld their power and influence. This paper will present a synthesis of the results of five archaeological studies(San Gabriel de Yungue [Florence Hawley Ellis], San Marcos [Ann F. Ramenofsky], Paraje de San Diego [Edward Staski], Nuestra Señora de Guadaluape[Patricia Fournier, Alfonos Rosales López and R. B. Brown], and Casa de Huesos [Rex E. Gerald, Patricia Fournier and R. B. Brown]) in order to analyze the beginning of the colonial process and the early development of Mestizo society.

8 THE THERMODYNAMICS AND BROAD SIGNIFICANCE OF HYDROGEN SATURATION OVENS
Richard T. Stark, The University of Texas at Austin

Hydrogen saturation ovens, or earth ovens, present predictable thermodynamics conditions which can be linked to specific archaeological contexts, subsistence strategies, and nutrition regimes. They are the most common prehistoric archaeological feature of the Texas Holocene and their use continues today. These ovens represent both significant socio-economic changes after the terminal Pleistocene and the specific culinary evolution of feast and famine oriented traditional food ways. A thermodynamic model for earth ovens is beneficial to understand their function and for a time-deep understanding of culinary prehistory and nutritional inheritance.

BIOLOGICAL SCIENCE

9 DETECTING VIRULENT *YERSINIA ENTEROCOLITICA* IN PROCESSED PORK USING PCR
Jafa Armagost* and William J Mackay. Edinboro University of Pennsylvania, Edinboro, PA

Yersinia enterocolitica is a small gram-negative rod bacterium that causes the disease Yersinosis. This pathogen has become a great concern for the pork-processors of the United States. Eating raw or undercooked pork products can infect individu-

als. *Yersinia enterocolitica* can survive in cold temperatures and after irradiation of processed pork. The objective of this study is to identify virulent *Yersinia enterocolitica* by detecting a virF gene using the polymerase chain reaction (PCR).

10 EFFECTS OF ENVIRONMENTAL PARAMETERS ON DISTRIBUTIONS OF OLIGOTROPHIC BACTERIA ALONG AN ELEVATIONAL GRADIENT AT BIG BEND NATIONAL PARK

James H. Campbell*, Randall M. Jeter, and John C. Zak, Department of Biological Sciences, Texas Tech University, Lubbock, TX

Bacteria which metabolize and divide at low concentrations of carbon are known as oligotrophs. Although desert soils are commonly carbon limited, the environmental parameters regulating oligotroph distributions in desert ecosystems have not been elucidated. Currently, five sites are under study representing an elevational and vegetational gradient along the Pine Canyon Watershed at Big Bend National Park. Soil samples from each site were diluted, spread on plates containing approximately 12 mg/L total carbon and incubated at 15, 25, 35, 45 and 60 degrees Celsius. Direct plate counts for January and August 2002 differed significantly with site and temperature treatments. Canonical Correspondence Analysis of colonial morphologies in conjunction with soil pH, nitrate, ammonium, microbial biomass and organic matter indicate that soil chemistry significantly affects distributions. However, it appears that many bacterial morphologies conform more closely to incubation temperature treatments than soil chemistry vectors. It is possible that thermodurance is as effective as soil chemistry in modulating oligotroph assemblages.

11 TISSUE CULTURE AND TRANSFORMATION ANALYSIS OF *CONYZA CANADENSIS*

Pamela A. Scheiber, William J. Quinn, and Fidelma A. O'Leary, St. Edward's University, Austin, TX

The introduction of genes for glyphosate resistance into crop species has transformed the technology of the agricultural industry. On the other hand, the onset of glyphosate resistant weeds has created growing concern. *Conyza canadensis* (L.) Cronquist (Mare's Tail) is one such weed that could have a large economic impact, and yet little is known about it and it has yet to be established in tissue culture. Since tissue culture is a valuable tool for providing tissue for bioassays, we designed a protocol for efficient culturing of *C. canadensis*. Protocols for culture initiation, transformation and plant regeneration of *C. canadensis* developed by utilizing MS0.9TC medium supplemented with 6-benzylaminopurine, a-naphthaleneacetic acid, and gibberellic acid at different stages in the plant's life cycle. Attempts to express resistance in tissue culture were not successful, and the transformation rate of marestail was 12.6%. The optimal growing conditions observed and preliminary data gathered provide the means for further study of the mode of resistance expressed by Mare's Tail. Subsequently, this may lead to the detection of a glyphosate resistance mechanism expressed in *C. canadensis*, thus providing a means for developing a rapid assay to detect resistance in other plant species.

12 ENTEROTOXIN A PRODUCTION BY AN ATYPICAL STAPHYLOCOCCAL ISOLATE

Suzanne M. Tomlinson, Crosby Jones, Kimberly Dybdahl, and Loren Ammerman, Department of Biology, Angelo State University, San Angelo, TX

An environmental staphylococcal isolate was shown to produce Enterotoxin A using a modified Ouchterlony immunodiffusion test. The gene for *S. aureus* Enterotoxin A (SEA) was amplified by PCR and sequenced. It was shown to be similar in sequence to that reported for the *Staphylococcus aureus* SEA gene. Further efforts to identify the species, however, have shown that unlike most *S. aureus* species, it is coagulase negative. Staph Trac identification tests point to an alternative species, *S. caprae*, which has not been reported to produce this enterotoxin. Internal Transcribed Spacer (ITS) PCR was performed with the unknown and several other known staphylococcal species. These results have also demonstrated significant differences between the unknown and known *S. aureus* isolates as well as differences from other staphylococcal species. Preliminary results are compared with new molecular data.

13 COMPLETION OF TRUNCATED GENE SEQUENCE OF THE hcf3 LOCUS OF MAIZE AND EXPRESSION OF ITS GENE PRODUCT

Sijiong Mou*, and William Cook, Midwestern State University, Wichita Falls, TX

Maize hcf3 mutants synthesize most of the components of the photosystem II complex, but the complex is not assembled stably. It is proposed that the Hcf3 gene product is a nuclear factor that is required for the stable assembly or regulation of expression of core subunits of the chloroplast photosystem II complex. A partial cDNA was previously isolated by homology to a transposon-tagged genomic fragment of the hcf3 locus. Subsequently, two cDNA fragments representing adjacent

portions of the 3' end of the Hcf3 coding sequence were isolated (Rolan 2001). This report describes the assembly and initial expression of the complete Hcf3 coding sequence in *E. coli*.

14 ISOLATION AND COMPARISON OF SELECTED PLANT EPSPS CODING REGIONS TO BETTER UNDERSTAND THE EVOLUTION OF GLYPHOSATE RESISTANCE

Wilfried Foadey and Fidelma A. O'Leary, St. Edward's University, Austin, TX, Gregory Heck, Chris Hubmeier, and Marianne Malven, Monsanto Company, St. Louis, MO

Glyphosate, the active ingredient of the herbicide Roundup, inhibits the enzyme 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS). This blocks the shikimate pathway, which is essential for plant growth and development. A small but increasing number of plant species, including a biotype of *Eleusine indica* in Malaysia, show evidence of resistance to glyphosate herbicides, causing serious problems for modern agriculture. Studies have revealed that an amino acid substitution has occurred in the EPSPS of the resistant plants. The observation in *Eleusine indica* in particular suggests that not all plant EPSPSs are identical, but that a significant variety may exist in the plant kingdom. In order to determine the diversity of higher plant EPSPSs, we focused on the gene coding sequence around position 106 in four species, *Conyza canadensis*, *Helianthus salicifolius*, *Sarracenia purpurea*, and *Asimina triloba*. We compared the sequences for the EPSPSs from these species with other, known EPSPS sequences. The results show that overall the EPSPS sequences for the plant species sampled are very similar to the known EPSPS sequences. In addition, we did not find any sequence changes to indicate a resistant EPSPSs in any of the four species. This suggests that the likelihood of a naturally occurring resistant EPSPS in these species is slight. Furthermore, with data collected in studies of other plant species, we propose that there is little natural variation that might predispose plant species to be resistant to glyphosate, and that this may partially explain the relatively low incidence of resistance observed to date.

15 ISOLATION OF A LOW MOLECULAR WEIGHT PROTEIN INHIBITING TUMOR CELL (T24) ADHESION TO FIBRONECTIN FROM THE VENOM OF *BOTHROPS COLOMBIENSIS* (MAPANARE)

Elda E. Sánchez*, Jacob A. Galán, Gonzalo López, Jr., John C. Pérez, Natural Toxins Research Center, Texas A&M University-Kingsville, Kingsville, TX, and Alexis Rodríguez-Acosta, Instituto de Medicina Tropical, Universidad Central de Venezuela, Caracas, Venezuela.

Many disintegrins are low molecular weight snake venom derived proteins possessing a binding site, many which is arginine-glycine-aspartic acid (RGD). Disintegrins are non-enzymatic cysteine-rich proteins that affect cell-cell and cell-matrix interactions by binding to integrins found on the surfaces of various cells. Integrins are adhesion molecules, many which are involved in the interaction of cancer cells to extra cellular matrices (ECM). Disintegrins block the action of integrins by sbinding to them. In this study a low molecular weight protein from the venom of *Bothrops colombiensis* (Mapanare) has been isolated by a two step purification procedure via reverse phase and gel filtration chromatography. The protein inhibits the adhesion of human urinary bladder cancer cells (T24) to the ECM, fibronectin, in a dose depended manner.

16 SEROPOSITIVE RATES FOR FIVE ZOONOTIC DISEASES IN AN EAST TEXAS POPULATION

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Q fever (*Coxiella burnetii*), Cat Scratch Disease (*Bartonella henselae*), Granulocytic Erlichiosis, (*Ehrlichia chaffeensis*), Toxoplasmosis (*Toxoplasmagondii*), and West Nile Virus are all zoonotic diseases with potentially serious human health consequences. Despite this, little is known about relative infectionrates and potential risk factors for exposure to these diseases. Usingcommercially available kits, the seropositive rates for these zoonoses weredetermined in an east Texas population. All individuals answered a questionnaire in an attempt to determine any factors that could increase an individual's risk of exposure to these infectious organisms.

17 THE EFFECT OF HYPEROXIA ON THE pH OF INSECT LARVAE HAEMOLYMPH

Cherice Anderson, Howard Payne University, Brownwood, TX

Fruit flies have been found to have a pronounced alkalization from 6.75 to 7.75 of their haemolymph when exposed to hypoxic conditions (21 kPa to 2kPa). By exposing fruit fly larva to 100% oxygen environments the pH of the haemolymph can be measured and compared to the normoxic population haemolymph. The purpose of this experiment was to deter-

mine if hyperoxic conditions produce acidic haemolymph. Once the difference in the hyperoxic pH and normoxic pH is determined the cause of this possible acidification will be investigated.

18 PRE-HOSPITAL DIAGNOSTIC ULTRASOUND: FEASIBILITY OF REMOTE ASSESSMENT AND TRIAGE FOR CARDIAC AND TRAUMA PATIENTS

Terry Bauch, MD*, Paul Garrett, MD; Christofer Strode, MD; Sheri Boyd, MD; and Jim Bulgrin, BSEE; and Bernard Rubal, PhD. Brooke Army Medical Center, Fort Sam Houston, TX

Diagnostic ultrasound imaging is a common procedure performed in radiology, obstetrics, cardiology, neurology, surgery and emergency medicine. The Defense Advanced Research Projects Agency (DARPA) has developed within the past decade hand-held ultrasound imaging devices for use in austere environments for military humanitarian missions and combat causality care. These devices weigh approximately 6 pounds and have transformed this critical diagnostic imaging modality from fix-based facilities to point-of-care applications. We report the feasibility of remote physician-directed ultrasound examinations for cardiac and abdominal assessments from simulated mass causality, triage sites, military field hospitals and moving ambulances in large metropolitan areas. Three image transmission techniques were compared: commercial satellite phone (INMARSAT), very small aperture terminal satellite (VSAT), and a distributed mobile local area network (LifeLink).

19 CAPTURE AND ANALYSIS OF PREHOSPITAL TRAUMA VITAL SIGNS

Jose Salinas, Victor Convertino, and John B. Holcomb, U.S. Army Institute of Surgical Research, Fort Sam Houston, TX

This project focuses on the capture and analysis of prehospital vital signs from Code 3 trauma patients during helicopter transport. Captured vital signs, transport interventions, initial hospital treatment, and patient outcomes are recorded by the system for use in validation of current emergency protocols and development of future treatment algorithms for patient care in both civilian and military environments. By providing a patient database of real trauma cases with actual progression data and outcome, researchers are able to analyze the correlation between types of injury, injury progression, effectiveness of prehospital and emergency interventions as related to patient outcome and survivability. The system under development is deployed in the Memorial Hermann Hospital Life Flight system in Houston, TX and consists of two independent components for both patient data acquisition and data warehousing and currently maintains over 750 trauma patient records. New capture sites are expected to be deployed within the San Antonio metro area to further populate the warehouse and increase the statistical robustness of the data.

20 HEMORRHAGIC SHOCK DATA MINING PROJECT

John A. Ward*, Brooke Army Medical Center, Fort Sam Houston, TX, and Jill L. Sondeen, Eric J. Ansorge, John B. Holcomb, US Army Institute of Surgical Research, Fort Sam Houston, TX

This project applies the techniques of data mining to estimate mean time to circulatory collapse from hemodynamic, respiratory and metabolic signs recorded in the ISR database of hemorrhagic shock protocols. The objective is to determine the best predictors to help the combat medic perform triage on the battlefield. The sample set contains data from 83 swine models, approximately 20% of the 400 animal records available. The analytical methods are correlation analysis, multiple logistic regression, Reed-Muench end-point estimation, ROC curve analysis, Kaplan-Meier survival analysis, cluster analysis, estimation of median time to failure and time series analysis. Mean arterial pressure (MAP), diastolic pressure, mixed venous oxygen saturation and cumulative hemorrhage volume are good predictors of median time to failure, but changes in MAP alone may come too late to be useful. Conclusions reached at this time are tentative and may be revised as more records are added to the database.

21 LOWER BODY NEGATIVE PRESSURE AS A MODEL TO STUDY PROGRESSION TO ACUTE HEMORRHAGIC SHOCK IN HUMANS

Victor A. Convertino and William H. Cooke. U.S. Army Institute of Surgical Research, Fort Sam Houston, TX

Hemorrhage is a leading cause of death in both civilian and battlefield trauma. Survival rates increase when victims requiring immediate intervention are correctly identified in a mass-casualty situation, but methods of prioritizing casualties based on current triage algorithms are severely limited. Development of effective procedures to predict the magnitude of hemorrhage and the likelihood for progression to hemorrhagic shock must necessarily be based on carefully-controlled human experimentation, but controlled study of severe hemorrhage in humans is not possible. Lower body negative pressure

(LBNP) "pulls" blood from the thorax into dependent regions of the pelvis and legs, effectively decreasing central blood volume in a similar fashion as acute hemorrhage. In this project, physiologic data obtained from human LBNP experiments are used to develop and demonstrate a semi-automated trauma triage capability that provides critical casualty information remotely to the battlefield or civilian medic. When this goal is met, the medic will possess a greater decision making capability for prioritizing casualty care based on continuous information about severity and progression of the injury and which injuries require life saving interventions (LSI). Through evaluation of data obtained from these experiments, we present evidence that supports the hypothesis that LBNP is an effective technique to study acute hemorrhage in humans as a means to ultimately identify bleeding victims who will likely progress to hemorrhagic shock and require LSI.

22 HYPOTENSIVE RESUSCITATION AFTER HEMORRHAGE

Jill L. Sondeen, John B. Holcomb, US Army Institute of Surgical Research

Recent studies demonstrated that rebleeding occurs following aggressive resuscitation back to normal blood pressure in the pre-hospital period with experimental subjects that have a vascular injury. Investigations using low volume resuscitation demonstrated that less rebleeding occurs and short-term survival is increased since the blood pressure isn't increased high enough to dislodge the blood clot. The smaller amount of fluid that is required to effect hypotensive resuscitation, and the smaller blood loss would be a logistical advantage in the military setting. Hypotensive resuscitation preventing rebleeding may also be advantageous in the urban arena. In the military setting with delayed or prolonged transport for up to 12-24 h before definitive surgical care, resuscitation will probably be necessary for its metabolic benefits. Since the first appearance from a previously unpalpable radial pulse is the most expedient method to estimate when blood pressure reaches 80 mmHg on the battlefield, we have chosen to use a systolic pressure of 80 mmHg as an endpoint of resuscitation. We will compare a crystalloid, lactated Ringer's solution, a colloid, Hextend, and a hemoglobin-based oxygen carrier, Polyheme, on their efficacy to maintain the systolic pressure at 80 mmHg for 24 h.

23 ASPECTS OF EGGSHELL FORMATION IN BIRDS AND CROCODILIA

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Alligator (*Alligator mississippiensis*) eggshells from both hatched and unhatched eggs provided by Louisiana Department of Wildlife and Fisheries. The crux of the study was to show that an extracellular enzyme, carbonic anhydrase (CA), occurs in the eggshell matrix plays a role in providing bicarbonate ion for mineralization. Proteins of the eggshell matrix were isolated, molecular weights estimated (SDS/PAGE), Western Blots run, and antibodies to bovine RBC carbonic anhydrase II used to identify the CA. The alligator eggshells were found to contain one protein, an extracellular CA, that had a molecular weight of about 31,000 and that cross-reacted with antibodies to bovine RBC CA II. Unlike the avian eggshell CA, the alligator CA did not have more than one gel band and thus may not readily dimerize. Calcareous portions of the eggshells were similar and composed of 97% mineral, 1.9% organic matrix, and 0.026% water-soluble protein (WSP). Alligator and chicken eggshell carbonic anhydrase was isolated via affinity chromatography and estimated spectrophotometrically to consist of 0.3 to 0.75% of the eggshell WSP fraction. Data suggest that not only does the cellular CA of the oviduct supply bicarbonate for eggshell mineralization, but that an extracellular CA in the shell matrix probably also plays a role in avian and crocodilian shell calcification.

24 DOMAINS OF EPH-A4 MEDIATING DISSOCIATION OF CADHERIN ADHESION COMPLEXES

Jon B Scales, Midwestern State University, Wichita Falls, TX

Members of the Eph receptor tyrosine kinase family play crucial roles in the establishment of boundaries and the regulation of cell migration during embryogenesis. We have found that mis-expression of EphA4 kinase activity in early *Xenopus* embryos causes loss of cell adhesion implying a molecular mechanism involving cadherin-based cell adhesion. By co-expressing a chimeric EphA4 and cadherin constructs having C-terminal truncations, we have shown that only a small portion of the intracellular juxtamembrane domain of cadherin is required to rescue cell-dissociation caused by EphA4 signaling. Other studies showed EphA4 signals through the rho family of GTPases. Our most recent results have demonstrated that the C-terminal residues of EphA4 mediate interactions with adherens junctions. The C-terminus of EphA4 is a binding motif for PDZ domain proteins. We propose that EphA4 is recruited to cadherin-based adhesion complexes by a PDZ protein, where EphA4 is then available to interact with ligand expressed on adjacent cells and in a position to disrupt cell adhesion in a localized fashion.

25 NEUROTOXIC VENOM COMPONENT ANALYSIS IN *CROTALUS MITCHELLII* AND *CROTALUS TIGRIS*

Randy L. Powell 1*, Carl S. Lieb 2, Eppie D. Rael 2, and John C. Perez 1. (1) Natural Toxins Research Center, Texas A&M University, Kingsville, TX (2) Department of Biological Sciences, Laboratory for Environmental Biology, University of Texas, El Paso, TX

Previous toxicological and immunology assays have suggested a neurotoxic component may be present in the venom of the speckled rattlesnake, *Crotalus mitchellii* and the tiger rattlesnake, *Crotalus tigris*. However, there has been no direct identification of this neurotoxin. Blood samples of individuals from both species were analyzed by PCR and DNA sequencing using primers specific for the acidic and basic subunits of Mojave toxin. Venom of snakes that provided blood samples were additionally tested for the presence of Mojave toxin with monoclonal antibodies. PCR and DNA sequencing analysis suggests the basic subunit of Mojave toxin is present in some populations of both *C. mitchellii* and *C. tigris*. However the acidic subunit was only present in *C. tigris*. Mojave toxin was not found in any *C. mitchellii* venom samples but was present in all venom samples of *C. tigris*.

BOTANY

26 AN INVESTIGATION OF RUST RESISTANCE IN FIVE INDIANGRASS (*Sorghastrum nutans* L. Nash) VARIETIES

John D. Matula* and Josephine Taylor, Stephen F. Austin State University, Nacogdoches, TX

Indiangrass (*Sorghastrum nutans* L. Nash) is a member of the family Poaceae and is a warm-season, perennial bunch grass. As a tallgrass prairie species, indiangrass is a very hearty grass that commonly grows in association with big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and switchgrass (*Panicum virgatum*). Currently, indiangrass is used by plant material centers to revegetate and reclaim grasslands that are infested by weeds or void of native grass species. Rust (*Puccinia virgata*) is a common pathogen of indiangrass. The purpose of this investigation was to categorize five varieties of indiangrass as resistant or susceptible to rust under field conditions. Plants in the field were assessed for disease severity by using a modified Cobb Scale to construct disease progress curves for each variety. The area under the disease progress curve (AUDPC) was analyzed by ANOVA to compare varieties. To determine if pathogen behavior at early stages of infection was affected by genotype, one month old plants of each variety were artificially inoculated with rust uredospores to assess the percentage of spore germination and successful appressorium formation. Chi-square analysis was used to ascertain if spore germination and successful appressorium formation were dependent on variety. Field evaluations showed ($p<0.0001$) that Osage was the most resistant variety. Knox was found to be moderately resistant. Lometa and Cheyenne were found to be moderately susceptible, and Rumsey was found to be very susceptible. Spore germination showed a slight dependence ($p=0.01$) on variety, whereas successful appressorium formation was very dependent ($p<0.0001$) on variety. These results indicate that Osage is the best variety to grow in the presence of rust.

27 EFFECTS OF SEED PREDATION BY CURCULIO WEEVILS ON POST OAK (*QUERCUS STELLATA*) SEED GERMINATION AND SEEDLING GROWTH

Wendi K Moran*, Herbert D. Grover, Nancy Neble, and Rocky McAdams, Department of Biology, Hardin-Simmons University, Abilene, TX

Abundant acorn production by Post Oak (*Quercus stellata*) occurred in 2003 in the Taylor County, Texas area. Preliminary results indicate greater than 30% of acorns collected in late October 2003 exhibited signs of infestation by the Curculio Weevil. Other studies have suggested that weevil infestation reduces acorn seed germination and may adversely impact seedling growth. Greenhouse studies were initiated in early November 2003 to quantify the effects of weevil infestation on Post Oak seed germination and seedling growth for acorns collected in the Taylor County area. Early project results indicate that weevil infested acorns germinate at about the same rate as non-infested acorns. Seedling growth studies are now underway to determine if endosperm consumption by the weevil has a quantifiable impact on seedling growth.

28 TEXAS OAK WILT INFORMATION PARTNERSHIP

Damon E. Waitt*, Lady Bird Johnson Wildflower Center, Austin, TX

The Oak Wilt Information Partnership is a collaborative project between the Texas Forest Service, the Forest Health Protection branch of the U.S. Department of Agriculture (USDA) Forest Service, the Central Southwest/Gulf Coast

Information Node of NBII housed at the Houston Advanced Research Center, and the Lady Bird Johnson Wildflower Center. The purpose of the partnership is to deliver Oak Wilt educational materials to the general public and to develop technologies to assess the geographic spread of oak wilt in nineteen Texas counties. The project takes advantage of open GIS to examine the geospatial relationship between the distribution of oak wilt and existing environmental features.

29 A VEGETATIVE KEY FOR THE IDENTIFICATION OF GRASSES (POACEAE) OF THE BALCONES CANYONLANDS OF TEXAS
Karl Hagenbuch and David E. Lemke*, Department of Biology, Texas State University, San Marcos, TX

Current methods for the identification of grass species depend almost exclusively on the availability of reproductive material. Inflorescence characteristics, such as spikelet arrangement and sexuality, floret number, disarticulation type, and bract morphology, as well as certain floral and fruit features, are the principal characteristics used for making accurate identifications. The identification of grass species, however, must often be attempted at times when flowers and/or fruits are unavailable (i.e., the specimens were collected prior to the flowering period, or the flowers and fruits were lost to mowing or grazing). This work examines the utility of vegetative characteristics, such as root, culm, and leaf morphology, sheath structure, collar, auricle, and ligule morphology, vernation type, and vestiture, for identification of the 66 genera and 173 species of grasses native to or naturalized in the Balcones Canyonlands subregion of the Edwards Plateau of Texas.

30 CHARACTERIZATION OF A *THELYPTERIS* HYBRID FROM WALKER COUNTY, TEXAS
Tracy E. Willis and Joan E. N. Hudson* Department of Biological Sciences, Sam Houston State University, Huntsville, TX

A new *Thelypteris* species with unknown origin was discovered in Walker County, Texas. Taxonomic features resemble both *Thelypteris kunthii* (tetraploid) and *Thelypteris ovata* var. *lindheimeri* (diploid) which indicates hybridity. Thus, the three ferns were studied to determine if this new fern could be a hybrid with *T. kunthii* and *T. ovata* var. *lindheimeri* as the parents. Spores of the putative hybrid examined by light and scanning electron microscopy appear to be abortive and sterile with 0% germination by day eighteen. Spore and guard cell measurements were intermediate to the presumed diploid and tetraploid parental species indicating that the hybrid is triploid. Morphological characters examined in the putative hybrid were an array of parental, intermediate, and extreme characters, suggesting that it may have resulted from a cross between *Thelypteris kunthii* and *Thelypteris ovata* var. *lindheimeri*.

31 SPECTRAL PATTERNS OF UV REFLECTANCE IN DIFFERENT PLANT SPECIES OF THE CONCHO VALLEY FLORA
Kremena G. Gineva*, Bonnie B. Amos and David Bixler, Angelo State University, San Angelo, TX

Research of specific coloration patterns in flowers yields information about the significance of color to pollinator attraction. Ultraviolet wavelengths are a particularly important part of insects' visual spectra, which is difficult for humans to perceive and analyze. UV reflectance patterns in flowers are typically assessed by taking pictures with a camera and an ultraviolet filter attached to the lens, which only allows wavelengths in the UV range(200-400nm) to pass through. In this study, another method of UV measurement is employed by using a portable USB2000 Miniature Fiber Optic Spectrophotometer. Reflectance spectra generated for different plant species exhibit interesting spectral patterns in the UV range. Also, various time-related changes in the shape and intensity of both UV and visible spectra are observed when wet vs. dry flowers are analyzed. The UV pictures taken concurrently with the data collected from spectrophotometer examination grossly confirm the areas of UV reflectance observed on reflectance spectra.

CHEMISTRY

32 SYNTHESIS AND X-RAY DIFFRACTION OF ALKALI AND ALKALINE EARTH METAL ORTHONITRATES
Richard H. Langley and Christine A. Strouse*, Department of Chemistry, Stephen F. Austin State University, Nacogdoches, TX

The orthonitrate ion is an obscure ion reported sporadically in the literature for the last 80 years. It is an unstable species in the presence of moisture or carbon dioxide. This tetrahedral ion has the shortest reported N-O bond length. Orthonitrates of sodium, potassium, and rubidium have been reported. The current project concerns further study on the known orthonitrates, plus the synthesis of new orthonitrates. These metal orthonitrates are produced by heating the metal oxide with the metal nitrate in the appropriate proportions. The mixture is heated in a sealed copper tube at 450¢ª C in a tube furnace for four days. The resulting compounds are examined by powder X-ray diffraction to determine if the orthonitrate salt formed.

33 GADOLINIUM-DOPED CERIUM OXIDE FILMS FROM GADOLINIUM AND CERIUM ALKOXIDE PRECURSORS
Derrick Smith*,Texas Southern University, Houston, Texas, and David M. Hoffman, Sherrika Daniel, Jun Guan, and Jean-Sebastien Lehn, Department of Chemistry and Center for Materials Chemistry at University of Houston, Houston, TX

Gadolinium-doped cerium oxide films have applications as buffer layers for YBa2Cu3O7-x (YBCO) coated superconductors and as an electrolyte for solid oxide fuel cells. In this project, gadolinium-doped cerium oxide thin films were prepared using a dip-coating process. A Gd:Ce solution of [Gd(OCMe2-i-Pr)2(Cp)]2 and [Ce(OCMe2(i-Pr))4]2 in p-dioxane was used as the coating solution. The films were grown on three substrates: Si, LaAlO3, and quartz. X-ray diffraction, X-ray photoelectron spectroscopy, and scanning electron microscopy were used to characterize the films. Films annealed under oxygen were crystalline beginning at 700ºC and had a 1:4 Gd:Ce ratio. Each dip in the solution produced approximately 8,000 ? of film on the substrate.

34 TIME DEPENDENCE OF THE SPECTRA OF METHYLENE BLUE/CALCIUM-HECTORITE CLAY MINERAL SUSPENSIONS
Dustin S. Barnes and Alyx S. Frantzen, Stephen F. Austin State University, Nacogdoches, TX

The aggregation of methylene blue (Mb) in Na-hectorite suspensions has been studies using visible spectroscopy. The interactions that are observed during the Mb/clay interaction include; Mb-surface interactions, Mb-Mb interactions, and interactions between clay particles. A decrease in the monomer absorption band and the appearance of bands at lower wavelengths is due to dimer formation and higher aggregates. This variation in electronic spectra has been studied in order to obtain information about the time-dependent process involved in the interactions between Mb and Na-SHCa suspensions. Immediately after mixing, the dyes are adsorbed to the external surface of the clay as monomers or induced aggregates. Evidence of this is seen in the visible spectra. A strong band at 580 nm is evidence of the aggregates. In time, the monomer band at 670 nm becomes dominant. This research is interested in looking at the time dependent spectra of Mb added to a Ca-SHCa suspension. The formation of aggregates and their mobility on the surface should be affected by the presence of the larger, higher charged calcium ion.

35 ENTHALPY OF HYDRATION OF MONTMORILLONITE CLAYS THROUGH CALORMINETRIC METHODS
Jason H. Cole* and Alyx S. Frantzen Department of Chemistry, Stephen F. Austin State University, Nacogdoches, TX

The exchangeable cations in the interlamellar region of smectite clays can become hydrated, causing the structure of the clay to expand. In nature, the cations found in this region are generally sodium and calcium, but can be replaced by other cations such as aluminum, potassium, or magnesium. This research is interested in measuring the enthalpy of hydration of a series of clays exchanged with sodium, potassium, magnesium, calcium, or aluminum. A solution calorimeter is used to measure the energy released when a dehydrated sample is immersed in water. Hydration is the process in which water molecules surround a solute particle. Hydration can be considered a three step process during which energy is absorbed and released. The first and second steps involve the separation of solute and solvent particles from their respective aggregates. This requires energy, thus the enthalpy change for both is positive. Finally, the solute and solvent are mixed. This is the only step that can release energy. Generally, hydration is an exothermic process, indicating the dominance of the third step.

36 FRUSTRATED INTERCALATION IN MONTMORILLONITE CLAYS. E.J. Acosta, Y. Deng, G.N. White, J.B. Dixon, K.J. McInnes, S.A. Senseman, E.E. Simanek, Texas A&M University, College Station, TX and A.S. Frantzen*, Stephen F. Austin State University, Nacogdoches, TX

The interaction of large dendritic surfactants with montmorillonite clays shows evidence for a new organoclay morphology termed frustrated intercalation. A series of four related dendrimers were intercalated with a calcium montmorillonite. The smaller of the dendrimers shows a dramatic increase in the basal spacing of the surfactant/clay composite while the larger, branched dendrimers show almost no increase in spacing. The water content of the interlamellar region also indicates a higher content with the larger dendrimers. This supports that the larger, branched surfactants are unable to accommodate themselves in the interlayer regions of the clay suspensions. These results support the hypothesis that shape, and not only size, is important in this morphology.

37 DETERMINATION OF ARSENIC IN DRINKING WATER USING HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY
Charlotte A. Smith* and Yuanjian Deng, Department of Chemistry, Texas Southern University, Houston, TX

Arsenic, a metalloid, occurs naturally in drinking water and has become a major health concern in recent years. It is primarily present as As(III) or As(V) in soil-water environments. Determination and speciation of arsenic in drinking water is critical in assessing its toxicity to humans. A liquid chromatographic method for the determination and speciation of As(III) and As(V) has been developed using a transition metal C18 column with UV-detection. The mobile phase used was a 0.020 M tetrabutyl-ammonium bromide and 30% acetonitrile.

38 SPECIATION AND DETERMINATION OF CHROMIUM(III) AND (VI) WITH HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
Wenluo Zhang* and Yuanjian Deng, Department of Chemistry, Texas Southern University, Houston, TX

Chromium is one of the pollutant metals that have environmental impact on humans and animals. The chromium in its compounds exist in two common forms: trivalent and hexvalent. Although the trivalent chromium is an essential nutrient and plays an important role in biochemical processes of aquatic plants and animals. However the hexavalent chromium is highly toxic and carcinogenic. Transport of metals from environment to plant relies mainly on their forms in aqueous solutions. Thus, the determination and speciation of chromium ions are of great importance in the analysis of environmental samples. Thus an analytical method with high performance liquid chromatography (HPLC) has been developed. The separation was conducted with either a chelating or an ion-pairing reagent present in the mobile phase.

39 HEATS OF COMBUSTION OF COAL SAMPLES
Jennifer C. Rohrer*, Alyx S. Frantzen, Department of Chemistry, Stephen F. Austin State University, Nacogdoches, TX

Coal is formed by the compaction of unconsolidated decaying plant material, referred to as peat. Lignite, bituminous and anthracite are the three main types of coals formed. This research is specifically interested in determining the calorific values of coal samples collected from the lower of three coal seams in Mt. Enterprise, Texas and the West Elk Coal Mine in southwestern Colorado. The type of coal collected from the two locations varies between lignite, found in Mt. Enterprise, and high-grade bituminous to semi-anthracitic coals, found in southwestern Colorado. The calorimetric data was determined using a bomb calorimeter. As coal is formed, impurities are included in its mineral framework. Nitrates were analyzed using titration techniques and sulfates were determined using precipitation reactions.

40 CONFORMATIONAL EFFECTS ON THE PHOTOCHEMISTRY OF BICYCLIC OXIRANES
Rick C. White*, Katherine M. White, and Benny E. Arney, Department of Chemistry, Sam Houston State University, Huntsville, TX

While the conical intersection for the photolysis of indene oxide is calculated to be a 1,3-diradical, the conical intersection for the photolysis of 1,2-dihydronaphthalene oxide conforms more to the dissociation of the oxirane to a carbene and carbonyl and/or a carbonyl ylid. The quantum yield for the formation of 2-tetralone increases with decreasing solvent polarity, consistent with the carbene and carbonyl in equilibrium with the carbonyl ylid.

41 THERMAL 2PI+2PI DIMERIZATION OF 1-VINYLCYCLOPROPENES TO TRANS-1,2-DIVINYLTRICYCLO[3.1.0.0(2,4)]HEXANES: A CASE OF SEQUENTIAL CONICAL INTERSECTIONS
Benny E. Arney, Jr.*, Molly Gutierrez, Department of Chemistry, Sam Houston State University, Huntsville, TX

An alternative synthesis of the parent 1-vinylcyclopropene, will be presented and the low temperature 2+2 dimerization will be discussed. The original proposed diradical mechanism is insufficient to explain the exclusivity of the reaction and an alternative mechanism has been developed that addresses the exclusivity and the ease of the reaction. This new mechanism involves a sequence of state crossings and conformational changes which lead down-hill energetically to only observed product.

42 RESOLUTION OF 2,2′-DIHYDROXY-1,1′-BINAPTHYL SULFIDE VIA DIASTEREOMERIC PHOSPHATES

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Racemic 2,2′-Dihydroxy-1,1′-Binapthyl Sulfide was treated with POCl3 followed by hydrolysis in an effort to form the cyclic acid phosphate. The acid phosphate was treated with (+)-cinchonine to form the diastereomeric salt and a series of subsequent reactions were performed, including fractional crystallization to isolate the pure enantiomers

43 SYNTHESIS OF NEW FLUORINATED DERIVATIZING AGENTS FOR CARBONYL COMPOUNDS

J. T. Mayo, Andria Kowis, W. N. Tinnerman and Thomas B. Malloy, Jr. Department of Chemistry, University of St. Thomas, Houston, TX

2,4-dinitrophenyl hydrazine has long been used as a derivatizing agent for carbonyl containing molecules. The high molar absorptivity of derivatives aldehydes and ketones makes it very useful when UV-vis detection is used, particularly with HPLC. It is the basis for several standard methods for carbonyls. .O-(2,3,4,5,6 - pentafluorobenzyl) hydroxylamine (PFBHA) has been used to form oximes which lend themselves to determination by GC or GC/MS techniques. The latter may be used to distinguish unknowns with similar retention times. With electron capture detector or negative ion mass spectrometry, exceedingly low detection limits may be approached. We recently have had occasion to deal with biochemical systems where PFBHA yields derivatives that are too heavy to chromatograph. Consequently, we have undertaken to synthesize a new set of fluoroalkyl hydroxylamines for this purpose that will maintain the low detection limits, but yield more volatile fluorinated oximes than PFBHA.

44 LIQUID CHROMATOGRAPHIC ANALYSIS OF POLYMER-BOUND N-(4-HYDROXYPHENYL) RETINAMIDE

Xianyi Cao and Chun Li, Department of Diagnostic Radiology, Division of Diagnostic Imaging, University of Texas M. D. Anderson Cancer Center, Houston, TX, and Jianxin Lin* and Yuanjian Deng, Department of Chemistry, Texas Southern University, Houston, TX

N-(4-hydroxyphenyl) retinamide (HPR), a vitamin A analogue, has been found to have antiproliferative activity in cultured human breast cancer cells. To improve HPR's aqueous solubility, poly(L-glutamic acid) (PG), a water-soluble polymer, has been chosen to react with HPR to form a polymer-drug conjugate PG-HPR, which is soluble in water. In order to monitor the release of HPR from polymer-bound conjugate, an analytical method need be developed. The present research focused on the spectroscopic and chromatographic characterization of HPR and PG-HPR and the application of HPLC to the analysis of HPR released from the PG-HPR conjugate in aqueous solution.

45 GC/MS APPLICATIONS IN THE UNDERGRADUATE ORGANIC LAB: DEUTERIUM EXCHANGE IN ISOMERIC ACYCLIC C-7 KETONES

Mariam Abdul-latif*, Sibyl Abraham*, W. N. Tinnerman, and Thomas B. Malloy, Department of Chemistry & Physics, University of St. Thomas, Houston, TX

A previously reported GC/MS experiment for the undergraduate organic lab involving the six isomeric C6 ketones is extended to the acyclic C7 ketones. A student is given the mass spectra of the undeuterated C7 ketones and a sample of one of them on which to perform a base catalyzed deuterium exchange reaction. The molecular ion found from gas chromatography mass spectrometry (GC/MS) is used to determine the number of hydrogens replaced by deuteriums. The change in the MS fragmentation pattern is used to determine where in the molecule the deuteriums are located. The student is then expected to identify which of the possible saturated acyclic heptanones they have and to explain the fragmentation patterns in the mass spectra. The goal is to illustrate a number of fundamental concepts including microscale reactions, catalysis, the use of stable isotopes, extraction procedures, mass spectrometry and keto-enol tautomerism. Modification of the experimental conditions used for the C6 ketones using a 50/50 mixture of D—2O and CH3OD permitted the full deuterium exchange on all 13 of the commercially available C7 ketones to be completed within 30 minutes. Using an HP G1800A GCD with auto-sampler provided the GC/MS results before the end of the lab period.

46 CALCULATION OF THE ENERGIES ASSOCIATED WITH ENANTIOMERS OF 2,2'-DIHYDROXY 1,1'-BINAPHYL SULFIDE
Yonas Gebremichael* and John B. Sapp, Department of Chemistry, Texas Southern University, Houston, TX

Enantiomers of 2,2'-Dihydroxy 1,1'-Binaphtyl Sulfide have been isolated. Some of the energies associated with the structures of the sulfide and the corresponding sulfoxide have been determined.

47 PARTIAL PURIFICATION AND CHARACTERIZATION OF A POTENTIAL RUBREDOXIN FROM ANABAENA 7120
Annie Mancha*1, Conrad R. Fjetland2, Mary Kopecki-Fjetland1, 1Department of Chemistry and Biochemistry, St. Edward's University, Austin, TX; 2 Department of Chemistry and Biochemistry, University of Texas at Austin, Austin, TX

Rubredoxins are small iron-sulfur proteins believed to be involved in electron transport. They are defined by the iron binding cysteine residues, which are ubiquitously conserved. Prior research showed that a gene in Anabaena 7120 encodes a protein displaying similarity to rubredoxins, which has been termed anaredoxin. The sequence homology to known rubredoxins is only seventeen percent, but the iron binding cysteine residues align perfectly. We hypothesize that anaredoxin is a rubredoxin. In order to prove this hypothesis, anaredoxin must be expressed, purified and characterized. In previous work, the potential anaredoxin protein appeared to be overexpressed upon addition of the inducer IPTG to a bacterial cell culture grown to an A600 of 1.0 at 37°C. In order to more clearly verify this potential overexpression, we are partially purifying anaredoxin using gel filtration chromatography. Samples of the partially purified protein will then be analyzed using SDS-PAGE and spectrophotometry. Future studies include subcloning the gene into an expression system to produce a tagged fusion protein for subsequent characterization.

48 PROTON INTERACTIONS WITH GAS TARGETS
Emiliano Garcia*, David Bixler, Angelo State University Physics Department, San Angelo, TX

The purpose of this investigation is to study the absolute cross sections for the emission of Balmer radiation from collisions of protons with various gases. When a proton interacts with a neutral gas molecule, an electron from the gas molecule can move to the proton, forming a neutral hydrogen atom and an ionized molecule. If the electron is captured into a excited energy state; the product excited hydrogen atom can undergo a decay process by emitting a photon of light. The Balmer-alpha radiation is produced when the electron transfers from the n=3 to the n=2 energy level of hydrogen; Balmer-beta radiation is produced during a decay from the n=4 to the n=2 energy levels of hydrogen. Studies of the radiation produced by a particular interaction reveal the cross section for electron capture into these excited states of hydrogen. The Physics research laboratory at Angelo State University houses a linear particle accelerator capable of producing an intense, monoenergetic beam of protons in the energy range of 4-20keV. The beam interacts with a known pressure of target gas, and a photomultiplier tube monitors the emission of Balmer radiation. The intensity is related mathematically to the cross section for electron capture into that particular excited state.

COMPUTER SCIENCE

49 EVALUATION OF SOFTWARE BASED FIREWALLS
James D. Pringle* and James McGuffee, St. Edward's University, Austin, TX

Studies were conducted comparing the effectiveness of McAfee Personal Firewall (2003) and Norton Personal Firewall (2003). An explanation of the experimental setup and an analysis of the results will be presented.

50 ROBOT TEAMWORK
John J. Pearce* and Mary Z. Last, St. Edward's University, Austin, TX

Two robots, based on the Carnegie Melon Palm Pilot Robot Kit (PPRK), were programmed to respond instinctually with a limited set of stimuli. The instincts used were survival, recognition, searching, team work, hunt, and capture. This experiment used the Acroname, Inc. Brainstem which is a micro-controller implementing a virtual machine of 1024 bytes with a stack of 128 bytes. The development process and its suitability as an educational environment will be presented.

51 PACKET SNIFFING OVER WIRELESS CONNECTIONS
Raul Hinojosa* and James McGuffee, St. Edward's University, Austin, TX

The goal of this study was to test the effectiveness of freely available packet sniffing software over wireless connections. An explanation of the experimental setup and an analysis of the results will be presented.

52 CRYPTOGRAPHY AND ENCRYPTION: IMPLEMENTING THE BLOWFISH ALOGRITHM
Shaun Encarnacion*, Jerry Garcia, Mary Last, and James McGuffee, St. Edward's University, Austin, TX

A study was conducted comparing various versions of the Blowfish algorithm. The variations tested included Bruce Schneier's original algorithm, a mini-Blowfish algorithm, and algorithms that partially uses Blowfish. The criteria used in the comparisons were differences in decryption speed and accuracy.

CONSERVATION AND MANAGEMENT

53 CHARACTERIZATION OF SECTION 404 PERMIT PLANS IN THE UPPER TEXAS COAST
April A. T. Conkey, Wildlife & Fisheries Sciences, Texas A&M University, College Station, TX

Section 404 of the Clean Water Act (1977), which requires an Army Corps of Engineers permit to dredge or fill, includes wetlands as "waters of the United States". Adoption of the "no net loss" policy in 1988 provided further protection by establishing a goal of no overall net loss of remaining wetlands. Wetland impacts are to be avoided, minimized, and mitigated to achieve this goal. The objectives of this study are to identify land use and changes in mitigation plans due to the implementation of the "no net loss" policy and to determine mitigation success. For a seven county area of the upper Texas coast, sixty Section 404 permits (individual) were randomly selected from 246 non-bay permits issued from 1981 – 1995 (Galveston District, U.S. Army Corps of Engineers database), and seven permits were randomly selected from 77 freshwater mitigation permits issued from 1994 – 2001 (Texas Parks & Wildlife – Dickinson Office). Seven applicant types and 15 land use types were identified. Applicants (n=60) were primarily from the oil and gas industry (40%), individual landowners (27%), and corporations or businesses (20%), with oil & gas drilling (25%) and erosion control structures (22%) being the most common construction classes. Only 20% of permits required mitigation (creation, restoration, enhancement, or preservation). Compliance with the "no net loss" policy was accomplished, in regards to area, by 11 of 14 mitigation permits, and 156 ha of mitigation were proposed for the destruction of 147 ha of freshwater wetlands. However, excluding wetland enhancement and preservation, only 109 ha were replaced (deficit of 37 ha). Permits issued after 1989 (n=7), had more detailed mitigation plans with goals or objectives and monitoring plans, but 21% of these had less than 1:1 replacement of wetland area.

54 PHENOTYPIC PLASTICITY CAN AFFECT THE SUCCESS OF FISH LIVING AMONG DIFFERENT HABITAT TYPES
Clifton B. Ruehl Texas A&M University

Phenotypic plasticity can affect the success of fish living among different habitat types. This has stock enhancement implications as the habitat and diet of hatchery reared fish is often different than wild fish. We tested for diet-induced morphological plasticity and feeding performance in the red drum (*Sciaenops ocellatus*). Fish from a Texas marine hatchery were fed commercial diets supplemented with either hard or soft food for two months. Fish feeding performance was assayed for three days to measure their ability to manipulate and consume hard food items. External morphology was assessed using geometric morphometrics. Pharyngeal crushing muscles were dissected and weighed to measure the effects of hard food on muscle development. Fish from the hard treatment developed deeper and larger heads, heavier pharyngeal crushing muscles, and initially consumed hard food items more efficiently than fish from the soft food treatment. These findings indicate red drum are phenotypically plastic. The observed morphological variation is in accordance with observed variation among species. This study is an initial step to understand the nature and magnitude of phenotypic plasticity in red drum populations. Understanding these mechanisms should aid in developing and optimizing conservation and supplementation efforts thus, easing the transition of fish from hatchery facilities to estuaries.

55 AQUIFER-DEPENDENT FISHES OF THE EDWARDS PLATEAU REGION

Robert J. Edwards*, Department of Biology, University of Texas-Pan American, Edinburg, TX, Gary P. Garrett, HOH Fisheries Science Center, Texas Parks and Wildlife Department, Ingram, TX, and Nathan L. Allan, Austin Ecological Services Field Office, U.S. Fish and Wildlife Service, Austin, TX

We provide a review of the status of many of the important aquifer-dependent fishes found in the Edwards Plateau. These fishes occur both in the spring outlets that are directly dependent on aquifer levels to sustain their habitats and also in downstream rivers and streams that indirectly depend on ground water. Of paramount importance to these environments is their overall habitat stability, especially with respect to water temperatures and flows. Regional planning efforts in the Edwards Plateau recognize that water supplies under current management scenarios are not likely sufficient to meet future water demands. Unfortunately, these water planning groups have not been highly responsive to the needs of aquifer dependent aquatic species.

56 ACCURACY ASSESSMENT OF SATELLITE IMAGERY USED IN DELINEATING GROUNDCOVER FOR THE PURPOSE OF IDENTIFYING GOLDEN-CHEEKED WARBLER HABITAT AT CAMP BULLIS, TEXAS

Susan Ann Harris, M.S., The University of Texas at San Antonio, 2003 Supervising Professor: Dr. Stephen C. Brown

Accurate habitat surveys are a necessity in estimating population trends of the endangered Golden-cheeked Warbler (*Dendroica chrysoparia*). Many agencies and organizations rely upon an accurate model of potential habitat to identify groundcover analysis and density estimates. To date, however, a universally accepted mapping system has not been widely agreed upon due to the wide variations of digital mapping models. This study researches two models for their accuracy in mapping groundcover. Thematic Mapper (TM) landsat satellite imagery was used by both modeling systems to assess selected land features. One system utilizes Geographic Information System (GIS) software and the other uses MultiSpecTM software. Each system utilizes a form of classification to categorize data into similarly unique classes taken from a satellite image of Camp Bullis, Texas. This area was chosen for study because of its numerous past sightings of Golden-cheeked Warblers. The classification uses two different methods referred to as Unsupervised and Supervised, which vary as a result of differences in software programs and statistical calculation of data. Both classification methods were tested for their accuracy in mapping selected ground-truth points. This assessment reveals a higher accuracy for the Unsupervised method vs. the Supervised method, although both classifications result in a fairly low accuracy. Thus, the use of digital maps that have been classified, such as TM imagery, may not be a useful mapping model when solely relied upon for habitat assessment, but may be resourceful when used with other data.

ENVIRONMENTAL SCIENCE

57 AN ANALYSIS OF WASTEWATER TREATMENT PROCESSES: EVALUATING AMMONIA-NITROGEN, *E. COLI* AND TOTAL SUSPENDED SOLIDS, AND TRIHALOMETHANES

Kathy Dial*, Rafael Gonzales, Jr., and Eloy Hernandez with Dr. Alakananda Chauduri, Dr. Edward Gonzalez, and Donna Wilkes, Department of Chemistry, University of the Incarnate Word, San Antonio, TX

As metropolitan populations increase, so do efforts to find viable water products for use in agriculture and recreation that will offset the ever-increasing amount of demand for potable water. As part of a solution to that search, many municipalities have implemented the use of water recycling facilities to convert wastewater to a product that can be utilized in a variety of ways. With this in mind, the purpose of this study was to compare the effectiveness of the processes between two, differing water-recycling centers of the San Antonio Water System (SAWS), namely Dos Rios Water Recycling Center (WRC) and Medio Creek WRC. At the heart of the differences between the two WRC's is their means of disinfection: chlorination at Dos Rios and UV radiation at Medio Creek. The study takes water samples from both treatment facilities at multiple areas within the process and analyzes them for nitrogen removal, E. coli growth, amount of Total Suspended Solids (TSS), and trihalomethane production. Preliminary results have shown that the Dos Rios WRC is more efficient in almost all of the facets observed.

58 ECOLOGICAL AND HYDROLOGICAL STUDIES OF THE SAN ANTONIO RIVER AT THE UNIVERSITY OF THE INCARNATE WORD, SAN ANTONIO, TEXAS

Dr. Bonnie McCormick* and Dr. William F. Thomann, University of the Incarnate Word, San Antonio, TX

Undergraduate Biology students conducted ecological and hydrological research on the San Antonio River as part of a long-term project to conserve and maintain the natural environment of the headwaters and the springs on the University of the Incarnate Word campus. Students enrolled in the Senior-level Water Quality Research class carried out field work involving stream discharge measurements, collection of macroinvertebrates using leaf packs, aquatic plant and tree identification, and testing of selected chemical constituents. Each team of four students working along a designated stretch of river were responsible for making weekly measurements of stream cross-section and stream velocity, and for in-stream measurements of temperature, salinity, conductivity, dissolved oxygen, and pH using hand-held digital meters. Water samples collected from the San Antonio River and "Blue Hole" (San Antonio Springs) were sent to local laboratories for analysis of the most common metal ions and anions, and for fecal colliform. The results of field and laboratory work show excellent water quality based on macroinvertebrate assessment, plant studies, and water chemistry.

59 NATURAL SOURCES OF POOR WATER QUALITY IN STREAMS OF EAST TEXAS

E.B. Ledger*, Geology and Environmental Science, Stephen F. Austin State University eledger@sfasu.edu, and Kathy Judy, Blinn College

Some small streams in east Texas have water of very poor quality. They are characterized by low pH, high concentrations of sulfate ion, and arsenic levels above 10 micrograms/L. The streams are associated with outcrops of the Eocene Weches and Reklaw Formations. Conditions are notably worse if the stream receives water from springs associated with these two formations. The Weches Formation is a 20 meter thick layer of green clay with abundant shallow marine fossils and accessory pyrite. The Weches exhibits elevated arsenic levels ten times higher than the average shale. The Reklaw Formation is a 30 meter thick layer of clay with slightly elevated arsenic and abundant sulfur. Visible pyrite occurs in the Weches Formation but the source of sulfur in the Reklaw Formation has not been observed. Both formations undergo acid-sulfate weathering to produce red soils. In streams associated with the Reklaw Formation, sulfate ion levels may exceed 1,000 mg/L. Although some of these streams and springs still contribute to domestic water supplies, the use of streams, springs, and hand-dug wells has decreased dramatically in the last forty years.

60 ENVIRONMENTAL WATER QUALITY CHARACTERIZATION OF THE TEXAS COAST FROM NATIONAL COASTAL ASSESSMENT DATA

James D. Simons, Texas Parks and Wildlife Department, Corpus Christi, TX, and Laura Lessin, Texas Water Development Board, Austin, TX

In the summer of 2000 Texas Parks and Wildlife Department began a five-year effort, funded by the Environmental Protection Agency (EPA), to monitor and assess the ecological health of the estuaries of Texas. This project is part of the National Coastal Assessment, which is an effort by EPA to assess the health of the nations estuaries. The program monitors water, sediment and biotic parameters. Physical water quality parameters monitored include dissolved oxygen, water temperature, salinity, pH, secchi depth and light transmissivity. In 2000, 44 stations were sampled along the Texas coast, ranging from three each in Sabine Lake and San Antonio Bay to twleve in Galveston Bay. Water temperature and pH were nearly constant along the entire coast, while salinity predictably increased from Sabine Lake to the Laguna Madre. Dissolved oxygen levels were good to fair along the coast, although they were slightly depressed in the mid coastal region. Light transmissivity was greatest in the Laguna Madre. Measures of secchi depth were problematic and in some cases did not correlate well with light data. Some of these data are currently being used to assess the condition of Texas estuaries in the National Coastal Condition Report, which is under policy review.

61 NATURAL SOURCE OF ARSENIC IN EAST TEXAS LAKE SEDIMENTS

Kathy Judy*, Department of Geology, Blinn College, Bryan, TX, E.B. Ledger, and Chris A. Barker, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

Elevated arsenic levels occur in the sediment of several east Texas reservoirs. Eight reservoirs exceed the statewide 85th percentile of 17 mg/kg dry weight for arsenic in lake sediment. Average arsenic concentrations in the sediments of these lakes

ranges from 19.5 – 83.5 mg/kg. The source of the arsenic is the marine mudstone formations which crop out in east Texas. Arsenic is common in marine mudstone where it substitutes for sulfur in the mineral pyrite. Unusually high levels of arsenic (up to 122 mg/kg compared to a global average of 13 mg/kg) are known to occur in the Weches Formation in east Texas. Other east Texas marine mudstone formations have not been analyzed for arsenic content. Oxidation of arsenic-bearing pyrite produces acid sulfate conditions, precipitated Fe(OH)3 and oxidized arsenic species. Arsenic species readily adsorb to Fe(OH)3 which is transported to reservoirs by streams and incorporated into the sediment.

62 ASSESSMENT OF VOLATILE ORGANIC COMPOUNDS IN INDOOR PARKING FACILITIES OF HOUSTON, TEXAS

Gabriel.A.Kristanto*, Bobby Wilson. Department of Chemistry, Environmental Toxicology, Texas Southern University, Houston, TX

Concerns about air quality in indoor parking facilities have been increasing steadily since more indoor parking facilities are built in many urban areas where lands are limited, and people rely more on private cars since public transports are not reliable. Despite automobiles as outdoor pollutant sources, further research by Wong et al. (2002) and El Fadel et al. (2001) stated that automobiles are potentially becoming an indoor air pollutant source. Many volatile organic compounds (VOCs) are generated from gasoline and driving processes. This study will test whether air quality, especially VOCs concentrations, in indoor parking facilities can be harmful to human. Research by US Department of Transportation in 2000 found that automobiles generated more VOCs in a lower velocity. In an indoor parking facility, this situation needs to be addressed since artificial ventilations are the major equipment that can maintain healthy indoor air. The specific objectives of this study are to assess types and concentration of VOCs in indoor parking facilities, to find a relationship between types of VOCs and their sources. EPA Method TO15 will be used for sampling and analysis.

63 INDENTIFICATION AND INTERPRETATION OF CONCENTRATIONS OF ATMOSPHERIC ORGANIC COMPOUNDS IN HARRIS COUNTY, TEXAS

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

Volatile organic compounds (VOCs) in the atmosphere are a major cause of urban air pollution. This is especially true in urban areas where industrialization has led to the emission of a large number of man-made VOCs. These VOCs are a principal component in atmospheric reactions that form ozone and other photochemical oxidants. Many of these VOCs are also hazardous air pollutants that can cause adverse health effects in humans. Due to their potential risk to public health, interest in identifying and quantifying VOCs in the atmosphere has increased over the last several decades. In Harris County, nearly 78,000 children attend schools in close proximity to industrial facilities that collectively release millions of pounds of toxic chemicals known to cause cancer, birth defects, learning disabilities and other serious health problems. Currently, the state of Texas has no plan to ensure that the air children breathe at schools near toxic emitters is safe. This research seeks to identify and compare volatile organic compound concentrations, by analyzing ambient air samples using EPA Method TO-15, and determine the impact that these chemicals may have on the health of children.

64 AN ASSESSMENT OF IN-VEHICLE VOCS DURING RUSH HOUR COMMUTES IN HOUSTON METROPOLITAN AREAS

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Congestion of Houston highways is a growing problem between the hours of 3:00 p.m. and 6:00 p.m. On average, people spend about 6% of their time in transit; much of this time is spent in rush hour traffic. Studies have found that individuals are exposed to elevated levels of 5 to 24 volatile organic compounds (VOCs) while commuting as compared to activities in which gasoline is not used. Within the last 15 years, very few studies have been conducted on human exposure to in-vehicle VOCs. Concentrations of in- vehicle VOCs were examined throughout daily commutes during high traffic density periods in the evening in Houston, TX. This study involved two traveling options, high occupancy vehicle (HOV) lane or standard freeway lanes. Samples were collected and analyzed using a GC/MS system programmed with a modified version of the EPA TO-14 method. Several VOCs were detected including benzene, toluene, ethylbenzene, xylene, 1,3-butadiene, and methylene chloride.

65 15 YEARS OF OBSERVATIONS OF UV, OPTICAL DEPTH, THE OZONE AND WATER VAPOR COLUMNS AND TREE RINGS AT GERONIMO CREEK OBSERVATORY

Forrest M. Mims III, Geronimo Creek Observatory, Seguin, TX

Geronimo Creek Observatory (GCO) (29.6N, 97.9W) is a field near Seguin, Texas, where a wide variety of atmospheric observations have been made for more than 15 years. Noon measurements of solar UV-B at 300 nm were begun in 1988. In 1990, observations were expanded to include total ozone, total water vapor and aerosol optical thickness of the atmosphere at solar noon. In 1994-5, measurements of full sky UV and photosynthetic radiation were added. A Solar Light 501 Biometer was added to record UV-B at 1-minute intervals. In 1998, a Yankee shadowband radiometer was added to record full sky and direct irradiance at 7 wavelengths at 15-second intervals. Also in 1998, digital photographs of the solar aureole and the sky over the north horizon were made during solar noon measurement sessions. In 2000, 180-degree (fisheye) photographs of the sky were begun. Many of the instruments at GCO have been calibrated during annual visits to Mauna Loa Observatory, Hawaii, since 1992. Observations at GCO are ongoing and are being compared with the regional tree ring record and with subcanopy growth of saplings in the adjacent forest. More information about GCO and related scientific publications are at www.forrestmims.org.

66 PRELIMINARY ANALYSIS OF SENSITIVE SOIL CONTAMINATION IN SOUTHERN BRAZORIA COUNTY USING INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY (ICP-MS)

Katoria R. Tatum*, Douglas M. Willis and Bobby Wilson. Environmental Research Technology Transfer Center (ERT2C), Texas Southern University, Houston, TX

An article in The Brazosport Facts dated Saturday, October 21, 2000 disclosed that barium, cadmium, chromium and selenium exceeded the EPA's safety limits in tests Dow Chemical conducted on groundwater 20-80 feet below the Freeport Municipal Golf Course and the Slaughter Road neighborhood. These areas are located in southern Brazoria County and in close proximity to the Dow Chemical Texas Plant. State agencies may regulate the maximum allowable soil concentrations of metals in sensitive and less sensitive areas. This ensures human and environmental safety. Sensitive soils include soils in residential and recreational environments while less sensitive soils include those located in industrial or commercial environments. Presently, Texas neither regulates soil quality nor enforces maximum allowable soil concentrations. Thus, this study aims to assess the presence, extent, and severity of barium, cadmium, chromium and selenium in the sensitive soil of the Slaughter Road neighborhood, the Freeport Municipal Golf Course and the Freeport Municipal Park. Sensitive soil samples were collected and analyzed with an Inductively Coupled Plasma Mass Spectrometer (ICP-MS) using methodology derived from EPA Method 3050B.

67 A REVIEW OF THE TOXIC METABOLITES FROM *STACHYBOTRYS* SPECIES

Veronica M. Amaku*, Olufisayo Jejelowo, John Sapp, Mofolorunsho Enigbokan, Tyronne Felder, Joseph Jones and Bobby Wilson. Center of Excellence for Biotechnology & Environmental Health, Texas Southern University, Houston, TX

Members of *Stachybotrys*, a genus of anamorphic filamentous fungi are becoming increasingly important moulds in enclosed environments because of the implications of *S. chartarum*, a member of the genus in sick building syndrome and pulmonary hemosiderosis in infants. However, there is still controversy within the scientific circle regarding the toxicity of these moulds. The metabolites that have been extracted from different members of this genus by various workers were complied in order to review the types and classes of toxins produced by these organisms. This review showed that the toxins are in two main categories: the highly toxic macrocyclic trichothecenes and non-trichothecene metabolites especially the spirolactones and spirolactams. In light of these findings, there is a concern about the toxicity of these moulds, and a need to conduct research to explicitly determine the dose - response relationship.

68 DETERMINATION OF VOCs IN NEW AND NEWLY RENOVATED BUILDINGS AT TEXAS SOUTHERN UNIVERSITY

Ahtavea Castellanos*, Felicia Conley, and Bobby Wilson. Environmental Research Technology Transfer Center (ERT2C), Texas Southern University, Houston TX

A wide variety of health effects are caused by exposure to indoor air pollutants. Volatile organic compounds (VOCs) are major air pollutants in the indoor environment. Researchers have linked exposure to VOCs as one of the possible causes of sick building syndrome (SBS). A typical setting for SBS is a newly remodeled building with some type of heating, ventilation,

and air conditioning system. This project documents the analysis of ambient air in a newly constructed and newly renovated building on the campus of Texas Southern University. The objectives of this project were to identify and quantify VOCs present in these buildings and compare concentrations to regulated standards. Samples were taken using a 6L silonite coated stainless steel canister, over an eight-hour period, for a total of 5 days in each building. A GC/MS system, programmed using a modified version of TO-14 EPA method, was utilized to analyze samples. The VOC levels in the new building were consistently lower than those in the renovated building, with the exception of methylene chloride.

69 PROHIBITED EXOTIC SPECIES ASSOCIATED WITH TEXAS ASIAN-AMERICAN COMMUNITIES

Jaimie E. Maher, Schreiner University, Kerrville, TX, and Robert G. Howells, Texas Parks and Wildlife Department, Ingram, TX

Texas Parks and Wildlife Department has long regulated exotic fishes, shellfishes, and aquatic plants as per legislative directive. Recent violations of restrictions on exotic species have involved such taxa as Japanese eel (*Anguilla japonica*), northern snakehead (*Channa argus*), and water spinach (*Ipomoea aquatica*). Groups utilizing these species were found to be primarily of Southeast Asian descent. Because this ethnic association with exotic species was a relatively new phenomenon, efforts were made to identify areas in Texas with significant Asian communities where problems with such organisms might be expected and where better public information efforts about restrictive regulations may be needed. Three primary and four minor areas of Southeast Asian population concentrations were identified.

69A INDUCED TOLERANCE AND THE POTENTIAL TO USE SUNFLOWERS FOR PHYTOREMEDIATION OF ARSENIC

Kirk V. Cammarata*, Laura C. Markley, and Katherine Sippel, Texas A&M University-Corpus Christi, Corpus Christi, TX

Phytoremediation engineers the use of plants to render environmental contaminants less harmful. The South Texas Uranium Mining District has mine spoils with potentially harmful levels of arsenic and molybdenum. Brake Ferns are known to phytoremediate As by hyperaccumulating it from the soil, but these plants may not survive in South Texas. We are studying endemic sunflowers (*Helianthus*) for their phytoremediation potential. In Alyssum species, foliarly applied amino acids induce metal tolerance, chelation and hyperaccumulation. We hypothesize that foliar application of cysteine and glutamate will elevate phytochelatins, polymers of cysteine and glutamate, leading to hyperaccumulation of arsenic. Potted sunflowers in a growth chamber were treated weekly with 2 mM NaAsO3 and NH4MoO4, either with or without foliar amino acid exposure (20 mM). Growth metrics (height, leaf count, and day died) and shoot concentrations of arsenic, molybdenum, copper and iron were determined by ICP. Consistently, most but not all plants receiving foliar application of cysteine and glutamate exhibited metal tolerance evidenced by delayed metal toxicity and lessened symptom severity until eventual death after multiple treatments. Arsenic was accumulated to between 100 and 5000 mg/kg dry weight. Several correlations were observed: As and days until death (r=-0.58), As and Mo concentration (r=0.79), Mo and Cu concentration (r=0.88). No correlation occurred between As and Fe or Mo and Fe. We conclude that the tolerance induced by foliar cysteine and glutamate application is not from hyperaccumulation. Enhanced exclusion of As and Mo from plant shoots is likely. Future analysis will focus on root metal concentration and phytochelatin levels.

FRESHWATER AND MARINE SCIENCE

70 BACTERIAL CARBON SUBSTRATE UTILIZATION PATTERNS AT THE SEDIMENT-WATER INTERFACE

B.W. Christian, Center for Reservoir and Aquatic Systems Research, Department of Biology, Baylor University, Waco, TX

Water samples were collected at the sediment-water interface before, during, and after autumnal mixing along a depth gradient in a stratified central Texas reservoir (Lake Belton). These were analyzed for the ability of their bacterial assemblages to oxidize various individual sources of organic carbon. Ninety-six-well Biolog ECO® microtiter plates, each containing 31 distinct organic carbon sources, were inoculated and incubated with water samples at in situ lake temperature and oxygen concentration. Color development (from tetrazolium dye reduction) and turbidity in each well were measured spectrophotometrically daily over the course of five days. Portions of each water sample were also measured for bacterial abundance and cell volume. Correlations among water temperature, dissolved oxygen concentration, and types of carbon substrates oxidized by the bacteria were derived. Spatial and temporal changes in organic carbon substrate utilization were compared. Further evidence is presented to show the extent that total bacterial numbers and rate of carbon substrate utilization at the sediment-water interface are affected by seasonal mixing events.

71 SPATIAL AND TEMPORAL VARIATION IN BIOGENIC SILICA RESUSPENSION WITHIN A POLYMICTIC RESERVOIR
Christopher T. Filstrup, Center for Reservoir and Aquatic Systems Research, Department of Biology, Baylor University, Waco, TX

As part of a larger study on sediment resuspension, biogenic silica resuspension is being examined spatially and temporally within a polymictic reservoir (Lake Waco, McLennan County, TX). Sedimentation traps are being deployed monthly at four designated sites representing various reservoir regions. Biogenic silica will be measured using time course extraction of the wet-alkaline digestion technique to determine the different components of biogenic silica. While diatoms comprise the majority of biogenic silica in Lake Waco, other fractions may also be significant. The percentage of biogenic silica being resuspended will be correlated with wave mixed layer (WML) values, which are a function of effective fetch and wind speed, versus depth at each site. I anticipate that biogenic silica resuspension is greater in the riverine regions due to shallower depths. I also anticipate that the riverine region of the "southern arm" serves as the predominant source of biogenic silica resuspension due to a great effective fetch and prevailing wind patterns. Conclusions drawn from this study may allow conjectures about silica recycling and trophic interactions within polymictic reservoirs.

72 EPIPHYTE LOAD ON ARTIFICIAL SEAGRASS BLADES IN THE LOWER LAGUNA MADRE, TX
Leonardo Saldana and Hudson DeYoe, Biology Dept. University of Texas Pan American, Edinburg, TX

Seagrass epiphytes are short-term integrating monitors of water quality. Artificial seagrass blades constructed of black plastic strips were deployed quarterly (February, May, August, November) at six locations in the Lower Laguna Madre arrayed around the Arroyo Colorado, the largest nutrient source for the lagoon. At the end of the exposure period which varied from 15-28 days, the strips were analyzed for epiphyte chlorophyll using dimethyl formamide to extract the pigment and spectrophotometry to quantify chlorophyll a. Epiphytic chlorophyll varied from 0.137 (SD 0.016) to 0.004 (SD 0.001) micrograms chl a/sq. cm/day. Chlorophyll levels were consistently higher at the two stations nearest the Arroyo Colorado. Epiphyte chlorophyll varied seasonally at each station with chlorophyll peaks occuring in May or August.

73 USE OF TISSUE NUTRIENT CONTENT OF THE MACROALGA *LAURENCIA POITEAUI* TO DETECT EUTROPHICATION IN THE LOWER LAGUNA MADRE, TX
Onur Dundar* and Hudson DeYoe, Biology Dept. University of Texas Pan American, Edinburg, TX

Eutrophication of the lower Laguna Madre by the Arroyo Colorado is presumed to increase the growth and abundance of drift algae, thereby exerting harmful effects on the seagrass ecosystem. It was hypothesized that due to the influence of the Arroyo Colorado algal tissue nutrients and chlorophyll would be higher near the Arroyo Colorado compared to other locations. To evaluate this hypothesis, clumps of the drift macroalga *Laurencia poiteaui* were collected from a nutrient-poor location in the lagoon, placed inside nylon-mesh bags and anchored at five locations arrayed around the mouth of the Arroyo Colorado. Incubation times varied from 22 to 32 days, with a heavy rainfall event occurring during the study. Wild Laurencia clumps were also collected for comparison with bagged samples. Algal samples were analyzed for tissue carbon (C), nitrogen (N), and chlorophyll content. Tissue N and chlorophyll content of bagged samples were highest at the site closest to the Arroyo Colorado. Tissue C did not differ appreciably amongst the locations. Tissue N and chlorophyll increased markedly near the Arroyo Colorado post-rainfall. The wild Laurencia samples had significantly higher tissue N and chlorophyll content than bagged samples.

74 TRACE METALS IN EPIPHYTES ASSOCIATED WITH *THALASSIA TESTUDINUM* LEAVES
Yoshiaki Yoshida*, Juan Reynoso, Thomas Whelan III, Maria CottaGoma, Hudson DeYoe, University of Texas-Pan American, Edinburg, TX

Algal epiphytes living on about 20 green *Thalassia testudinum* blades from 7 locations in a healthy *Thalassia* meadow were scraped onto collection paper using a glass microscope slide and analyzed for trace metals. Values for the epiphytes were always enriched relative to the leaf where they were growing. Lead showed values from 1-10 times higher than the leaf lead. Fe ranged from 1700 to 1072 ppm, which was up to 5 times greater than the leaf iron. Zinc showed the highest variability and ranged from 2.7 to 36 ppm. Manganese was similar in metal content to the leaf and ranged from 318 to 118 ppm. Copper showed the most consistent values ranging from 8.2 to 19.5 ppm which was up to 5 times the leaf copper content. Epiphytes can be may be a more sensitive indicator of metal pollution than the seagrass on which they are growing. In addition, epiphytes may be a significant contributor to metal cycling in the Laguna Madre.

75 SPATIAL TRENDS IN PERIPHYTON NUTRIENT STATUS: EXAMINATION ALONG A DIFFERENTIAL NUTRIENT DEPLETION GRADIENT IN A FRESHWATER MARSH

Thad Scott*, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX, Robert Doyle, Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX, and Tom Conry, City of Waco, Waco, TX

Nutrient removal from water flowing through freshwater wetlands often results in longitudinal gradients along the flow path of water. While both N and P concentrations commonly decline, there may also be a shift in N:P ratios along the gradient if specific N and P removal rates are unequal. Decreasing N:P ratio, a result of higher N removal, may subsequently shift periphyton assemblage structure and function by favoring organisms adapted to better compete for alternate nitrogen sources (i.e. cyanobacterial nitrogen fixers). Because periphyton assemblages play a major role in food web dynamics in freshwater systems, changes within assemblages could adversely impact ecosystem functions. The objectives of this study were to 1) evaluate water column nutrient removal rates in a newly constructed freshwater marsh, 2) determine nutrient limitation status of periphyton along a longitudinal nutrient gradient, and 3) examine changes in periphyton nitrogen fixation rates along the observed gradient. In situ bioassays using nutrient enrichment periphytometers were employed to test nutrient limitation status, while N fixation rates were assessed using the acetylene reduction method on periphyton sampled from artificial substrate. Results indicate that N removal along the nutrient depletion gradient was substantially greater than P removal, resulting in a decreased N:P ratio. Subsequently, nutrient limitation status of periphyton generally shifted from P+N co-limitation at the wetland inflow to strict N limitation at greater distances along the nutrient depletion gradient. Further, substantial increases in N fixation along the gradient were observed. Spatial and temporal changes in nutrient removal rates, periphyton nutrient limitation status, and periphyton N fixation rates will be presented.

76 MACROPHYTE COMMUNITY CHANGE IN THE SAN MARCOS AND COMAL RIVER

Robin Swindle* and Robert Doyle, Baylor University Center for Reservoir and Aquatic System Research, Waco, TX

Vegetation surveys conducted on the San Macros and Comal Rivers using GPS mapping, showed a significant increase in the relative abundance of exotics species following a major flood. The San Marcos and Comal are spring fed rivers that contain abundant and diverse macrophyte communities. In October of 1998, a 500 year flood caused major scouring of vegetation in both rivers. The disturbance caused by the flood favored exotic species such as *Hygrophila polysperma* and *Hydrilla verticilla*. In the two years following the flood, exotic species increased in relative abundances, while native species significantly decreased. The endangered *Zizania texana* was reduced in relative abundance the first year after the flood, but had returned to pre-flood levels by the second year. *Potamogeton illonoensis* populations were significantly reduced both years post flood.

77 HYDROGEN SULFIDE IN PORE WATERS OF A *THALASSIA TESTUDINUM* MEADOW IN THE LOWER LAGUNA MADRE

David Camacho, Thomas Whelan III, Hudson DeYoe, and Maria CottaGoma, University of Texas-Pan American, Edinburg, TX

Hydrogen sulfide levels in concentrations greater than 6 mM have been shown to contribute to seagrass die off. Simple disposable pore water samplers were constructed using pipettes, coarse-grained sand, and plastic 3-way stopcocks. The samplers could sample the pore water at three depths 2.7, 8 and 15 cm below the sediment-water interface. The methylene blue colorimetric method was used to quantify the pore water hydrogen sulfide concentration. The reagent was prepared fresh and added to the pore water immediately after collection. Pore water hydrogen sulfide ranged from less than 10 to over 2000 uM. Values 8 cm below the sediment-water interface were highest, relative to the surface and 15 cm depths. Pore water collected from healthy seagrass, barren areas, and drift algae covered areas of the bay floor showed the algae covered seagrass contained the highest sulfide values. No values approaching the toxic level were found in any area studied. Contribution of drift algal blooms, and concurrent hydrogen sulfide build up, must be considered as a detrimental factor to seagrass health.

78 PHYSIOLOGICAL RESPONSES OF *THALASSIA TESTUDINUM* TO TRACE METAL EXPOSURE

Maria CottaGoma*, Thomas Whelan III, David Camacho, and Hudson DeYoe. University of Texas-Pan American, Edinburg, TX

In order to better understand the mechanism and response of trace metals in seagrass communities, two experiments were undertaken. First, sediments containing healthy stands of Thalassia were injected with 100 ppm of the essential micronutrients Fe, Mn and Cu chloride solutions to follow the potential metal uptake in from the root/rhizome complex into the leaf

material. In the second experiment, Thalassia plugs were transferred to controlled outdoor microcosms and inoculated with 1 ppm solutions of the same 3 metals complexed in EDTA to slow precipitation. Tissues were sampled after 3 days exposure to the metal treatments. Manganese was clearly enriched in the leaf tissue after 3 days exposure. Neither Fe nor Cu showed enrichment. In addition, no apparent visual changes were observed with the Mn, Cu and Fe treatments. However, anomalous chlorophyll A values were observed in the Cu treated seagrass. Previous work showed that other seagrass species, Halophila ovalis among others, showed a dramatic decline in photosynthetic efficiency with a 1 ppm Cu treatment.

79 RIPARIAN RESPONSE TO HYDROLOGIC FLUX IN THE DOWNSTREAM REACH OF AN IMPOUNDED 2nd ORDER STREAM
Jacquelyn R. Duke* and Dr. Joseph D. White, Baylor Univ. Biology Dept., Dr. Peter Allen, BU Geology Dept. and Dr. Ranjan Muttiah, TEAS

Current river restoration policies have focused on dam removal to establish pre-dam river functions. This push is based on numerous studies of large-scale dam negative impacts, yet the vast majority of those decommissioned have been small-scale dams. One misconception is an assumed relationship between dam size and severity of negative impacts which overlooks the broad ecological differences among various-sized dams. This study examines the relationships between hydrologic fluxes in stream, groundwater, unsaturated zone and riparian response in the downstream reach of a small, impounded stream. A three-year study was conducted along a 2nd order stream to examine water exchanges between the stream and riparian zone. We found canopy transpiration to be closely coupled with stream and groundwater fluctuations in which the riparian zone was benefiting from increased stream water availability. Canopy productivity is enhanced via increased transpirative ability under such conditions. Thus, in addition to the economic use for which small dams were intended, they also provide an ecological benefit of reduced fragmentation and even increased development of the riparian zone.

80 IMPROVEMENTS IN WATER QUALITY FOLLOWING RENOVATION OF A WATER SUPPLY RESERVOIR
Matthew M. Chumchal*, University of Oklahoma, Norman, OK, Ray W. Drenner, Texas Christian University, Fort Worth, TX, David H. Marshall, Jennifer L. Owens and Mark R. Ernst, Tarrant Regional Water District, Fort Worth, TX

The Balancing Reservoir consists of two seven-hectare basins that store untreated lake water prior to use in the municipal water treatment system of Fort Worth, Texas. In an attempt to improve water quality, the Tarrant Regional Water District drained the basins, removed fish and sediment, and replaced the plastic lining that covered the bottoms and sides of the basins with concrete. The objective of this study was to examine changes in water quality before and after renovation of the basins. Before renovation, the basins were eutrophic with high concentrations of chlorophyll, low densities of cladocerans, and high densities of planktivorous fish. After renovation, chlorophyll concentrations were lower, cladoceran densities increased, and the densities of planktivorous fish decreased. In addition, the slope of the chlorophyll - total phosphorus relationship for each basin was lower after renovation, suggesting that changes in planktivorous fish populations may have induced a trophic cascade effect that contributed to improvements in water quality.

81 TEXAS TIDAL STREAM AQUATIC LIFE USE ATTAINABILITY
Cindy H. Contreras*, David Buzan, Grace Chen, Ph.D., Greg Conley, Winston Denton, Josh Harper, Kay Jenkins, Nathan Kuhn, Steven Mitchell, Dan Moulton, Ph.D., Melissa Mullins, Smiley Nava, Janet Nelson, Chad Norris, Cherie O'Brien, Pat Radloff, Ph.D., Michael Ratcliff, Margaret Scarborough, James Tolan, Ph.D., Michael Weeks, and Adam Whisenant; Resource Protection Division, Texas Parks and Wildlife Department, Austin, TX

Tidal streams in Texas are components of estuaries that provide vital habitat such as nursery grounds for many aquatic organisms, including economically important species like shrimp and game fish. There is no methodology in place to evaluate the aquatic life use (ALU) of tidal streams, a designation that has regulatory consequences such as driving the levels of contaminants permitted in wastewater discharges. TPWD is leading a four-year study of five tidal streams, sampling fish, invertebrates, habitat, flow, and water quality to set the ALU of these streams. The study streams are Tres Palacios Creek Tidal, Garcitas Creek Tidal, and Cow Bayou Tidal. The reference streams are West Carancahua Creek Tidal and Lost River. Field sampling began in 2003 and will continue through 2004. The project will be described and placed in context with state and national efforts to develop methods for assigning an ALU to tidal streams.

82 TOXIC CONTAMINANT CHARACTERIZATION OF ESTUARINE SEDIMENT AND ORGANISMS ON THE TEXAS COAST
Charles R. Smith*, Texas Parks and Wildlife Department (TPWD), Austin, TX, James D. Simons, TPWD, Corpus Christi, TX, Pamela Hamlett, TPWD, San Marcos, TX, David M. Klein, TPWD, San Marcos, TX, and Gary Steinmetz, TPWD, San Marcos, TX

Numerous recent studies have assessed coastal environments for toxic contaminant loads by assaying sediment and a variety of species for various analytes. The Resource Protection Division of the Texas Parks and Wildlife Department, funded by the U.S. Environmental Protection Agency (EPA) under the National Coastal Assessment Program, has monitored contaminants in sediment and selected shellfish and finfish species along the entire Texas coast since 2000. Compounds measured in whole-carcass homogenates of target organisms included polynuclear aromatic hydrocarbons, pesticides, polychlorinated biphenyls, and trace elements listed on the EPA Priority Pollutant List. The results provide insight into the influence of sediment analyte concentrations and organism species on tissue uptake of the compounds. Ultimately, this baseline data will permit meaningful comparison with other studies of areas with different sediment contaminant levels and organisms.

83 COMPARISON OF EPIPYTIC DIATOM COMMUNITIES ON MARINE SEA GRASS *HALODULE WRIGHTII* IN THE LOWER LAGUNA MADRE BELOW SEWAGE EFFLUENT WITH AND WITH OUT WETLANDS
Hudson De Yoe Dept. of Biology University of Pan Am, Edinburg, TX, and Cheryl Allen Gilpin*, Phycologist, Environmental Consulting and Photomicroscopy Services, San Marcos, TX

Diversities of marine diatom epiphytes greater than any ever documented on the Texas Coast were discovered and documented by taxonomic descriptions. Distributions patterns between the epiphytes grouped by their modes of attachment were observed between habitats with and without wetlands. High potential for establishing indicator species for various environmental conditions if research continues.

84 PLANKTONIC NITROGEN FIXATION IN LAKE WACO: HOT SPOTS AND HOT MOMENTS
Robert Doyle, Baylor University Center for Reservoir and Aquatic Systems Research, Waco, TX, and Tom Conry, City of Waco, Waco, TX

Reservoirs have long been recognized as "hot spots" of biogeochemical activity. While much attention in the past has appropriately focused on the role of phosphorus in controlling reservoir productivity, there is a growing realization that nitrogen may play a key role at some times and in some locations. This presentation reports on the seasonal and spatial patterns of planktonic nitrogen fixation in Lake Waco. Nitrogen fixation was strongly light-dependent, indicating that, as expected, the nitrogen fixers are probably photosynthetic blue green algae. High rates of nitrogen fixation on the lake were measured during the mid to late summer period (July-October). This suggests that the lake may be limited or co-limited by nitrogen during this important warm-season growth period. Additionally, the rates of nitrogen fixation were observed to be highest in the "transition zone" between the North Bosque River and the lacustrine zone of the reservoir. These data suggest that nitrogen may play an important role in controlling reservoir dynamics in some places (hot spots) and at some times of the year (hot moments).

85 AQUATIC PLANT GROWTH RESPONSES TO WATER WITH LOW CO2 CONCENTRATIONS
Cynthia Gorham-Test*, BIO-WEST, Inc.; Edmund Oborny, BIO-WEST, Inc., Kristine Dennis Parkerson; Paula Powers, USFWS National Fish Hatchery and Technology Center; Randy Gibson, USFWS National Fish Hatchery and Technology Center

This study was conducted at the National Fish Hatchery and Technology Center (NFHTC) in San Marcos, Texas in fall 2003. Five species of aquatic plants commonly found in the San Marcos and Comal Rivers were exposed to three different CO2 concentrations in water pumped from the Edward's Aquifer. Water for the low and moderate CO2 concentration treatments were aerated to reduce CO2 in the water. Water for the high CO2 concentration treatment was not aerated. Temperatures were held constant across the three treatments. Water was then pumped into the NFHTC's 950-liter flow through tanks. Three plants per species were randomly chosen and placed in each of the nine tanks. Each of the three CO2 treatments were represented by three tanks. The experiment was conducted for approximately six weeks during the fall of 2003. At the end of the experiment plants were dried and weighed. Results of the experiment will be presented.

86 BACTERIA SOURCE TRACKING IN COASTAL TEXAS WATERS USING PULSE FIELD GEL ELECTROPHORESIS

Roy L. Lehman* and Joanna B. Mott . Center for Coastal Studies. Texas A&M University-Corpus Christi, Corpus Christi, TX

A pilot field project was completed in the Oso Bay/Oso Creek system of south Texas in 2001-2002. Five sites were sampled quarterly, with two additional After-Rainfall event collections. At least ten (10) *E. coli* isolates were obtained from each water sample after filtration, using mTEC medium (Standard Methods 9213 D.3. for *E. coli*). All isolates were cultured, and identification was confirmed, after growth on Rainbow agar, using a rapid test system (Biolog). The confirmed *E. coli* isolates were batch cultured for DNA analysis. Total DNA was extracted from each culture, cut with a restriction enzyme (Not I), and fingerprinted by using Pulsed Field Gel Electrophoresis (PFGE). Results were compared to a previously developed library of electrophoretic DNA fingerprints of each source animal's *E. coli* bacteria established for the South Texas geographic region. An image analysis system with associated software was used to preserve an image database of known sources of bacterial strains. Results indicate that 82% of isolates originated from nonhuman sources, including many wildlife species typically associated with urban streams. Waterfowl contributed about one fourth of the matched bacteria, while dogs and cats accounted for 10% of the matched strains, and cows 6.5%. Deer and other wild animals were also identified as animals contributing to bacterial contamination of Oso Bay/Creek. This BST profile is potentially similar for many other urban areas. PFGE is a highly sensitive database-dependent approach to Bacteria Source Tracking (BST). The method can provide high specificity, allowing the identification of many species that contribute fecal bacteria to water bodies; however, the level of effectiveness requires that the database be specific to a region.

87 TWO YEAR PHYTOPLANKTON SPECIES DISTRIBUTION ANALYSIS OF FT. COBB RESERVOIR, OKLAHOMA EVALUATING TECHNIQUES FOR CONTROLLING TOXIC BLUEGREEN CYANOBACTERIA

James Fairchild,Research Ecologist, USGS, Columbia, MO, and Cheryl Gilpin*, Phycologist, Environmental Consulting and Photomicroscopy Services, San Marcos TX

This study shows that phytoplankton species distribution is a valuable measurement for evaluating changes in nutrient regimes applied to this reservoir. Futher documentation of species distribution is needed in order to model the impacts of nutrient changes in this reservoir on its water quality because various species impact water quality in different ways.

88 METAL PARTITIONING BETWEEN THALASSIA TESTUDINUM AND SEDIMENT IN THE LOWER LAGUNA MADRE, TEXAS

Thomas Whelan, III*, Jorge Espinoza, Xiomara Villarreal, and Maria CottaComa, University of Texas-Pan American, Edinburg,TX

In the Lower Laguna Madre (LLM) seagrass coverage has been reduced by over 400% since 1963. One possible contribution to this decline is the influx of pollutants including trace metals. In this study we examined various morphological components of the seagrass, *Thalassia testudinum*, for existing baseline concentrations of essential trace metals Cu, Fe, Mn, Zn, and non-essential metals As and Pb. Trace metal concentration is generally higher in summer than winter, with the exception of the non-essential metals Pb and As. Four locations were studied and the rhizosphere sediments showed the same trace metal pattern at all four locations, whereas the tissue did not follow a pattern nor did it relate to the sediment directly. These results indicate that the essential trace metals are extracted from the water column and the concentration of the metals studied in this work are well below the values reported for polluted sites.

89 EFFECT OF DRIFTING SEAWEED ON SEAGRASS SURVIVAL IN THE LAGUNA MADRE, TX

Hudson DeYoe, David Camacho, Thomas Whelan III, and Joseph Kowalski. Center for Subtropical Studies, University of Texas Pan American, Edinburg, TX

Drifting macroalgae are common in the Laguna Madre and can form large stationary clumps. When stationary over seagrass for long enough periods they kill the seagrass. We hypothesized that the drift algae have a dual negative effect on seagrass- shading and elevated hydrogen sulfide. To evaluate this hypothesis, drift algae (*Digenea simplex*) clumps of two sizes (medium- 0.0625 and large- 1 sq m) and shredded black plastic (0.0625 sq m) were anchored on top of the seagrass Thalassia testudinum for 58 to 67 days. Seagrass blade chlorophyll, seagrass biomass and sediment hydrogen sulfide were measured during the experiment. Mean blade chlorophyll values were more depressed for plants covered by drift algae (either size) than black plastic (0.70 lg, 0.54 medium vs. 1.6 plastic micrograms chl/sq cm.). Seagrass leaf biomass was highest for the large clumps (0.020 g/sq cm), lowest for the medium clumps (0.008 g/sq cm) and intermediate for the

black plastic treatment (0.015 g/sq cm). Rhizome biomass did not differ significantly amongst the treatments. Root biomass was twice as high for the black plastic treatment (0.049 g/sq cm) than the two algal clump sizes (both at 0.014 g/sq cm). Hydrogen sulfide data was highly variable and showed no pattern.

90 SEASONAL LEAF CHLOROPHYLL DYNAMICS IN *HALODULE WRIGHTII* (SHOAL GRASS)

Joseph L. Kowalski* and Terry C. Allison. The University of Texas - Pan American, Department of Biology, Edinburg, TX

Photoautotrophs, from blue-green bacteria to higher vascular plants, adjust their photosystem stoichiometry to optimize photosynthetic performance. Alteration of chlorophyll (Chl) concentration and Chl a to b ratios is a common adaptation to changes in irradiance. *HALODULE WRIGHTII* from the Laguna Madre, TX does not demonstrate a strong seasonal signal in total blade Chl concentrations, but seasonal a:b ratios were clearly discernable. Total Chl and a:b ratios were negatively correlated with temperature in this study to a significant degree. It is believed that the redox state of the thylakoid electron transport system regulates nuclear gene transcription of chlorophyll pigments and proteins, which are adjusted to a given light and temperature environment in order to protect the plant from photoinhibition, and/or the toxic build-up of unbound Chl molecules. It is possible that low temperatures causes *HALODULE* to mimic high-light conditions because of the necessity to dissipate irradiance in excess of that needed for photosynthesis. The greater changes in Chl b could be related to reorganization of photosystems during photoacclimation as has been documented in other plants.

91 A LOWER RIO GRANDE BENTHIC INDEX OF BIOLOGICAL INTEGRITY

Brad Henry, Department of Biology, UT-Pan American, Edinburg, TX

Macroinvertebrates were sampled seasonally at four Lower Rio Grande sites. Sampling was limited to hard substrates in natural and artificial riffles and runs. A multimetric index was constructed using boxplots to evaluate individual metric variation across the range of Lower Rio Grande conditions. These included a natural riffle upstream of Falcon Reservoir, a run downstream of Falcon Reservoir near Fronton, an artificial rubble-riffle below Anzalduas Dam, and the last rubble weir on the river located just downstream of Brownsville. A limited habitat assessment was included. Sample size was evaluated using cluster analysis. Results support the a priori selection of the most upstream site as the reference for the region and that biological integrity at the El Jardin weir downstream of Brownsville is the poorest.

92 IDENTIFICATION OF A TEXAS OPHIACTID BRITTLE STAR USING MOLECULAR TECHNIQUES

Ana B. Christensen, Biology Department, Lamar University, Beaumont, TX, and Eric F. Christensen, USDA-ARS

A small fissiparous ophiactid brittle star possessing hemoglobin was collected in Port Aransas. Analysis of morphological characteristics failed to provide a positive identification of the species. Fragments of the COI and 16s rRNA mitochondrial genes and the 28s rRNA nuclear gene were sequenced. The 534 bp COI sequence was compared to sequences from seven species belonging to the family Ophiactidae. There was a greater than 98% homology between the Texas unknowns, *Ophiactis simplex* (California), and *O. rubropoda* (Florida), suggesting that all three populations may belong to the same species. There was a less than 80% homology between these groups and the remaining five species examined. Preliminary phylogenetic analyses of the three loci lend support to the idea the Texas population is *O. simplex* and that the Florida population of *O. rubropoda* is synonymous.

93 MAPPING OF OYSTER REEFS AND ANTHROPOGENIC IMPACTS IN LAVACA BAY, TEXAS

Josh Harper* and James Simons, Texas Parks and Wildlife Department, Corpus Christi, TX, Tim Dellapenna and Jason Bronikowski, Texas A&M University, Galveston, TX, William Sager and Mary Patch, Texas A&M University, College Station, TX

Oyster reefs are an important economic and ecological resource in Lavaca Bay, Texas, a sub-bay of the Matagorda Bay System. The geospatial coverage of these oyster reefs needs to be well defined to better study and manage Lavaca Bay. Texas Parks and Wildlife Department and Texas A&M University have jointly conducted a side-scan sonar and sub-bottom profile survey of Lavaca Bay to map the oyster reefs, as well as anthropogenic impacts such as pipelines, dredged channels, and structural debris. Side-scan sonar generates acoustic images analogous to aerial photographs of the bay bottom. Sub-bottom profiles create a vertical linear cross section of the bay stratigraphy. Comparison of this data to historical nautical charts allows for analysis of changes in areal coverage of the oyster reefs and changes in bathymetry of the bay. The sub-bottom profiles show historical reefs that have been covered by sediment as well as changes in sedimentation patterns. Maps of the oyster reefs will be made available to state agencies, researchers, industry representatives, and the general public.

94 DISTRIBUTION AND ECOLOGICAL IMPACT OF ASIAN CLAM IN TEXAS

Alexander Y. Karatayev*, Lyubov E. Burlakova, Stephen F. Austin State University, Nacogdoches, TX; Robert G. Howells, Texas Parks and Wildlife Department, Ingram, TX; Brian D. Sewell, and Rhonda L. Mood, Stephen F. Austin State University, Nacogdoches, TX

Asian clams (*Corbicula fluminea*) were first found in Texas in 1964 in El Paso. Since their introduction, Asian clams have spread throughout at least 149 counties. Especially high densities may form in streams, rivers, and well oxygenated littoral zones of lakes and reservoirs. Because Asian clams are powerful suspension feeders, they may transport material removed from the water column to the benthos, providing a direct link between plankton and benthic communities. The movement of large amounts of seston from the plankton to the benthos can induce changes in all aspects of freshwater ecosystems after Asian clams invade including: increased water transparency, macrophyte coverage of the waterbody and fish production, with decreases in seston concentration, BOD, and phytoplankton density. However, the effect of Asian clams on native benthic invertebrates is controversial.

95 FRESHWATER MUSSELS OF THE SAN MARCOS-BLANCO RIVER BASIN: HISTORY AND STATUS

Robert G. Howells*, Texas Parks and Wildlife Department, Ingram, TX, and Paula Power, U.S. Fish and Wildlife Service, San Marcos, TX

The San Marcos River originates from springs in the City of San Marcos and represents a unique ecosystem with endemic taxa. About 8 km from these headwaters, the Blanco River joins the San Marcos River. Eighteen species of freshwater mussels (Family *Unionidae*) were documented in the San Marcos River and seven in the Blanco River. In 1977 and 1978, drought conditions dewatered major portions of the Blanco River. Flooding in 1978 and 1981 caused scouring that modified habitat and largely eliminated mussels from both systems. Only a single specimen was found alive from 1992 through 1995. No living unionids have been found since in the Blanco River, but in 1999 and 2000 in the lower San Marcos River produced two species found alive and recently dead valves of a third. Of these, two are rare endemics in Central Texas. These recent finds may be individuals overlooked in earlier surveys, reintroductions from the Guadalupe River downstream, or both. Unfortunately, a variety of factors may be confounding reinvasion and recovery of mussel populations in this system.

96 FACTORS LIMITING DISTRIBUTION OF FRESHWATER MUSSELS IN TEXAS PONDS

Lyubov E. Burlakova*, Alexander Y. Karatayev, Stephan F. Austin State University, Nacogdoches, TX; and Robert G. Howells, Texas Parks and Wildlife Department, Ingram, TX

Distribution of two unionid species, giant floater (*Pyganodon grandis*) and paper pondshell (*Utterbackia imbecillis*) was studied in three small ponds in Camp Maxey (Texas National Guard Training Camp), Lamar County, Texas (Lamar Lake, area 13 ha; Neff Lake, 3.5 ha and Lee Moore Lake, 1 ha). In all three ponds, mussels were found only at depths between 0.5 and 2 m. In shallower zones, they appeared limited by mammals. In deeper waters, low dissolved oxygen levels may have been limiting. High macrophyte densities also appeared to limit unionid distribution. In Lee Moore Lake, that lacked dense vegetation, unionids were distributed evenly across the whole pond. In the other two ponds, mussels were found in restricted areas of the littoral that were free of dense macrophytes beds. Total unionid population estimates ranged from app. 5,000 in Neff Lake to 6,500 in Lee Moore Lake. Preliminary estimates suggest annual predator losses up to 5%. Predation likely increased during periodic declines in water level.

97 NESTING SUCCESS AND ECOLOGY OF SNOWY PLOVER (*CHARADRIUS ALEXANDRINUS*) IN NUECES COUNTY, TEXAS: PRELIMINARY RESULTS

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Snowy Plovers (*Charadrius alexandrinus*) are one of the few shorebird species that nest on the Gulf Coast of Texas, but little is know about its nesting phenology, habitat, or success. Nesting Snowy Plovers were studied at two sites in Nueces County during the 2003 breeding season (February-September): the Barney M. Davis Power Plant, a man-made power plant cooling lake, and Sunset Lake Park, an area that had previously been a construction materials excavation site. Nesting at both sites was first observed during the last week of March and continued until mid-July. Hatching success ranged from 36.7% at the power plant to only 9.1% at Sunset Lake. The primary cause of nest failure at the power plant was predation by coyote (*Canis latrans*) and raccoon (*Procyon lotor*). Predation by racoons and feral cats was also a factor in nest failure at Sunset Lake, but anthropogenic disturbances also appeared to be important.

GEOLOGY AND GEOGRAPHY

98 MAMMALIAN DIVERSITY AS A PALEOCLIMATIC INDICATOR IN HALL'S CAVE, KERR COUNTY, TEXAS

Christian O. George* and Dennis R. Ruez, Jr., Jackson School of Geosciences, The University of Texas at Austin, Austin, TX

A strong correlation between both the absolute and relative abundance of certain mammal groups and climate occurs today, and this relationship is potentially applicable to fossil sites. This method is advantageous because it is not dependent on individual taxa; rather it simply looks at the number or proportion of species to determine the climate. We tested this correlation using an assemblage of mammals from Hall's Cave, a late Pleistocene-Holocene fauna found on the Edwards Plateau. While the majority of the mammalian groups displayed exhibit similar overall patterns, there was no consensus. Actual predicted temperature values fell into two clusters: one similar to today and another indicating considerably warmer climates. To accurately test the ability of species diversity to reflect climate in the past, we utilized a combination of climate signals to eliminate potential biases associated with each method. Climate data was taken from pollen records, stable isotopes, and climate models. The dominant pattern generated from the mammalian diversity data mirrored that from independent climate proxies.

99 NEW PALEONTOLOGICAL INVESTIGATIONS AT CATHEDRAL CAVE, NEVADA

Christopher N. Jass, Department of Geological Sciences, The University of Texas at Austin, Austin, TX

Cathedral Cave is situated at 1950 m elevation near the mouth of Smith Creek Canyon in the northern Snake Range of east-central Nevada. The first paleontological excavations at the cave were conducted in 1989 by students and faculty from Northern Arizona University. The results of that research suggested that the site preserves one of the few mid- Pleistocene faunal assemblages known from the Great Basin. The current age estimate for the Cathedral Cave fauna ranges from 750,000 yr B. P. to 850,000 yr B. P., and is based on the similarity between the arvicoline rodent faunas from Cathedral Cave and the Pit Locality in Porcupine Cave, Colorado. New paleontological investigations at the cave began in June 2003. The primary goals of this new research include: (1) resolution of discrepancies regarding the age of the fauna, (2) an evaluation of the Cathedral Cave fauna in the context of models of montane island biogeography within the Great Basin, and (3) comparison of the Cathedral Cave fauna with other Irvingtonian faunas from outside of the Great Basin (e.g., the Great Plains). Fieldwork in 2003 included the excavation of a 2 x 1.5 m area in arbitrary 5-cm intervals, except where natural sedimentary levels were distinguished. The 2003 excavation resulted in the recovery of an estimated 60,000+ new vertebrate specimens. To date, the majority of sorted specimens consist of isolated teeth. The preliminary faunal list includes several taxa not previously reported from the site, including two turtles, a large carnivoran, a badger, and a muskrat.

100 FORENSIC APPLICATIONS OF PALYNOLOGY

H. Steven Dittrich, Geoscience Data Management, Inc., Plano, TX

The use of palynology (pollen, spores, dinoflagellates, acritarchs, etc.) as a diagnostic tool in geological and anthropological applications is well established, however its use in criminal investigations is less well-known. New Zealand has led the way in forensic palynology, however, its use in the United States is hampered by the lack of criminalists familiar with its use, budgetary constraints, as well as the nature of our legal system. Some case studies are presented.

101 FIRST RECORD OF THE MONSTER CROCODILE *DEINOSUCHUS* IN MEXICO

James Westgate* and Jeffrey Pittman, Department of Geology, Lamar University, Beaumont, TX; Dana Cope, Department of Sociology and Anthropology, College of Charleston, Charleston, SC.; and R. B. Brown, Instituto Nacional de Antropologia E Historia, Chihuahua, MX

Outcrops of Late Cretaceous (Campanian) deposits of the San Carlos Formation exposed south of Ojinaga, Chihuahua, and deposits of the Aguja Formation in the Canon de Santa Elena National Area of Protection near Los Altares, Chihuahua, have yielded the first remains of the giant crocodile *Deinosuchus* sp. discovered in Mexico. Specimens include teeth and a dermal scute. Ammonite assemblages in the strata south of Ojinaga indicate that locally the uppermost Ojinaga Formation is earliest Campanian in age and overlying San Carlos Formation deposits are of early Campanian age. The San Carlos Formation *Deinosuchus* sp. is similar in age to *D. rugosus* specimens reported from the Atlantic and Gulf Coastal Plain strata in the eastern and southeastern United States by Schwimmer (2002). The Aguja Formation *Deinosuchus* sp. occurrence is correla-

tive with late Campanian *D. riograndensis* specimens reported from the Aguja Fm. in Big Bend National Park, Texas; and correlative strata in Montana and Wyoming. Mexican *Deinosuchus* remains collected so far are insufficient to identify at the species level.

102 TWISTED IN TEXAS: MEASURING TIGHT FOLDS ON THE FIRST DAY OF FIELD CAMP

Chris A. Barker*, and R. LaRell Nielson, Dept. of Geology, Stephen F. Austin State Uuniversity, Nacogdoches, TX

Students face many challenges at summer field camp, including learning to use unfamiliar equipment and applying concepts from the classroom to real world situations. We address those challenges on the first day of our geology field camp in a fold measuring exercise in Ernst Tinaja in Big Bend Nat'l Park. In this slot canyon, multiple tight to open, sub-parallel to disharmonic, flexural-slip folds are exposed and readily accessible. The folds are in flaggy Cretaceous limestone layers and students are assigned to measure six to ten folds. Working in pairs, they use Brunton compasses to measure the orientation of each fold axial plane, axis, interlimb angle, fold wavelength, and the average strike and dip of each limb. Each student makes all measurements and draws a sketch of the fold. At the end of this exercise students have had a good introduction to both the Brunton compass and to measurement of folds. A few days later, after reaching our first base camp, students plot their fold data on stereonets to determine the average orientation of the folds. Thus they also gain familiarity with stereonet usage through this exercise.

103 THE WALKER LANE, NEVADA AND TEXAS LINEAMENT: SIMILAR TRANSTENSIONAL FAULT ZONES

Joseph I. Satterfield, Department of Physics, Angelo State University, San Angelo, TX

The Walker Lane (WL), Nevada and the Texas Lineament (TL) are ~100-km wide, 1000 km-long zones of late Cenozoic strike-slip and normal faults. The WL is a Cenozoic tectonic boundary zone separating the western Great Basin from the Sierra Nevada. It extends from Las Vegas northwest to NE California and Oregon. Regional structures include en echelon NW-striking, range-bounding right-lateral strike-slip faults as well as high-angle normal faults and low-angle detachments of various orientations. A belt of shallow earthquakes also defines the WL. Recent 1:24,000-scale mapping in the Cocoon Mountains, within the central WL, reveals the WL-Great Basin boundary is not abrupt and contains a complex network of curved Cenozoic faults. Fault kinematic indicators display normal, strike-slip, and oblique-slip motions. The TL (Muehlberger, 1980) is a Precambrian – Cenozoic zone of WNW-trending structures separating the Chihuahuan Trough from the Diablo Platform. It extends from El Paso through the Big Bend region. Sierra del Carmen in Big Bend National Park contains Cenozoic WNW-striking right- and left-lateral strike-slip faults with dip-slip components and NNW-striking normal faults (Mustafa, 1988).

104 IMAGING SHALLOW STRUCTURE OF THE SAN ANDREAS FAULT WITH SEISMIC REFRACTION DATA

Kori Brown*, Texas Southern University Mentor: Robert Clayton, California Institute of Technology

A series of seismic refraction surveys were conducted in April and July of 2003 in the Carrizo Plain area of the San Andreas Fault to explore the subsurface structure of the San Andreas at depths up to 50 m. Preliminary analysis of these surveys indicates a fault like feature located 30 m west of the surface expression of the fault and at a depth of approximately 30 m suggesting the San Andreas is in fact offset at this location. A finite-difference technique was used to compute wave forms from the model to compare to the observed data. Computational modeling is used to model the existence of an offset in the San Andreas at its shallower depths, and approximate its location suggested by seismic refraction data.

105 APPLICATION OF POLARIZATION MICROSCOPY TO PROCESS MINERALOGY:
PRINCIPAL ASPECTS AND EDUCATIONAL CONSEQUENCES

Volker W. Göbel, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

Polarization microscopic (PM) investigations of minerals and rocks are fundamental to geology since the 1860s. Transmitted light (TL) techniques were followed by reflected light (RL) methods and corresponding instrumental designs of metallographic and ore microscopes about 50 years later. The new approach to opaque materials found immediate applications in the metal, mining, and coal industries. It is fundamental for the economic processing of present low-grade ores, and also for the quantitative assessment of mineral contents, mineral intergrowths, and extent of locking and liberation. PM-examinations of polished sections, thin sections, and polished thin sections of ores and beneficiation products by RL, TL, and combined RL/TL techniques also provide data essential for further XRD/XRF, SEM, and electron microprobe studies.

This all means for academia that students should to be properly educated in (1) PM-TL/RL methods and (2) in their applications to process, technical, and environmental mineralogy. Curriculum changes may be a necessary consequence.

106 HYDROGEOMORPHIC ANALYSIS OF MUCK WETLANDS AT GUS ENGELING WILDLIFE MANAGEMENT AREA, ANDERSON COUNTY, TEXAS

Carol A. Thompson, Tarleton State University, Stephenville, TX

There are numerous examples of bogs in the West Gulf Coastal Plain, but beyond extensive surveys of their botanical composition little is known of their development, geomorphology, or hydrology. A study was begun in late 2003 on a bog at Gus Engeling WMA in Anderson County, TX. Topographic surveys and coring has allowed the stratigraphic setting to be reconstructed. Wells were installed late in 2003 and instrumented for continuous water levels. The larger site is a combination hillside seep possibly grading into an old oxbow. Cores have shown that there is a difference in the type of wetland substrate present over the site. In the upper part of the site to the north there is some very well-preserved peat, while lower on the site the substrate is primarily silt and clay typical of a riparian setting. Analysis of organic carbon was performed on five cores using the loss of ignition technique. The average organic matter content was 70.1% ranging from 28.6 to 94.3%. In general, organic matter was lower near the surface compared to samples at depth. Radiocarbon analysis was done on two samples taken from the bottom of the cores at the sand interface. Core 1 was dated at 18,960 ± 270 BP; Core 2 was dated at 20,130 ± 130 BP. This puts the initial development of the site during the Full Glacial period when it would have been more moist and cooler.

MATHEMATICS

107 A STUDY OF OSCILLATION AND STABILITY IN DIFFERENTIAL AND DIFFERENCE EQUATIONS VIA DIAGRAMS

Lorie A. Perez, Cynthia L. Romano, and Willie E. Taylor. Texas Southern University

Second-order linear differential equations and difference equations will be studied using oscillation and stability diagrams. These diagrams will be used to determine which equations are oscillatory and which equations have stable solutions.

108 RECONSTRUCTING CONVEX POLYHEDRONS IN THREE-SPACE

Mary H. Avery* and David Naples, St. Edward's University, Austin, TX

This research concerns the theory and methods of the reconstruction of convex polyhedrons from a single directed x-ray. Topics include detecting nonsmooth points and conditions for uniquely determining polyhedrons.

109 LINEAR DIFFERENTIAL OPERATORS AND LINEAR DIFFERENTIAL EQUATIONS

William F. Bryant, Jr., and Willie E. Taylor. Texas Southern University

Consider the linear differential operators: $L(y) = y''' + py$ and $L^*(z) = -z''' + pz$, where p is a continuous function over some interval I=[a,∞‡). A connection between these operators will be established and a conncetion between elements in the kernels of L and L* will be considered.

110 VARIATIONS ON SOLAR ENERGY

Ali Amir-Moez, Texas Tech University, Lubbock, TX

Paraboloids of revolution have been used for many purposes such as searchlights, radars, and other operations concentrating on broadcasting of waves. This article is a study of some variations of these ideas.

111 APPLICATIONS OF GRAPHICAL REPRESENTATION FOR INVERSE FUNCTIONS

David R. Cecil, Office of the College of Arts & Sciences, Texas A&M University-Kingsville, Kingsville, TX

The method of graphical representation for inverse functions can lead to alternate and sometimes novel ways of solving for an inverse. For background information on the graphical method of finding inverses, please see Texas J. Sci. 55(3):215-218, August, 2003.

112 SOLVING OPTIMIZATION PROBLEMS USING PRECALCULUS METHODS
Elsie M. Campbell*, Angelo State University, Dionne T. Bailey*, Angelo State University

Optimization problems are traditionally solved using methods of calculus. We will demonstrate how some of these problems can be solved in precalculus.

113 A NET AND OPEN-FILTER PROCESS OF COMPACTIFICATION OF ANY ARBITRARY TOPOLOGICAL SPACE
Hueytzen J. Wu, Texas A&M-Kingsville, and Wan-Hong Wu, UT-Health Sciences Center at San Antonio

Let X be any topological space, {xi} any C*(X)-net not converging in X, F an open filter such that {xi} is eventually in all open sets in F. Let {wk}F be the net based on F, Y the set of all {wk}F for which F is an open filter determined by a non-converging C*(X)-net. Let X* be the union of X and Y. For each open set U in X, define U* as the union of U and the set of all {wk}F for which {wk}F is eventually in U. Equip X* with the topology induced by {U*| U is open in X}. Then X* is a compactification of X.

114 THE VANDERMONDE CONVOLUTION
Philip S. Morey, Jr., Texas A&M University—Kingsville., Kingsville, TX

The Vandermonde Convolution is a well-known formula used by the present author in his proofs.

115 THE PERFECT RATIONAL CUBOID
Raul A. Cabezas*, St. Edward's University, Austin, TX and Michael P. Saclolo, St. Edwards University, Austin, TX

The problem of finding or disproving the existence of a Perfect Rational Cuboid is currently an unsolved problem in mathematics. In this study a more algebraic approach to the problem is presented by adapting an algorithm for constructing a representation for the space curved formed by two intersecting algebraic surfaces.

PHYSICS AND MATERIAL SCIENCE

48 PROTON INTERACTIONS WITH GAS TARGETS
Emiliano Garcia*, David Bixler, Angelo State University Physics Department, San Angelo, TX

The purpose of this investigation is to study the absolute cross sections for the emission of Balmer radiation from collisions of protons with various gases. When a proton interacts with a neutral gas molecule, an electron from the gas molecule can move to the proton, forming a neutral hydrogen atom and an ionized molecule. If the electron is captured into a excited energy state; the product excited hydrogen atom can undergo a decay process by emitting a photon of light. The Balmer-alpha radiation is produced when the electron transfers from the n=3 to the n=2 energy level of hydrogen; Balmer-beta radiation is produced during a decay from the n=4 to the n=2 energy levels of hydrogen. Studies of the radiation produced by a particular interaction reveal the cross section for electron capture into these excited states of hydrogen. The Physics research laboratory at Angelo State University houses a linear particle accelerator capable of producing an intense, monoenergetic beam of protons in the energy range of 4-20keV. The beam interacts with a known pressure of target gas, and a photomultiplier tube monitors the emission of Balmer radiation. The intensity is related mathematically to the cross section for electron capture into that particular excited state.

SCIENCE EDUCATION

116 DISRIMINANT ANALYSIS OF NON-COGNITIVE VARIABLES THAT AFFECT STUDENT PERFORMANCE IN AN ENTRY-LEVEL COLLEGE BIOLOGY COURSE
Jimmy Hand, Texas State University-San Marcos

Numerous professional publications have explored factors affecting academic performance and student retention (Astin, 1993; Pascarella, 1991; Sedlacek, 1996; Tinto, 1987). Traditional studies adopting standardized test scores and high school grade-point-average to predict studentsÕ academic performance produced comparatively low validity (Houston, 1980;

Sedlacek, 1998; Stanley, 1971). While academic institutions rely heavily on incoming studentsÕ test scores as admission criteria, most academic departments do not take advantage of the database of non-cognitive student variables available to them (American College Testing Program, 1999). Six semesters of assessment of the Biology 2000 Curriculum at Texas State University ? San Marcos has produced non-cognitive, demographic data that has been analyzed via discriminant analysis to determine predictors of student success in our entry-level biology course. The purpose of this study was: 1) to use demographic variables gleaned from a program assessment instrument to predict participantsÕ performance as measured by passing or failing entry-level biology courses; and 2) to derive a regression equation that might be used to help predict participantsÕ performance in future courses. Results of the discriminant analysis of 579 subjects indicate the selection of high school physics, organismal biology, high school AP biology, academic classification, and SAT scores as the predictor variables that discriminate the criterion variable of student performance. The resulting discriminant equation is D = 4.444 + .378(classification) + -.435(SAT) + -3.583(Organismal Biology) + .882(High School AP Biology) + .908(High School Physics). The model developed in this study is designed to use non-cognitive student variables to predict student performance in entry-level biology course outcomes as determined by passing or failing the course. The model is a good start for future exploration of how demographic, non-cognitive variables can be used to predict participant outcome in entry-level college biology courses.

117 ASSESSING THE IMPACT OF A MULTIDISCIPLINARY SCIENCE INSTITUTE FOR TEACHERS OF SAN ANTONIO AREA PUBLIC SCHOOLS

Alakananda Ray Chaudhuri* and William F. Thomann, University of the Incarnate Word, San Antonio, TX

This paper explores the impact of an inquiry-based professional development program on the changes in the K-12 teachers' science content and pedagogical knowledge and their constructivist teaching approaches in their classrooms. The primary goal of the program is to enhance the science content understanding and pedagogical knowledge of the participant teachers in order to increase teacher confidence and promote the implementation of standard-based teaching practices in pre-college classrooms. The Science Institute was designed with three components: a summer institute, an academic year component and classroom implementation activities. The assessment findings provide very strong indications that the overall goal of the program to enhance the ability of the teachers to communicate scientifically and understand the content and pedagogical knowledge in sciences was achieved during the first year of the program. Through program participation, teachers demonstrated a better understanding of science content, integration of the different disciplines of sciences, and methods to effectively teach these subjects in their classrooms.

118 DENDROECOLOGY AS A VEHICLE FOR MULTIDISCIPLINARY SCIENCE TEACHING

Frank F. Willingham, Tomball College, Tomball, TX

Dendroecology involves relatively simple field and laboratory techniques using tree rings to establish chronologies, date historical events, reconstruct past climates and date a variety of other events that leave a biological signature on tree growth. Because of their broad application, tree ring studies can be used to teach in a number of different fields. There is also the added benefit of low cost and unsophisticated equipment. A group dendroecological project with applications in biology, geology, math, climatology, geography, and hydrology is presented as an example of the usefulness of this methodology to teach across a broad area of science.

119 LEARNING MATH IN SCIENCE CLASS AND SCIENCE IN MATH CLASS

Judith E. Beauford, Ph.D. University of the Incarnate Word

Efforts to integrate mathematics and science in elementary and secondary classrooms are hampered by the differences in language and representation used by the disciplines. With attention to these differences, teachers in both disciplines can support better comprehension in both. Rationale and suggestions for such will be presented. Mathematics teachers can pay more attention to unit analysis and the metric system. Examples from science should use appropriate symbolism and language. Science teachers should take better care in the graphical representation of function and relation. Attention could be paid to the algebraic connections between representations of formulas.

120 DISCOVERING PLATE BOUNDARIES: A DATA-RICH CLASSROOM EXERCISE
Alison T. Henning* and Dale S. Sawyer, Rice University, Houston, TX

Discovering Plate Boundaries is an introductory geoscience exercise that familiarizes students with the geologic processes that occur at the boundaries between tectonic plates. Students at all levels should be aware of and understand these processes, which include natural hazards such as earthquakes and volcanoes. The activity utilizes geophysical data sets to promote active learning of plate tectonic concepts. It is based on four modern global geophysical data sets: earthquake locations and depths, recent volcanic activity, topography and bathymetry, and seafloor age. Students work in teams to classify the boundaries of the plates according to their own observations of these data. This exercise has been used with students of varying age level, from 7th graders to college students, as well as with a wide variety of class sizes, ranging from 4 to 120 students. It provides an opportunity to reach many students, regardless of the resources available at their particular school. Students experience the process of science and learn the concepts of plate tectonics, which can help open their minds to scientific training.

121 ASSESSING INQUIRY LEARNING IN THE COLLEGE SCIENCE CLASSROOM
R. Russell Wilke, Angelo State University – Dept. of Biology; William J. Straits, Appalachian State University – Dept. of Curriculum and Instruction

Inquiry learning in its many forms has been recommended as a means for instruction in college science classrooms by major science organizations. Research has demonstrated the potential benefits of this approach over traditional passive learning, especially as a means for teaching science process skills. However one of the challenges of inquiry learning and teaching science process skills is the development and use of appropriate assessments. This difficulty can be eased by casting a critical eye upon course goals and objectives and ensuring assessment matches instruction. This presentation will help instructors identify appropriate outcomes of inquiry learning and design meaningful assessment strategies for the college science classroom.

122 THE TEXAS SECONDARY SCIENCE SAFETY PROFILES OF 1991, 2001 & 2003
Sandra S. West* Texas State University-San Marcos, TX

The Texas Secondary Science Safety Profiles of 1991, 2001 & 2003 surveyed over 1600 science teachers at 199 secondary school campuses as part of the random sample of schools drawn by the Texas Education Agency. The sample was based on (1) district type, (2) percentage of economically disadvantaged students on the campus, and (3) percentage of students of different ethnicity on campus. Of those sampled approximately 50% secondary science teachers responded. The primary populations who did not respond as reported by the science department chairs included coaches and retiring teachers. The two-part survey consisted of a multiple-choice survey and an open-response Incident/Accident Report. The multiple-choice survey was organized around eight topics: (1) Conditions of Science Teaching; (2) Teacher Certification; (2) Science Facilities; (4) Teacher Safety Training; (5) Student Safety Training; (6) Science Safety Incidents; (7) Science Safety Accidents; and (8) Greatest Hazards of Teaching Science. The Incident/Accident Report asked teachers to describe the incident or accident and the contributing factors. Over 400 Incident/Accident Reports were analyzed. Statistically significant linkages between mishaps and overcrowding were found. Patterns emerged in the areas of (a) overcrowding, (b) school or district characteristics and (c) teacher characteristics. Recommendations for safe science classes include responsibility at the state, district, school, and teacher levels.

123 INTEGRATED TEACHER PREPARATION FOR SECONDARY MATHEMATICS AND SCIENCE
Judith E. Beauford, Ph.D., University of the Incarnate Word, San Antonio, TX

Qualitative and quantitative analysis of a three-year program in which mathematics and science teachers were prepared for certification in a NASA funded integrated environment. This Teacher Development Experiment investigated the experiences of 22 adults in a post-graduate teacher preparation program in secondary mathematics and life science. Participants were supplied with tuition and materials to follow individual programs for two general types of participation: elementary certified teachers needing content courses and graduates in the content area needing pedagogy courses. All students took three courses integrating both disciplines with the use of NASA prepared resources. Participants presented evidence of an increase in content knowledge and an awareness of the possibilities and benefits of integration. Challenges included incomplete knowledge of the adopted discipline, the lack of resources to support the effort, and inflexible curricular requirements.

SYSTEMATICS AND EVOLUTIONARY BIOLOGY

124 MOLECULAR AND PHYLOGENETIC ANALYSIS OF THE CYANOBACTERIAL ORDER OSCILLATORIALES BASED ON SEQUENCE ANALYSIS FROM THE 16S – 23S RIBOSOMAL RNA INTERNAL TRANSCRIBED SPACER REGION

Patricia Hayes*, Department of Biology, St. Edward's University, Austin, TX; Jerry Brand, Department of Molecular Cell and Developmental Biology, University of Texas, Austin, TX; Jimmy Mills, Department of Biology, Austin, TX and David Nobles, Botany Department, University of Texas, Austin, TX

For many years the classification and phylogeny of cyanobacteria has been based on morphological, physiological, and cytological criteria. Unfortunately, inaccurate identification into specific taxa can result from culturing and environmentally induced changes among cyanobacterial strains, making classification difficult. More recently molecular techniques have been employed to help resolve problems present in current taxonomical schemes. In this study, the 16s to 23s rRNA internal transcribed spacer region (ITS) was used to investigate the genetic heterogeneity among 16 different strains of cyanobacteria within the order Oscillatoriales. Cyanobacterial specific primers were used to amplify extracted genomic DNA from cultures obtained form the University of Texas Culture Collection. DNA Sequences were determined for all strains and used within a multiple alignment in order to create a neighbor joining tree to aid in strain comparison. The tree points to the need for further revision in the order and may indicate that some species from the genus *Oscillatoria*, *Lyngbya*, and *Phormidium* are incorrectly placed into their particular genus. The ITS region is also shown to be a successful indicator of sequence similarities between different strains of cyanobacteria.

125 MOLECULAR ANALYSIS OF SELECTED STRAINS OF CYANOBACTERIA IN THE ORDER OSCILLATORIALES

Regina Loya* and Jimmy T. Mills, St. Edward's University, Austin, TX

Several strains of Cyanobacteria in the order Oscillatoriales were examined using molecular techniques to obtain the 16s-23s rRNA gene and its Internal Transcribed Spacer (ITS) region. The ITS region was amplified using cyanobacterial specific primers, and the squence was determined. Sequences were used within a multiple alignment to create a neighbor joining tree to compare the strains. This study is part of a continuing effort to help elucidate phylogenetic relationships within the order. The strains used were provided by the UTEX Culture Collection of Algae.

126 COMPARISON OF INTERNAL TRANSCRIBED SPACER (ITS) REGIONS OF THE 16s-23s rRNA GENE IN SELECTED POPULATIONS OF THE CYANOBACTERIUM NOSTOC; A CORRELATION WITH ENVIRONMENTAL FACTORS

Samantha Ramirez* and Jimmy T. Mills, St. Edward's University, Austin, TX

Samples of the cyanobacterium Nostoc were collected from three widespread locations and examined using molecular techniques to obtain the 16s-23s rRNA gene and its Internal Transcribed Spacer (ITS) region. The ITS regions were sequenced and compared with each other as well as published sequences for Nostoc to examine the genetic heterogeneity in this widely distributed cyanobacterium.

127 ANALYSES OF THE SMALL SUBUNIT RIBOSOMAL DNA OF TEN SPECIES OF *STACHYBOTRYS* USING PCR TECHNIQUE

Veronica Amaku*, Olufisayo Jejelowo, Texas Southern University, Houston, Texas, Tamas Torok, Gary Andersen, Terry Hazen, Lawrence Berkeley National Laboratory, Berkeley, California and Oliver Rojas, Houston Community College System, Houston, TX

Stachybotrys chartarum is known to produce mycotoxins. Although the traditional method of identification is based on morphology of the sporulating structures, PCR primers specific for *S. chartarum* have been developed and may now be used to identify this fungus. The Internal Transcribed Spacer (ITS) regions in ribosomal DNA are variable regions that are flanked and spaced by highly conserved sequences of coding ribosomal genes. Regions of ITS are more conserved within species than between species, making it a suitable marker for species identification. In this study, PCR method was used to amplify the ITS regions of 10 *Stachybotrys* species using the primers, IT51 and IT41 respectively. The results show that the *S. chartarum* species sequences are comparable to those already in scientific database, while the sequences of the other species do not fit any of those in the database. There is a question over the specificity of these primer set and the initial identification of the species used. More tests need to be carried out to confirm the identification of the species used in this study.

128 GASTROINTESTINAL HELMINTHS OF RAFINESQUE'S BIG-EARED BAT, *CORYNORHINUS RAFINESQUII* (CHIROPTERA: VESPERTILIONIDAE), FROM SOUTHWESTERN ARKANSAS

Angela D. Burns*, Chris T. McAllister, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX; and Charles R. Bursey, Department of Biology, Pennsylvania State University-Shenango Valley Campus, Sharon, PA

Rafinesque's big-eared bat, *Corynorhinus rafinesquii* (Lesson, 1827), a former USFWS Category 2 species, is one of the least known of North American bats. In Arkansas, *C. rafinesquii* is currently a species of concern. It is a medium-sized bat with very prominent ears and a large, distinctive facial gland on each side of its snout. The species inhabits hollow trees, crevices, culverts, and a variety of abandoned buildings. Although information is available on the ectoparasites of *C. rafinesquii*, very little has been published on its helminth parasites. On 3 July 2003, 10 juvenile and adult *C. rafinesquii* were collected from a church belfry off St. Hwy 41, Little River County, Arkansas, and returned to the laboratory for necropsy. The following parasites were found to infect this host: an immature tapeworm, *Vampirolepis* sp. in one (10%), and the nematodes, *Physaloptera* sp. (third-stage larvae) in one (10%), and female or ova of *Capillaria palmata* Chandler, 1938, in nine (90%). These represent new host records and *C. palmata* is reported from Arkansas for the first time. In addition, no coccidial parasites were observed in fecal samples and the blood was negative for hematozoans.

129 A SURVEY ON COCCIDIAN PARASITES (APICOMPLEXA: EIMERIIDAE) FROM SELECT BATS (CHIROPTERA) OF ARKANSAS, MISSISSIPPI, OKLAHOMA, AND TEXAS

Chris T. McAllister*, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX; Steve J. Upton, Department of Biology, Ackert Hall, Kansas State University, Manhattan, KS; and Zachary D. Ramsey, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX

Compared to rodents, little is known about the coccidian parasites of the second largest order of mammals, the Chiroptera (bats). Duszynski (2002. Spec. Publ. Mus. Southwest. Biol. 5:1-45) recently provided a summation on the coccidia of bats of the world and reported that of the 86 species that had been surveyed, only 11% were infected with 31 eimerians and one isosporan. Therefore, most of the approximately 919 bat species of the world remain to be surveyed. Indeed, of the 16 species found in the state of Arkansas alone, only the eastern pipistrelle, *Pipistrellus subflavus* has been surveyed and subsequently reported by McAllister et al. (2001. J. Ark. Acad. Sci. 55:181-183) to harbor *Eimeria macyi* Wheat, 1975. In Mississippi, Oklahoma, and Texas, to our knowledge, none of the 16, 21, and 32 species of bats has been surveyed from within these states, respectively. Between September 2000 and 2003, a total of 74 bats were collected as follows: 27 southeastern myotis, *Myotis austroriparius* from Arkansas and Mississippi, seven northern myotis, *Myotis septentrionalis* from Arkansas, five eastern red bats, *Lasiurus borealis* from Arkansas, two Seminole bats, *Lasiurus seminolus* from Arkansas and Texas, one evening bat, *Nycticeius humeralis* from Arkansas, nine big brown bats, *Eptesicus fuscus* from Arkansas, two *P. subflavus* from Arkansas, 11 Rafinesque's big-eared bats, *Corynorhinus rafinesquii* from Arkansas, and 10 Brazilian free-tailed bats, *Tadarida brasiliensis* from Oklahoma. Of these bats, only five (6.8%) were found to harbor coccidia, including two (29%) *M. septentrionalis* with *Eimeria catronensis* Scott and Duszynski, 1997, and three (60%) *L. borealis* with two new species of *Eimeria*. The former has been reported previously from the little brown bat, *Myotis lucifugus* and the Yuma myotis, *Myotis yumanensis* from Catron County, New Mexico, a site that is nearly 1,287 km (800 mi) west of our Arkansas locale. We report a new host and distributional record for *E. catronensis* and provide descriptions of the two new species of *Eimeria* from eastern red bats from Arkansas. Additional surveys on larger samples of bats are certainly warranted to help further our knowledge of the coccidia of the Chiroptera.

130 DISTORTED SEX RATIOS IN NATURAL POPULATIONS OF *ARMADILLIDIUM VULGARE* FROM CENTRAL TEXAS

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Populations of the terrestrial isopod *Armadillidium vulgare* from central Texas often exhibit female-biased sex ratios. One population from McLennan Co., TX that has been monitored over a four-year period consistently had 70-80% females. Systematic sampling revealed that female-biased sex ratios in this population are not the result of biased collecting methods. Clutches of progeny from wild-inseminated females collected from this population exhibited variable sex ratios, including all-female progeny and the presence of some intersex individuals. These results strongly implicate the presence in this population of one or more parasitic sex factors, which convert genetic males into physiological females. Parasitic sex factors, including *Wolbachia* bacteria, have been demonstrated in European populations of *A. vulgare*.

131 NOTEWORTHY RECORDS OF *SCYTONOTUS GRANULATUS* (DIPLOPODA: POLYDESMIDA), WEST OF THE MISSISSIPPI RIVER

Chris T. McAllister*, Department of Biology, Texas A&M University, Texarkana, TX; Rowland M. Shelley, North Carolina State Museum of Natural Sciences, Raleigh, NC; and Zachary D. Ramsey, Department of Biology, Texas A&M University, Texarkana, TX

The genus *Scytonotus* Koch, 1847, occurs in four regions of North America, including one east of the Central Plains, and three west of the Continental Divide. Currently there are 9 recognized species, and one of these, *S. granulatus* (Say, 1821), has an extensive range covering nearly the entire generic distribution in eastern North America westward to northeastern Kansas (Douglas and Shawnee counties), southeastern Nebraska (Cass and Richardson counties), and extreme northeastern Arkansas (Craighead County, Jonesboro). This milliped prefers the undersurfaces of wet bark and decaying hardwoods, and appears to be more active in the cooler months of the year. Herein, we report, for the first time, particularly noteworthy records of S. granulatus west of the Mississippi River from the following locales: Arkansas, Logan County, Magazine Mountain; Oklahoma, Latimer County, and LeFlore County, Rich Mountain. The latter site represents a range extension of approximately 322 km (200 mi) southwest of the closest previous locale in Jonesboro, Arkansas, and, most importantly, a new state record for the genus in Oklahoma.

132 NEW GEOGRAPHIC DISTRIBUTION RECORDS FOR *THEATOPS POSTICUS* (CHILOPODA: SCOLOPENDROMORPHA: CRYPTOPIDAE), FROM OKLAHOMA

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Shelley (2002. Virginia Mus Nat Hist Mem No 5:1-108) provided a synopsis of the North American centipedes of the order Scolopendromorpha that includes an indigenous fauna of three families, eight genera, and 21 species. In addition, McAllister et al. (2003. J. Ark. Acad. Sci. 57: in press) provided more than 35 county records for eight species from Arkansas, Oklahoma, and Texas. One of these species, *Theatops posticus* (Say, 1821), was reported to consist of two allopatric populations, an eastern one that extends westward from Arkansas to the eastern one-third of Oklahoma at an unknown locality in Seminole County. This centipede has also been reported from Pittsburg, Choctaw, Marshall, and McCurtain counties in the east-central, extreme south-central, and southeastern part of the state, respectively. Herein, we report three additional specimens of *T. posticus* collected from the following locations in the state as follows: 12 September 2003, Owl Cave, 9.6 km south of Freedom off St. Hwy 50A, Alabaster Caverns State Park, Woodward County; 8 November 2003, Fort Cobb State Park off St. Hwy 146, Caddo County; and 8 November 2003, Foss Reservoir State Park off St. Hwy 73, Custer County. At the former site, habitat consisted of rock and mineral formations in ravines and gorges of mixed-grass prairie predominated by cedar elm, eastern red cedar, and live oak. In addition, this locale is more than 282 km (175 mi) northwest of Seminole County and represents the westernmost record of an indigenous east-Nearctic scolopendromorph species in the family Cryptopidae aside from the far western (disjunct) population of *T. posticus*. This centipede has now been documented from eight of Oklahoma's 77 counties. Additional collecting in far western Oklahoma and further west into the panhandle of Texas may provide further records for cryptopid scolopendromorphs, and a more extensive range than previously known for *T. posticus*.

133 NEW GEOGRAPHIC DISTRIBUTION RECORDS FOR THE FLIER, *CENTRARCHUS MACROPTERUS* (PERCIFORMES: CENTRARCHIDAE), FROM SOUTHWESTERN ARKANSAS

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The flier, *Centrarchus macropterus* (Lacepede) is a deep-bodied and slab-sided sunfish with a moderately large mouth, seldom exceeding 20 cm in length and 400 gm. It ranges from eastern Virginia south to northcentral Florida and west throughout much of the Gulf Coastal Plain to eastern Texas and the Mississippi Valley, north to southern Illinois. It prefers lowland habitats with clear, heavily vegetated water, without noticeable current. In Arkansas, the flier is sporadically distributed in all the major drainages of the Coastal Plain lowlands and is most common in the southcentral part of the state. We report 10 additional records for the species that have been collected since Robison and Buchanan's (1988. Fishes of Arkansas) species account and they are summarized as follows: Clark/Nevada County line, Little Missouri River; Howard County, two sites on the Saline River; Little River County, backwater of Little River, Cypress Creek, and Miller Creek; Nevada County, Caney Creek and Middle Creek; Sevier County, Cossatot River and Millwood Lake. The collections listed herein represent new locality records of C. macropterus from the Arkansas portion of the Little River system (Red River drainage).

134 AN EXAMINATION OF THE LAND SNAIL GENUS *PRATICOLELLA* (GASTROPODA: PULMONATA) AND THE UTILITY OF GEOGRAPHIC MODELING OF SPECIES DISTRIBUTIONS IN SNAIL SYSTEMATICS
Kathryn E. Perez*. Department of Biological Sciences, University of Alabama, Tuscaloosa, AL

The land snail genus *Praticolella* von Martens, 1892 is found throughout the southeastern United States, Mexico, and Central America. *Praticolella* is currently composed of 15 recognized species, several of which are of proposed hybrid origin and uncertain taxonomic status. A project is currently being conducted on systematics, taxonomy, and conservation of this genus. One aspect of this research is to plot distributional data in conjunction with biotic and abiotic environmental factors (geology, vegetation, precipitation, etc.) to create a model of the species' habitat requirements. Georeferenced coordinates of latitude and longitude derived from museum specimens will be used for modeling of geographic distributions of the snails. BIOCLIM will be used for calculation of predicted species distribution. This approach highlights the utility of spatially explicit hypotheses about phylogeographic structure as independent reinforcing data to molecular phylogenies. It also shows the value of natural history collections for providing historical distributional data.

135 A DIGITAL MOVIE OF *BEMBECINUS NEGLECTUS* BEHAVIOR (HYMENOPTERA: SPHECIDAE)
Allan Hook, Dept. of Biology, St. Edward's University, Austin, TX

This movie shows female nest digging and provisioning behavior, and interactions with parasitoids and ants. Mutillid and chrysidid wasps and bombyliid fly parasitoid behavior is also included. Males practiced scramble competition polygyny that often results in mating balls. Males forming pseudomating balls around emerging bombyliids is also demonstrated. Sleeping aggragations are also filmed.

136 AN ETHOLOGICAL STUDY OF THE ENTRANCE OPENING BEHAVIOR OF *BEMBECINUS NEGLECTUS* (HYMENOPTERA: SPHECIDAE)
Sofia Angelo* and Florence Kajoina, Dept. of Biology, St. Edward's University, Austin, TX

The provisioning behavior of *Bembecinus neglectus* was studied with respect to temporal aspects of female entering. The strongest correlation found was between the total time taken by a prey-laden female to enter a nest and the number of times she took-off from the nest. There was a significant difference between the total and actual time spent opening a nest, and between the actual times recorded in 2002 and 2003. We also examined how prey size affected the time that it took a female to open her nest; the total time taken to open a nest with small prey was significantly less than that for medium and large prey. There was a slight correlation between the weight of a female and the weight of her prey. No correlation was found between the number of conspecific prey-stealing attempts and the number of take-offs at the nest entrance.

137 FREQUENCY, DURATION, TYPES AND TEMPORAL ASPECTS OF MATING BALLS IN *BEMBECINUS NEGLECTUS* (HYMENOPTERA: SPHECIDAE)
Florence Kajoina* and Sofia Angelo, Dept. of Biology, St. Edward's University, Austin, TX

The frequency, duration and temporal aspects of mating and pseudomating balls are reported for the sand wasp, *Bembecinus neglectus*. In 2003, duration of mating balls ranged from 8 sec. to nearly 45 mins, and averaged about 6 mins. Forty-six pseudomating balls averaged nearly 5 mins in duration and ranged from 10 sec. to 42 mins. Pseudomating balls often formed around bee fly (Bombyliidae) puape and other dark objects. There was no difference in duration between mating and pseudomating balls. Both mating and pseudomating balls were more frequent in the early part of the emergence period of females.

138 THE BIOLOGICAL CONTROL OF RED IMPORTED FIRE ANTS BY PHORID PARASITOIDS IN CENTRAL AND SOUTH TEXAS; ESTABLISHMENT AND EXPANSION OF POPULATIONS
Richard J.W. Patrock and Lawrence E. Gilbert. Brackenridge Field Laboratories, Section of Integrative Biology, University of Texas at Austin, Austin, TX

Five years following initial classical biological control releases of *Pseudacteon tricuspis*, population expansions of the parasitoid have become common in Central Texas. In addition to elaboration of this pattern, we discuss recent advances in foreign exploration for additional species of Pseudacteon fire ant specific parasitoids.

139 EVALUATION OF A POTENTIAL HYBRID ZONE BETWEEN *NEOTOMA MICROPUS* AND *NEOTOMA FLORIDANA* USING MOLECULAR TECHNIQUES

J. Delton Hanson*, Robert J. Baker, Rober D. Bradley. Department of Biology, Texas Tech University, Lubbock, TX

Different authors have proposed a hybrid zone between *Neotoma micropus* and *Neotoma floridana* in north west Oklahoma, based on morphological data. In 1988 a sample of 86 animals from this hybrid zone were collected from two sites along the Canadien River near Seiling Oklahoma. Field notes of the collectors show that both species were collected with micropus being collected from the sandy dunes away from the river and the floridana being collected from along the river bank. Field notes also indicated intermediate animals in the sample. We sequenced animals from out side the hybrid zone for both the Cyt B mitochondrial gene as well as the Acohol Dehydrogenase Intron II (ADH). These sequences were used to determine restriction sites specific to each species. All 86 animals from the hybrid zone were submitted to restriction digests. Preliminary results show forty-two of the forty-three micropus samples showed the micropus mitochondrial DNA while one animal showed floridana mitochondrial DNA. Sixteen of the forty-six floridana showed floridana mitochondrial DNA while 28 showed micropus mitochondrial DNA.

TERRESTRIAL ECOLOGY AND MANAGEMENT

140 *QUERCUS BUCKLEYI* OVERSTORY RECRUIMENT IN UNDISTURBED COMMUNITIES OF CENTRAL TEXAS

John Gregory Penn and William J. Quinn, St. Edward's University, Austin, TX

Quercus buckleyi, commonly called Spanish oak or Texas oak, is a species of particular interest to conservation biologists in Central Texas. In this area, *Q. buckleyi* is at least indicative of, if not essential to, suitable nesting habitat for the endangered golden-cheeked warbler, *Dendroica chrysoparia*. Casual observation of many *D. chrysoparia* nesting sites in Central Texas indicates that very few *Q. buckleyi* seedlings are being recruited into the mid- and over-story of these communities, raising questions about the continued of role of *Q. buckleyi* as a factor in habitat maintenance. The causes underlying the failure of adult *Q. buckleyi* recruitment are not well understood. While some attention has been given to herbivory, particularly by deer, other factors, particularly human influences, may have contributed to the failure of adult recruitment as well. In order to determine if recruitment problems exist in areas with little to no recent human influence, we studied the community composition at the Barton Creek Habitat Preserve, on very steep (and relatively inaccessible) slopes above Barton Creek. Our findings indicate that, even in areas with little direct human influence, *Q. buckleyi* rarely if ever grows from seedlings into the sapling stage. While a very few sprouts occasionally "escape" into the understory, any sexually reproduced individuals appear destined to die in their first year.

141 THE RESPONSE OF HERBACEOUS SPECIES TO SEASON OF PRESCRIBED FIRE IN A TEMPERATE SAVANNA IN CENTRAL TEXAS

Mark T. Simmons* and Steve Windhager. Lady Bird Johnson Wildflower Center. Austin, TX

The savannas of the Hill Country of Central Texas have undergone significant change and are in dire need of restoration. The introduction of intensive livestock grazing and suppression of fires for the last 150 years, combined with climatic drought cycles, have resulted in an increase in many woody species and a shift in the abundance of many grasses and forbs. Prescribed fire can be an effective tool for landscape restoration; however, differential effects of prescribed fire season have been rarely investigated, and predictive models are consequently very coarse. In this study, four treatments (n = 6) of prescribed fire (winter, summer, fall, no fire) were installed across 24 randomly selected plots (approx 0.75 ha each), for two consecutive years. While many species reacted predictably to fire season and rainfall patterns, a few dominant warm-season grasses had unexpected responses, particularly to summer fire. This study indicates that current models of response of plant composition to fire need to be reexamined to improve their predictive power.

142 QUANTIFYING MESQUITE AND JUNIPER INVASION IN SOUTHERN TAYLOR COUNTY, TEXAS

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The dominant vegetation of large areas of central and west-central Texas has changed dramatically in the past 100 years. Taylor County and surrounding areas have converted from principally grasslands to shrublands and woodlands dominated by mesquite (*Prosopis glandulosa*) and cedar (*Juniperus asheii* and *J. pinchotii*), with an increase in the distribution and local

abundance of prickly-pear cactus (primarily *Opuntia phaeacantha*). The ongoing project reported on in this paper is a quantification of mesquite and cedar expansion in southern Taylor County as it relates to historical land use practices; trends in local climate; topography and soil type; and associated vegetation types. Information on vegetation cover is being collected using repeat landscape photography and recent vs. historical aerial photography from overflights extending back to the 1940's. Daily precipitation and temperature records for Abilene and surrounding recording stations are being analyzed to determine potential climatic influences on observed vegetation changes. A GIS is being assembled to organize each of these data types into layers for quantification and analysis.

143 PRELIMINARY RESULTS OF THE 2003 OUACHITA MOUNTAINS BAT BLITZ, WEST-CENTRAL ARKANSAS

Zachary D. Ramsey*, Chris T. McAllister, Department of Biology, Texas A&M University-Texarkana, Texarkana, TX; D. Blake Sasse, Arkansas Game and Fish Commission, Little Rock, AR; and David A. Saugey, U.S Forest Service, Jessieville, AR

The 2003 Ouachita Mountains Bat Blitz took place from August 4-7, 2003, in the Ouachita National Forest of the Interior Highlands of western Arkansas. The purposes of the blitz was to learn more about the biology of bats in the region while sharing collecting and sampling techniques with other researchers. The event was co-sponsored by the U.S. Forest Service, Arkansas Game and Fish Commission, and the Southeastern Bat Diversity Network. Camp Clearfork campground, west of Hot Springs in Garland County, served as headquarters. Volunteer biologists from state and federal agencies, universities, and private companies representing nine states collaborated in the research efforts. A total of 209 vespertilionid bats, including 156 eastern red bats, *Lasiurus borealis*, 25 eastern pipistrelles, *Pipistrellus subflavus*, 16 evening bats, *Nycticeius humeralis*, seven northern long-eared bats, *Myotis septentrionalis*, and five big brown bats, *Eptesicus fuscus* were captured at 22 sites on streams and roads in four Ranger Districts. Samples from captured bats, including blood, DNA (from wing punches), feces, and hair were collected to aid in ongoing research projects. In order to generate positive publicity for bats, one evening was designated as "media night" and representatives from Arkansas' statewide newspaper along with seven television stations from Arkansas, Oklahoma, and Tennessee accompanied biologists into the field to film mistnet trapping sessions and disseminate this information to the public. Indeed, an excellent story was subsequently published in the Arkansas Democrat-Gazette newspaper (11 August 2003 issue). Due to the success of this event, a third Bat Blitz is planned for the near future.

144 THE 2003 DILEMMA FOR LEPIDOPTERA AND GRIZZLY BEARS IN THE GREATER YELLOWSTONE ECOSYSTEM: EL NIÑO OR LA NIÑA?

Karölis Bagdonas, Department of Biological Sciences, Sam Houston State University, Huntsville, TX

After an extended four year drought in northwestern Wyoming wilderness areas, the early months of 2003 brought back typical El Niño weather with heavy snows through April. By May, the high watersheds of the Greater Yellowstone Ecosystem averaged 200% above normal snowpack. Grizzly bears emerging from hibernation from late March into April were faced with deep snow and had to rely on mostly winter killed big game for food. Lepidoptera food species were absent. However, in early May, typical hot, dry La Niña weather reappeared, some early Lepidoptera emerged, and by late May, the entire snowpack had melted in most areas. June reversed weather patterns and subfreezing nights and cold days with light snow dominated the month. July again reverted back to extreme hot, dry conditions, Vegetation, especially nectar sources, withered and many species failed to bloom. Grizzly bear lepidopteran food species failed to emerge or flew at the lowest levels ever recorded. Most lepidopterans which did fly were one third to half natural size. The numerous species which normally comprise the bulk of spring and summer grizzly diets were not there. As a result, most grizzlies had to wander great distances in search of meager food and were not in great shape when El Niño snows and hibernation returned in early October.

145 OCCURENCE OF MEDIUM- AND LARGE-SIZED MAMMALS AT HIGHWAY UNDERPASSES ALONG INTERSTATE 35 IN TEXAS

Kimberly D. Jarrett* and Kevin J. Gutzwiller, Biology, Baylor University, Waco, TXs; Jose Guardiola, Institute of Statistics, Baylor University, Waco, TX; Lisa Zygo, Center for Applied Geographic and Spatial Research, Baylor University, Waco, TX; J.J. Bolton, Waco, TX

Roads dissect many landscapes and may act as barriers to mammalian movement. Running essentially north and south through central Texas, Interstate 35 has the potential to isolate mammal populations. Underpasses along this highway may provide a means for species movement across this barrier. To provide information useful for designing roads with fewer eco-

logical impacts, ecologists need to identify features of underpasses and the adjacent landscape that affect the number of mammal species using underpass corridors. This study included 27 underpasses between Fort Worth and San Marcos, Texas. At each underpass we measured underpass height, width, and length, and the amount of woodland cover within 0.73 km of the underpass. This area was equal to the median home range size for the mammals we detected. We analyzed species density—the number of medium- and large-sized mammal species detected (based on tracks) per unit area of the sampled underpass. Species density was positively correlated (marginally, P=0.074) with underpass height and negatively correlated (P=0.017) with nearby woodland cover. Higher underpasses may have less noise disturbance, and underpasses surrounded by large amounts of woodland may not be required by most species to access other woodland areas. Similar studies are needed to improve knowledge of how features of underpasses and the surrounding landscape affect underpass use by mammals. Such information may be helpful for designing the structure and landscape placement of underpasses to minimize isolation of mammal populations.

146 EFFECTS OF AN INVASIVE SPECIES, RED IMPORTED FIRE ANTS (*SOLENOPSIS INVICTA*), ON SURVIVORSHIP OF SMALL MAMMALS IN NATIVE TALLGRASS PRAIRIE

Cathleen N. Early* and Kenneth T. Wilkins, Dept. of Biology, Baylor University, Waco, TX

Red imported fire ants (*Solenopsis invicta*) are an introduced predator that aggressively defends its mounds and foraging territory, adversely affecting many native species of vertebrates and invertebrates. Previous studies investigating the impact of imported fire ants on small mammals have produced inconclusive or contradictory results. At Leonhardt Prairie, a preserve in Falls County owned by the Nature Conservancy of Texas, small-mammal populations have been monitored in 3 pairs of plots since May 2002. Trapping will continue through April 2004. One plot in each pair has been treated with Distance® fire ant bait to reduce the abundance of fire ants. Ant-foraging intensity measured every 6 weeks indicates ant abundance has been lowered significantly in treated plots. Small-mammal mark/recapture data is being analyzed to assess survivorship and population structure of *Sigmodon hispidus*, the most abundant rodent at the study site. Preliminary results will be presented.

147 USER-FRIENDLY BENEFIT-COST ANALYSIS

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There continues to be considerable controversy over whether a formal benefit-cost analysis (BCA) process would improve the quality of the benefit-cost judgments inherent in making public policy. The central issues on both sides of the controversy are uncertainty about key future determinants of benefits and costs and 'black box' calculations. Some key numbers are a function of unforeseeable events. For many potentially critical parameters, even estimates of current values are often unavailable. And there is a long history of omitting impacts not readily reflected in market activity. Many observers have alleged that project proponents have exploited the black box and uncertainty about future numbers to manufacture favorable BCAs. Since entire books recount manipulations to justify politically correct projects, one could easily conclude that taxpayers should not pay for studies so likely to be distorted. But that would be a mistake. Many decisionmakers are interested in the information only a formal benefit-cost analysis (BCA) can deliver. And most important of all, the formal BCA process can be improved to better inform unbiased decisionmakers and increase the accountability of decisionmakers with pre-determined preferences. The paper demonstrates a BCA process that creates quality public information. 'Public' means relatively transparent. It means the process has to be user-friendly enough that citizen groups can find credible net present values and benefit-cost ratios for themselves. And 'quality' means insightful despite significant uncertainties about key parameters and future events. The paper uses data from the proposed Brownsville (TX) Weir to demonstrate the productionand interpretation of the BCA numbers.

THREATENED OR ENDANGERED SPECIES

148 ENVIRONMENTAL CONTROLS OF NATIVE FISHES, OTHER BIOTA, AND AMBIENT WATER QUALITY IN TEN MAJOR SPRING SYSTEMS OF TEXAS

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The physical, chemical and biological data collected indicate that thermal stability is a major control for fisheries abundance and diversity in springs, with pH and ammonia levels providing minor control effects. *Gambusia*, the genus of several

species of the family of Poeciliid livebears, is the primary indicator species of fisheries behavior in major springs. This species was present in all the major springs studied, and the entire aquatic biota of these spring systems behaves fundamentally as *Gambusia* does in their response to fluctuating hydrothermal conditions.

149 DIFFERENTIAL GROWTH RATES DUE TO VARIABLE PROTEIN DIET IN ENDANGERED TURTLES

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Growth rates help determine survival rates. This is especially important for species with few offspring, low survival rates, and endangered species. Significant efforts toward turtle conservation have become focused on captive propagation as a means to assist in the survival of many rare species. As a consequence, it is important to determine what aspects of diet can be manipulated to influence growth rates in captivity. A population of *Graptemys nigrinoda* was studied from November 2002 until July 2003 in a man-made pond and fed diets consisting of differential protein levels. According to the data from the experiment, higher protein diets yield a steeper growth curve over the juvenile growth stage. It may be possible to further manipulate growth rates through increased protein levels to determine a "cut off point" at which the turtles increase growth at the same rate regardless of protein content in the diet.

150 DIMINISHED SPRING FLOWS IN THE SAN SOLOMON SPRING SYSTEM, TRANS-PECOS, TEXAS, AND EFFECT ON HABITAT OF ENDANGERED FISH SPECIES AND OTHER RARE AQUATIC SPECIES OF CONCERN

Raymond C. Mathews, Jr.*, Cindy Ridgeway, Barney Austin, Ali Chowdhury, Brent Christian, Doug Coker, Richard Smith, and Will Watson, Texas Water Development Board, Austin, TX

The primary objectives of this three-year study were to analyze the hydrogeology of source aquifers for the San Solomon Springs system and to evaluate the effect, if any, of groundwater well usage on springflow. This information is important because the springs are important aquatic habitat for many local wildlife species, including two federally endangered fish species, the Comanche Springs pufish and the Pecos gambusia. These springs are also an important source of municipal and irrigation water for the communities in the Toyah Basin. Phantom Lake Spring has experienced a significant decline in discharge over the past several drought years. In 1999, flow dwindled to a trickle. To support the surface population of species, a submersible pump was installed by the Bureau of Reclamation in May 2001 to pump water from inside Phantom cave to the surface refugia. The San Solomon Springs groundwater flow system is not in equilibrum and is causing continued declines in springflow. A direct correlation of groundwater use to springflow patterns was not observed.

151 LIFE HISTORY TRAITS AND THE EFFECTS OF DISTURBANCE ON *THYMOPHYLLA TEPHROLEUCA* (ASHY DOGWEED), A NARROW TEXAS ENDEMIC

Darren P. Dodson* and Paula S. Williamson, Department of Biology, Southwest Texas State University, San Marcos, TX

Thymophylla tephroleuca, an endangered plant species endemic to south Texas, was monitored in an attempt to document factors influencing its limited distribution. Life history traits including breeding system, pollination agents, growth and reproductive capacity, phenology, pollen viability, seed viability, recruitment and population density were examined. In addition, a controlled experiment was conducted documenting the effects of anthropogenic disturbances on *T. tephroleuca* recruitment. The disturbances included root-plow, blade and root-plow seeded with buffelgrass (to document competitive effects). Results indicate that *T. tephroleuca* is an outcrossing species with a variety of floral visitors in the order Hymenoptera, Coleoptera, Diptera and Lepidoptera. Pollen viability was consistently high, while seed viability was low and variable depending on the year. Density, recruitment, and size structure of individuals was variable between the two monitored populations, presumably due to site characteristics. Results of the disturbance experiment indicate that root-plowing increases plant density relative to root-plow seeded with buffelgrass plots and controls.

152 SOUTH TEXAS AMBROSIA, AMBROSIA CHEIRANTHIFOLIA: HISTORICAL PERSPECTIVE, CURRENT STATUS, AND FUTURE MANAGEMENT

Jim Sinclair* and Dr. Alice Hempel, Texas A&M University-Kingsville

The coastal bend area of south Texas, in particular Nueces and Kleberg counties, is home to a number of rare and endangered plants that have received limited study. The South Texas ambrosia, *Ambrosia cheiranthifolia*, of the Asteraceae family, was listed in 1994. We provide an overview of the historical distribution, including past monitoring activities. Our current research

focuses on developing techniques for refining the spatial data on extant populations utilizing precision Global Positioning System (GPS) equipment and Geographical Information System (GIS) software. Because ambrosia is often found in close association with other endangered species, the techniques that we develop with have utility in future studies of those species.

153 STATUS OF BLACK BEARS IN TEXAS

John H. Young* and David Holdermann, Texas Parks and Wildlife Department, Austin, TX

Black bears were present in al the major ecoregions of Texas prior to Anglo settlement (Hall 1981). In 1905 the US Department of Agriculture, Biological Survey conducted the first organized survey of texas mammals and found that black bears wer reduced to scattered remnant populations in the eastern Texas but still fairly common in the mountains of the Trans-Pecos Ecoregion (Bailey 1905). By the mid-20th century black bears were extirpated from Texas as a result of predator control and habitat alteration associated with human settlement and livestock production (Onorato and Hellgren 2001). In the 1980's bears began to reappear in the Big Bend National Park, from bear populations in northern Coahuila, Mexico (Doan-Cridder and Hellgren (1996). By the mid 1980's a small breeding population was reestablished in the Chisos (Skiles 1995) and Dead Horse Mountains (McKinney and Pittman 2001). Texas classified the black bear as endangered in 1987 and upgraded its status to threatened in 1996. Black bear sightings are now reported annually from the Del Norte, Davis, and Guadalupe Mountains. Occassional sightings have been confirmed in the Panhandle and in east Texas. We will present information on possible causes and avenues for the natural recolonization of black bears to Texas, the challenges to continued recolonization, and past and current Texas Parks and Wildlife Department activities and research projects on black bear.

154 A POSSIBLE CAUSE OF THE DISPARITY IN THE SEX RATIO OF ADULT HOUSTON TOADS

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Sex ratios are difficult to determine for explosively breeding anuran populations. For taxa spending the majority of their lives underground the problem is further exacerbated. However, it is important to obtain accurate estimates, especially for endangered species, because a naturally biased sex ratio decreases effective population size. A population of Houston toads was studied at the Griffith League Ranch in Bastrop County, Texas from March 2001 – August 2003 by both drift fence / pitfall traps and extensive breeding pond surveys. Houston toads appear to remain within or immediately adjacent to canopied forest. A male biased sex ratio was evident for both trapping methods. From the results of a simulation model, adult Houston toad populations are likely male biased as a consequence of the mortality associated with delayed female maturation. It may be possible to predict the mortality of juvenile female Houston toads in the wild using refined models of adult sex ratios.

155 OCELOT AND BOBCAT SPATIAL PATTERNS RELATIVE TO ROADS IN SOUTHERN TEXAS

John H. Young*, Jan E. Janecka †, Steven Webb †, Linda L. Laack ††,, and Michael E. Tewes †, *Texas Parks and Wildlife Department, †Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, Kingsville, TX, ††U. S. Fish and Wildlife Service, Laguna Atascosa NWR, Rio Hondo, TX

Roads are one of the most extensive anthropogenic structures that affect wildlife populations. Road development often leads to increases in human activity, habitat alterations, and road mortality. Road kills represent an important cause of ocelot mortality in southern Texas. We examined the relationship between roads and ocelot and bobcat home range use. We analyzed telemetry locations of 28 ocelots (14 males, 14 females) and 25 bobcats (16 males, 9 females) in southern Texas and classified roads into secondary highway, hard surface, and other. We examined road densities and proximity of telemetry locations to roads. Ocelot home ranges had lower secondary highway mean density ($P = 0.0529$) than the study area and greater hard surface road and other road mean densities ($P < 0.05$). Ocelot home ranges had lower secondary highway and paved roads mean densities and higher other road mean density than bobcat home ranges. Ocelots also were located farther away from secondary roads and hard surface roads than bobcats. Ocelot locations were at greater distances from secondary roads than from hard surface roads ($P<0.01$). Ocelots were found to avoid paved roads more than bobcats. This may be a result of selection for dense brush by ocelots. We also identified roads in southern Texas that pose the highest risk to ocelot and make suggestions on ways to minimize impacts of roads. Understanding the relationship between road development and ocelot distribution is important in the conservation of ocelot.

BIOLOGICAL SCIENCE POSTERS

P1 HELMINTH PARASITE COMMUNITIES IN BLUEGILL SUNFISH (*LEPOMIS MACROCHIRUS*) FROM A CONSTRUCTED POND IN SOUTHEAST TEXAS

Aaron H. Taylor* and H. Randall Yoder, Department of Biology, Lamar University, Beaumont, TX

On September 27, 2002, 39 bluegill sunfish (*Lepomis macrochirus*) were collected from a constructed pond in Jefferson County, Texas. Each fish was examined for endoparasites and ectoparasites. All host individuals were infected with one or more parasites (prevalence of infection = 100%). A total of 2,732 parasite individuals representing 4 phyla were collected. These included Acanthocephala, Arthropoda (Copepoda), Platyhelminthes (Trematoda, Monogenea), and Nematoda. The mean abundance of infection was 70 parasites per host individual (range = 4-353. The metacercarial stage of the trematode *Posthodiplostomum minimum* occurred with highest prevalence (100%), and abundance (58.3 worms per host (range = 1-342)).

P2 THE IMPACTS OF SIMULATED INCREASED NITROGEN DEPOSITION ON SOIL FUNGAL FUNCTIONAL DIVERSITY AND MICROBIAL BIOMASS IN THE CHIHUAHUAN DESERT AT BIG BEND NATIONAL PARK

Heath Grizzle*, and John C. Zak, Dept. of Biological Sciences, Texas Tech University, Lubbock, TX

High concentrations of soil nitrogen have been shown to decrease activity, biomass and abundances of soil fungi. However, the effects of nitrogen in low concentrations resulting from atmospheric deposition have not been studied in desert ecosystems. A study was initiated to determine the impacts of a two-fold and three-fold increase in deposition on soil fungal assemblages in a sotol grassland (SG) and oak-pine forest (LM) in Big Bend National Park. Differences in carbon and nitrogen utilization between the two sites were examined in August 2003 using the Soil Fungilog Procedure. Total substrate activity (TA) and substrate richness (SR) on carbon sources and microbial biomass is significantly different between sites but not treatments. TA and SR on nitrogen sources are significantly different between sites. Furthermore, TA increased with increasing nitrogen deposition at SG. The results show that fungal activity on nitrogen in SG is stimulated by the additional nitrogen, whereas LM is unaffected by the treatment.

P3 NEUTRALIZATION OF VENOMS FROM TWO SOUTHERN PACIFIC RATTLESNAKES (*CROTALUS HELLERI*) WITH COMMERCIAL ANTIVENOMS AND ENDOTHERMIC ANIMAL SERA

Jacob A. Galán*, Elda E. Sánchez, John C. Pérez, Natural Toxins Research Center (NTRC), Texas A&M University-Kingsville and Alexis Rodríguez-Acosta, Universidad Central de Venezuela, Instituto de Medicina Tropical, Caracas, Venezuela

The Southern Pacific Rattlesnake (*Crotalus helleri*) is found in southwestern California (USA), southward through North Baja California (MX) into the northern part of Southern Baja California (MX). Venom from the Southern Pacific Rattlesnake has been known to be yellow and white within a single species. In this study, the venoms from two Southern Pacific Rattlesnakes were partially characterized. Differences in the venom color, concentration, high performance liquid chromatography (HPLC) profiles, electrophoretic titration (ET) profiles, proteolytic assays, and inhibition of platelet aggregation were evident. Both venoms were neutralized differently by two antivenoms, Antivipmyn (Fab2H) and CroFab (FabO). Certain endothermic animals like the Virginia opossums (*Didelphis virginiana*), South American opossums (*Didelphis marsupialis*), grey woodrats (*Neotoma micropus*), hispid cotton rats (*Sigmodon hispidus*), and Mexican ground squirrels (*Spermophilus mexicanus*) contain inhibitors that neutralize certain proteolyitic activities in snake venoms. Opossum and Mexican ground squirrel sera did not neutralize the hemorrhagic activity of the yellow venom. The sera of grey woodrats and hispid cotton rats neutralized all hemorrhagins in the white and yellow venom. Differences in the composition of *C. helleri* venoms may help explain why snakebites are a difficult medical problem to treat and why an effective polyvalent antivenom is difficult to produce.

P4 ISOLATION AND IDENTIFICATION OF TWO NOVEL PERCHLORATE-RESPIRING BACTERIA FROM A BIOREACTOR

James H. Campbell*, Joseph E. Faust, Randall M. Jeter, Department of Biological Sciences, Texas Tech University, Lubbock, TX, Lokesh Padhye, Audra Morse, and Andrew Jackson, Department of Civil Engineering, Texas Tech University, Lubbock, TX

Recent studies have elucidated widespread contamination of drinking water with the anion perchlorate (ClO4-) most likely linked to the manufacture of ammonium perchlorate and its subsequent use in rocket fuel, explosives and pyrotechnics. A

bioreactor inoculated with soil from a perchlorate-contaminated site in MacGregor, Texas has yielded two novel perchlorate-respiring bacterial isolates. Isolates O2 and O3 are Gram-negative rods and were placed in the phylum Proteobacteria using 16S rDNA sequences. O2 is most closely related to *Pseudomonas synxantha*, while O3 is most closely related to *Aminobacter aminovorans*. In 7 days, O2 and O3 were shown to reduce perchlorate from 43.3 to 14.3 parts per million (ppm) and 45.0 to 14.7 ppm, respectively. While another known perchlorate-respiring pseudomonad (strain PK) has been reported, the 16S rDNA sequences of O2 and PK exhibit less than 95% similarity, indicating that O2 is a novel species. Respiration of perchlorate was previously unknown for members of the genus *Aminobacter*.

P5 CHARACTERIZATION OF THE CODING SEQUENCE OF THE HCF108 LOCUS OF *ZEA MAYS L*

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Maize hcf108 mutants fail to stably assemble the chlorplast ATP synthase complex. Previous characterization of a partial Hcf108 cDNA shows that the gene does not encode any of the subunits of the ATP synthase complex. The partial cDNA encodes a putative nuclear localization signal, suggesting that the hcf108 product affects the ATP synthase assembly from the nucleus rather than from within the chloroplast. A 5'-3' RACE strategy is being used to isolate and characterize the full lenght hcf108 cDNA. Preliminary sequence analysis of the 3' product indentified homology with a member of the WRKY transcription factor superfamily.

P6 GROWTH RESPONSES OF THE OBLIGATE OLIGOTROPHIC BACTERIUM *AGROMONAS OLIGOTROPHICA* TO NUTRIENT ADDITIONS

Joseph E. Faust*, James H. Campbell, Randall M. Jeter, and John C. Zak, Department of Biological Sciences, Texas Tech University, Lubbock, TX

Obligate oligotrophs can be defined as organisms that are unable to grow in high concentrations of organic nutrients. *Agromonas oligotrophica* (ATCC 43045) has been described as an obligate oligotroph with an optimal growth medium of 1% nutrient broth (NB). A range of NB concentrations from 1% to 100% and additions of individual nutrients to 10% NB were used in this study to reevaluate the optimal growth conditions of this organism. The optical density (OD) at 550nm of the *A. oligotrophica* culture peaked at 20% NB and was depressed at concentrations above or below the peak. Additionally, the growth of *A. oligotrophica* was stimulated by the addition of succinate or glutamate to 10% NB. Thus, the oligotrophic phenotype of this organism may be due to growth inhibition by high concentrations of one or more nutrients in 100% NB.

P7 PARTIAL PURIFICATION OF A FIBRINOLYTIC ENZYME FROM POOLED VENOM OF *AGKISTRODON PISCIVORUS LEUCOSTOMA*

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Agkistrodon piscivorus leucostoma, known as the water moccasin or the western cottonmouth, is partly an aquatic snake, living in or near water and feeding mainly on fish and amphibians. The cottonmouth resides in the Southeastern United States and is aggressive when threatened. Then venom contains metalloproteinases that are hemorrhagic and fibrinolytic and both have important biomedical applications. One particular enzyme is a fibrinolytic enzyme that could potentially be used in the treatment of strokes and heart attacks. Fibrinolytic enzymes work by breaking up fibrin. After three purification steps using High Performance Liquid Chromatography (HPLC), a partially purified protein (APL2) was obtained. Electrophoretic titration, SDS-PAGE, and mass spectroscopy results revealed two different proteins with molecular weights of 12 and 22.7kDa.

P8 AN ECOLOGICAL ASSESSMENT OF THREE FAMILIES OF COLEOPTERA FROM THE CHIHUAHUAN DESERT OF WEST TEXAS

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Diversity, evenness, richness, and abundance of beetle species were evaluated for families Carabidae, Scarabaeidae and Tenebrionidae from four separate habitats within the Chihuahuan Desert in West Texas. In the 12.5 month period, pitfall traps collected 994 individuals, representing 53 species. Sandy Canyon and Upper Spring had the largest Shannon diversity indices and were the richest in species, which corresponded with the greatest variety of dominant perennials. Camp Site had the lowest species diversity, and significant differences in diversity were found between Camp Site and both Upper

Spring and Sandy Canyon. Overall, pitfall traps indicated that tenebrionids far outnumbered carab and scarab beetles, however, the most abundant species was *Canthon imitator* Brown (Scarabaeidae). The low species diversity of Camp Site may be due to habitat disturbance.

P9 BIOMINERALIZATION OF EGGSHELLS IN AMERICAN ALLIGATORS

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

Alligator (*Alligator mississippiensis*) eggshells from both hatched and unhatched eggs were provided by Louisiana Department of Wildlife and Fisheries. The crux of the study was to show that an extracellular enzyme, carbonic anhydrase (CA), occurs in the eggshell matrix and may play a role in providing bicarbonate ion for shell mineralization. Proteins of the eggshell matrix an d membranes were isolated, molecular weights estimated (SDS/PAGE), Western Blots run, and antibodies to bovine RBC carbonic anhydrase II used to identify CA. Alligator eggshells contain one protein, an extracellular CA, molecular weight of about 31,000, and cross reacted with antibodies to bovine RBC CA II. Unlike the avian eggshell CA, the alligator CA did not have more than one gel band and thus may not dimerize. The calcareous portion of the eggshell was composed of 97% mineral, 1.9% organic matrix, and 0.026% water soluble protein (WSP). No CA was detected in the eggshell membranes. Alligator eggshell CA was isolated via affinity chromatography and estimated spectrophotometrically to consist of 0.3 to 0.75% of the eggshell WSP fraction. Data suggest that not only does the cellular CA of the oviduct supply bicarbonate for eggshell mineralization, but that an extracellular CA in the shell matrix probably also plays a role in crocodilian shell calcification as it does in birds.

P10 IN VITRO HAEMORRHAGIC ACTIVITY INHIBITION USING SOUTH AMERICAN OPOSSUM (*Didelphis marsupialis*) LIVER SPHEROID CULTURE

Luis M. Salgueiro-Tosta.*, John C. Pérez, Natural Toxins Research Center (NTRC), Texas A&M University-Kingsville, TX, and Francisco A. Rodríguez-Acosta, Instituto de Medicina Tropical. Universidad Central de Venezuela, Caracas, Venezuela

The natural resistance of certain animals to the Crotalidae venoms has been reported. This resistance is due to the presence of metalloproteinase inhibitors (MPI) in the sera of these animals. The hepatocytes appear to be the cells that synthesize MPI in the opossum. The MPI prevent myonecrosis, hemorrhages, edema and lethality of the venom. The main aim of this work was the development of a primary hepatocyte culture from the South American opossum (*Didelphis marsupialis*). A primary cell culture from the liver of the *Didelphis marsupialis* was used in this study to produce MPI. *Bothrops colombiensis* venom was used since it has the same ecological niche as the opossum. The MPI specific activity was increased 4 folds between 240 and 480 hr of incubation. The cellular aggregates suspended with enriched medium were the ideal experimental model developed to simulate the liver microenvironment. The opossum hepatic spheroids culture is a efficient method of obtaining MPI.

BOTANY POSTERS

P11 DEVELOPMENT OF WINGED CORK IN *ULMUS CRASSIFOLIA* NUTT

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Winged cork is characteristic of the stems of cedar elm, *Ulmus crassifolia*. Scanning electron microscopy observations reveal that cedar elm first produces a periderm that is circumfluent or nearly so, comprised of 5-6 layers of phellem or cork cells. The wing is initiated by radial expansion of these existing cork cells, often rupturing the stem epidermis. After the initial radial expansion of existing cells, new layers are added to the wing by increased divisions of the cork cambium (phellogen) in the area of the wing, followed by radial expansion of these newly produced cells. Although wings form on both sides of the stem, usually one wing develops well before the other is visible. During these early stages of wing development, the cork cambium in other parts of the stem is not as active as in the areas of wing development. This type of wing development, with a circumfluent, uniform periderm formed prior to wing initiation, has been reported in *Acer* and other species of *Ulmus*. This is in contrast to the type reported in *Euonymus alatus*, in which wings are formed in localized regions of periderm initiated prior full periderm formation.

P12 POTENTIAL PHYTOXIC MODE OF ACTION FOR A *RAMALINA DILACERATA* SECONDARY METABOLITE
Helen Vo*, Howard Vo*, and J.G. Romagni, University of St. Thomas, Biology Deptartment, Houston, TX

Lichens are obligate symbiots consisting of a fungal (mycobiont) and an algal (chlorophyta and/or cyanobacteria) partner. All lichen species produce secondary metabolites that must have an important ecophysiological role. These roles might include protection against biotic (competition, parasitism and herbivory) and abiotic (UV light) factors. We are currently investigating one phytotoxic secondary metabolite obtained from *Ramalina dilacerata*. Our compound inhibited plant growth and germination. The results of a mitotic index suggested that most cells remained in interphase. It appears that the metabolite produced by *R. dilacerata* might inhibit formation of the mitotic spindle thereby inhibiting root growth and germination. We will continue to research the putative mode of action using immunoflourescence.

P13 FLORA AND ECOLOGY OF NATURAL AND CONSTRUCTED WETLANDS ALONG THE LEON RIVER IN THE WESTERN CROSS TIMBERS, COMANCHE CO., TEXAS
Jeffrey S. Brister* and Allan D. Nelson, Tarleton State University, Stephenville, TX

Two wetlands located along the Leon River in the Western Cross Timbers, Comanche Co., Texas were examined during this study. A wetland constructed during 1999 and a natural wetland established by beavers were compared based upon plant species composition, distribution, and density. Plant data was collected from transects along a baseline in each wetland between August 2001 and September 2002. Comparisons based on species diversity and importance values were used to evaluate vegetative similarities. In addition, a floral survey was conducted between April 2001, and October 2003. This data was examined to determine native verses introduced species, endemic species, threatened and endangered species, as well as range extensions and county records. Preliminary results and conclusions from these analyses will be presented.

P14 BEYOND THE FENCE LINE: DISTRIBUTION OF *OPHIOGLOSSUM POLYPHYLLUM* (OPHIOGLOSSACEAE) WITHIN WEST TEXAS
Ryan A. Livingston, Paul A. Schlicting, Sheri J. Carlson, Patricia R. Manning, and James C. Zech, Department of Biology, Sul Ross State University, Alpine, TX

Ophioglossum polyphyllum (Ophioglossaceae) is a new species of fern for North America North of Mexico and Texas, occurring primarily within five Trans-Pecos Counties and appearing to be associated with extensive and/or fragmented grasslands. Collections thus far have been restricted to roadsides, without the possibility of investigation beyond fence lines. Searches for *O. polyphyllum* within the Nature Conservancy of West Texas' Hip-O Ranch Preserve have been conducted during the past two years without success. Lack of *O. polyphyllum* documentation within the Hip-O Ranch Preserve continues to support a roadside restricted distribution. However, this fern's ephemeral nature, suggested dormancy, possible seasonality, and apparent dependence upon optimal levels of moisture and temperature, still does not omit the possibility of its occurrence elsewhere. Statistical spacial analyses were used not only to illustrate *O. polyphyllum's* distribution within the Trans-Pecos, but also to suggest the soil type of collection sites, and finally, as a predictor of likely additional locations.

CHEMISTRY POSTERS

P15 ELECTRON AND CHEMICAL IONIZATION MASS SPECTROMETRY CHARACTERIZATION OF SECONDARY METABOLITES EXTRACTED FROM LICHENS
Claudia Oviedo, Rannieri Cocciani, Joanne G. Romagni and Thomas B. Malloy. Department of Chemistry and Department of Biology, University of St. Thomas, Houston, TX

Lichens of genus *Ramalina*, collected in Spain, were pulverized in liquid nitrogen, extracted with acetone in Soxhlet extractors, and further separated into ether soluble and insoluble fractions. A portion of each fraction was derivatized with BSTFA to cap the polar OH and COOH groups and then analyzed by GC-Mass Spectrometry. Electron ionization and chemical ionization with several reagent gases were used. By knowing the molecular weights and major fragment ions, it was possible to efficiently compare possible matches to metabolites previously identified in lichen samples. In this way, structures were identified. In addition, numerous structures, not previously reported in lichens were found and possible structures proposed. A study of the bioactivity of these fractions is underway.

P16 AGRICULTURAL, MIMA MOUND, AND FOREST SOIL ANALYSIS FROM SHELDON LAKE STATE PARK. Daniel Haddock* and Scott Slough, University of Houston-Downtown, Houston, TX

Agricultural, mima mound, and forest soil samples were collected from Sheldon Lake State Park to determine if farming had effected the metals composition of the soil. The metal composition of 24 samples were determined via ICP spectrophotometery utilizing a fusion process to analyze the total sample and an acid digestion procedure for soluble components, which are

P17 TRYPTIC MAPS BY CAPILLARY ELECTROPHORESIS
Daniel Horrell* and Robert Holloway, Schreiner University, Kerrville, TX

Although some workers have tried to exploit the high resolving power of capillary electrophoresis for proteolytic mapping (R. Holloway, C. A. Keely, T. A. A. M. van de Goor, D. McManigill, Journal of Chromatography A, 652(1993) 283-289); R. Holloway, W. Cole, C. Keely-Templin, V. Smith, and T. van de Goor, (poster) January 25, 1996, HPCE 96, Orlando, FL), application of the technique has been limited, due to the dominance of liquid chromatography as an analytical modality. We have begun a study of the optimization of the technique by performing trypsinolysis and subsequent CE analysis of the small proteins myoglobin and leptin.

P18 THE REDUCTION OF QUINONES
D.Ponds, Texas Southern University, J.Miller, Brookhaven National Labratory, A. Funston, Brookhaven National Labratory, A. Cook, Brookhaven National Laboratory

The electrochemical behavior of quinone compounds has been extensively studied, because of their ability to transport electrons and protons in biological processes such as photosynthesis and bacterial respiration. This Study is an attempt to test solvent polarities effect, quantity of ion produced and the stability of multiple quinones negative ions with various redox potentials using the reducing agent Cobaltacene CoCp2 at room temperature. Duroquinone (DQ), Benzoquinone(BQ), 1,4-Napthaquinone, 2-Methyl-anthraquinone(2MAQ), Anthraquinone(AQ), 2-Methyl-1,4-napthaquinone, 2-Phenyl-1,4-benzoquinone, 2,5-Di(tert)butyl-1,4-benzoquinone, 2,6-Di(tert)butyl-1,4-benzoquinone, 2,5-Diphenylbenzoquinone, 2,3 Dichloro-5,6-dicyanobenzoquinone, Flouronile (F4BQ), and Ethylanthraquinone were made into solutions in Tetrahydrofuran (THF) and Methylcyanide (MeCN) and reduced by cobaltacene in 200ml cells. DQ, BQ and F4BQ were reduced quantitatively and BQ, MAQ, and F4BQ were reduced in both THF and MeCN. The quinones were measured using UV/Vis/NIR spectrophotography and solutions were analyzed using IGOR Pro (Wave Metrics). All of the quinones were reduced except AQ. CoCp2 did not quantitatively reduce DQ and BQ in THF solutions and when MAQ was tested in THF anion was not formed but in MeCN the negative ion was formed. The redox potentials of the quinones as well as the polarity of the solvent are a major factors in the behavior of their reduction by CoCp2.

P19 SYNTHESIS OF THIOPHENE AND DITHIOPHENE COMPOUNDS
Sarah A. Mankin*, Christopher E. Hobbs*, Donna K. Howell, Angelo State University, Department of Chemistry and Biochemistry, San Angelo, TX

The purpose of this research is to synthesize a tetrathiophene based macrocycle which can incorporate transition metal centers into the structure's cavity. Toward this goal, several substituted thiophene and dithiophene compounds have been synthesized as precursors. Through an acid-catalyzed condensation between 2-bromothiophene and dimethoxymethane, 5,5'-dibromo-2,2'-dithienylmethane was produced according to literature methods and characterized by proton NMR. Since the bridge hydrogen atoms between the two rings are acidic, the basic conditions in the next synthetic step produced an unwanted carbanion. To avoid this, the use of 2,2'-dimethoxypropane replaced dimethoxymethane in the reaction. With this change in the first synthetic step, the new product was 5,5'-dibromo-2,2'-dithienylpropane. When less than 0.5 molar excess of the thiophene is used the 5-bromo-2-thienyl-2'methoxypropane is produced as the major product. We have recently been successful in the synthesis of 5,5'-diformyl-2,2'-dithienylpropane from 5,5'-dibromo-2,2'-dithienylpropane and the spectroscopic characterization of this compound will be reported.

P20 THE ALZHEIMER'S ALUMINUM CHOLESTEROL LINKAGE
Emily Colyer, Howard Payne University, Brownwood, TX

It has been postulated that there is a connection between cholesterol levels and Alzheimer's disease. In one study, it was found that the protein flotillin, which is associated with the lipid rafts and cholesterol, accumulated most often with the tangle-bearing neurons associated with Alzheimer's disease. In addition, recent epidemiological Studies suggest that people taking statins, a class of drugs prescribed to lower blood cholesterol levels, may have a reduced risk of developing Alzheimer's disease. In the proposed research, I will have a three fold purpose to (1) determine the binding effects of titrating Al(3+) with albumin protein and brain protein (2) Analyze the effect that ARICEPT, an Alzheimer's prescription drug, has on albumin and brain protein (3) Analyze the binding effects that Vitamin D has on albumin and brain protein.

P21 1,2-ALKYL MIGRATIONS IN 1,3-DIRADICALS
Katherine M. White* Benny E. Arney, Kim S. Mangus, Phil W. Livanec, and Rick C. White, Department of Chemistry, Sam Houston State University, Huntsville, TX

The photochemistry of alkylidenefluorene oxides has ben examined. Results show that the aryl-oxygen bond is cleaved to give a 1,3-diradical and that the diradical undergoes rotation about the carbon-carbon sigma bond such that an alkyl group can undergo a 1,2-migration. The quantum yields are approximately the same in acetonitrile (polar) and hexane (non-polar) which verifies that this rearrangement is radical in nature and not dipolar. The key for the migration is the energy involved in the rotation about the carbon-carbon bond of the diradical so that the alkyl groups can be aligned for migration to occur.

P22 EFFECTORS OF MUSHROOM TYROSINASE ACTIVITY
Sabrina Jones* and Mary F. Plishker, Sam Houston State University, Huntsville, TX

The enzyme tyrosinase, which catalyzes the production of melanin pigments from tyrosine, is involved in the browning of fruit and hyperpigmentation in skin. Several different compounds similar in structure to tyrosine have been examined to determine the effect of each on mushroom tyrosinase activity using L-DOPA as the substrate.

P23 COMPARISON OF ACRYLAMIDE CONTENT IN SNACK CHIPS VIA HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
Soumaly Rattanasavanh*, Jonathan Wagner, Nick Flynn, Angelo State University, Chemistry and Biochemistry Dept, San Angelo, TX

Acrylamide is a potent neurotoxin and a known carcinogen. Under high-temperature cooking processes glucose and asparagine combine in the Maillard reaction to produce acrylamide. We have expanded on previous experiments involving selected snack chips to determine whether other snack chips differ in acrylamide content. We have quantified the acrylamide content using a reversed-phase HPLC/UV detection method. Extracts (n=6) were analyzed using reversed phase HPLC and UV detection. Corn chips contained the lowest acrylamide concentration (0.0441 +/-.01 ug/ml). The two brands of baked potato crisps (1.1916 +/- 35 ug/ml and 3.19 +/-.344) had a higher concentration than fried potato chips (0.3891+/-027 ug/ml) while fat-free potato chips had a higher acrylamide content than fried potato chips (2.36 +/- .372 ug/ml). The presence of higher acrylamide content in fat free chips suggests that cooking oil, source of potato or processing methods may be responsible for differences in acrylamide content.

P24 ISOLATION OF APP: TITRATION OF ACETOMETAPHINE, ASPERTANE, AND MSG
Jessica Rodriquez*, Howard Payne University, Brownwood, TX

Plaques in the brain formed from the Amyloid Precursor Protein are an indicator in the early stages of dementia for Alzheimer's disease. These plaques consist of B-amyloid protein. It is hypothesized that neuron cell death is due to aluminum binding to the neuron cell which forms ion channels that allow the cell to be flooded by other ions. In this experiment aluminum binding to the Amyloid Precursor Protein will be compared to APP binding with acetametaphine, aspertame, and MSG.

P25 SEQUENTIAL SIMPLEX OPTIMIZATION OF A GC SEPARATION OF HEXANE, CHLOROFORM, AND 2-METHYL-2-PENTENE
Shirmeen Lakhani*, John A. Palasota, and William N. Tinnerman, II, Department of Chemistry & Physics, University of St. Thomas, Houston, TX

The development of a chromatographic separation of hexane, chloroform, and 2-methyl-2-pentene using the sequential simplex method is presented. Sequential simplex optimization is a local hill-climbing algorithm that moves a figure with (n + 1) vertexes through n-dimensional space toward improved response. The goal of this study is baseline chromatographic separation of all analyte components, as measured by the chromatographic response function. Baseline separation of all three analytes was achieved within six iterations of the simplex.

ENVIRONMENTAL SCIENCE POSTERS

P26 MICROBIAL ANALYSIS OF MARS SIMULANT SOIL
Dipal Patel*, Poonam Gulati and Penny Morris-Smith, University of Houston-Downtown, Houston, TX

Bacteria and archaea are probably the oldest forms of life and have existed on earth for most of time. With the assumption that perhaps bacteria could exist in other environments, Martian Simulant Soil is being analyzed for signs of bacteria and biofilms, which may indicate possible life on Mars. The simulant soil was obtained from a Hawaiian island volcano, and closely matches the color, chemical composition, and particle size of probed Mars soil. Most bacteria exist in nature as biofilms, which are communities of microorganisms that adhere to environmental surfaces and synthesize and secrete polysaccharides, which protect them from environmental insults. In this study, bacteria were isolated and identified using cultural, biochemical and molecular techniques. In addition, biofilm formation was detected using two techniques. Biofilms from soil fragments were isolated and examined microscopically. Using the stimulant soil, biofilm formation was carried out on plastic wells and measured using a spectrophotometer. The data demonstrates several species of bacteria and biofilms are present in the Mars Simulant Soil.

P27 DIVERSITY OF *FUSARIUM* SPECIES IN COASTAL PRAIRIE SOILS AT SHELDON LAKE STATE PARK
Leslie G. Cook and Philip C. Lyons, University of Houston-Downtown, Houston, TX

The University of Houston-Downtown Coastal Prairie Research Project (CPRP) aims to characterize the biological, physical and geophysical features of disturbed areas and intact remnants of the Coastal Prairie, the dominant ecosystem of the Upper Texas Gulf Coast. An important goal of this project is to study the diversity of soil fungi and their significance in this ecosystem. We have isolated more than 50 fungal species from cultivated coastal prairie soils at Sheldon Lake State Park (SLSP), including more than 35 *Fusarium* isolates representing at least five different species. Dominant Fusarium species include *F. solani* and *F. oxysporum*. To facilitate rapid identification of Fusarium species and other fungi, and the extent of genetic variation among isolates of the same species, we are establishing ribosomal DNA (rDNA) clonal libraries of these fungi. We have determined that there is significant rDNA sequence variation between different *Fusarium* species. We are now determining whether rDNA sequence variation is a useful criterion for distinguishing among different isolates within the same *Fusarium* species.

P28 IMPACT AND CONCENTRATION DETERMINATION OF MERCURY IN SANDHILL CRANES (*GRUS CANADENISIS*)
Leslie Patterson*, Howard Payne University, Brownwood, TX

Mercury concentration in ecosystems has become a major concern in ecological science in this century. Mercury atmospherically deposited on the landscape is converted by bacteria from the inorganic elemental form into methyl mercury (MeHg), a more toxic organic form. Methyl mercury is then available to the environment where it accumulates and biomagnifies in higher trophic level animals such as predatory fish and carnivorous birds and mammals. Increases in mercury are of concern because of the small margin of safety between background levels of exposure and concentrations potentially harmful to organisms including humans. Due to these harmful effects an investigation of the concentration of mercury in Sandhill Cranes (*Grus canadenisis*) in North Western Texas would yield results that allow for the interpretation of an accurate account of MeHg present in this ecosystem. To accomplish this both secondary and primary flight feathers of the crane would be collected from museum specimens as well as live avian. Feathers are recognized as the major excretory pathway for Hg and recent experimental evidence suggest that concentrations > 20ug/g or higher are at risk of toxic effects. After

determination of mercury concentration the ecological as well as physical impact of MeHg on Sandhill cranes will be observed and recorded.

P29 THE FUTURE OF TEXAS AIR: AUSTIN AND OZONE

Lynn Kirby, Jane Thomson, Jasmine Thum, Chloe Tuck and Amanda Villarreal, Kealing Magnet School, Austin, TX

Since 1999, the Austin-Round Rock Metropolitan Statistical Area (A-RRMSA) has violated the proposed health standard for ground-level ozone. Because the federal Environmental Protection Agency's implementation of the proposed standard is delayed, this area is subject to increased health concerns. Reducing regional ozone depends on lowering emissions of nitrogen oxide (NOx), one of the two primary precursors of ozone. The burning of fuels, primarily in internal combustion engines, is the most significant regional source of NOx in the Austin area; over 180 tons of NOx are emitted daily in A-RRMSA.Because population growth and the resulting increase in vehicle-related emissions drives ozone levels A-RRMSA, we examined the potential results from predicted demographics. Population is predicted to double in the A-RRMSA in the next 20 years. Our research first estimates the increase in ground-level ozone if no interventions are implemented. The second part of our research examines several proposed interventions suggested by the City of Austin and how they might eliminate some of the ozone produced. We then revise our ozone predictions taking into consideration these local remedies.

P30 AEROSOL OPTICAL THICKNESS MEASUREMENTS OF THE SKY AT SAN MARCOS AND SEGUIN, TEXAS, DURING SUMMER OF 2003

Muhammad Tauhidur Rahman*, Brandy Bagnall, Julie Westerlund, Texas State University - San Marcos, San Marcos, TX, Lans Martin, Seguin High School, Seguin, TX, and Forrest M Mims III, Geronimo Creek Observatory, Seguin, TX

The effects of aerosols on the global climate have been investigated for more than two decades by climatologists, environmental chemists, meteorologists and geographers. One of the key parameters in these studies is the optical thickness properties of various kinds of aerosols. Since the density, composition and optical properties of aerosols in a column through the atmosphere can change rapidly and unpredictably, careful measurements should be taken over a long period to recognize patterns that might be associated with urban, regional and continental climatic changes. In this poster, we discuss preliminary results of Aerosol Optical Thickness measurements by two sun photometers at or near solar noon over a period of six months at San Marcos, Texas. We also compare our data with observations from researchers in neighbouring cities. Finally, we discuss the effect on our measurements of regional air pollution events.

P31 AMMONIA EXTRACTION FROM SWINE URINE

Paul A. Loeffler*, Cody Craig, and Sarah Spikes, Department of Chemistry, Sam Houston State University, Huntsville, TX

The USDA and EPA have identified ammonia loading in waste waters associated with animal farming operations to be a general area of concern. This study reports the results of the Ammonia Recovery Process (ARP) in extracting ammonia from collected swine urine. Waste was initially treated with urease and the solution pH was adjusted. This treated swine urine then served as the influent for the ARP demonstration. The ARP unit employed a metal ion treated resin bed, having a wet volume of approximately 10.2 L. During each run the pH of the effluent was monitored as an operational parameter. Ammonia content of collected effluent samples was determined by ion sensing electrode. Swine urine was processed in three independent run sets which examined initial ammonia extraction efficiencies and extraction efficiencies as a function of column regeneration protocol. Subsequently the study routinely achieved greater than 90% reduction in ammonia content for swine urine samples which had initial ammonia concentrations of approximately 6000 ppm.

P32 EVALUATION OF MICROBIAL COMMUNITIES, SOIL PROPERTIES AND ANIMAL AND PLANT DIVERSITY PRIOR TO RESTORATION OF COASTAL TALL GRASS PRAIRIE

Philip C. Lyons, Lisa D. Morano, Poonam Gulati, Scott Slough, and Deanna McCullough, University of Houston-Downtown, Houston, TX

The University of Houston-Downtown Coastal Prairie Research Project (CPRP) aims to characterize biological, physical and geophysical features of disturbed and intact areas of Coastal Prairie. We describe initial results from analyses of soil properties, plant and animal populations, and soil microbial communities at Sheldon Lake State Park (SLSP). Comparative analyses demonstrate significant differences in soil sand, silt and clay in mima mound and non-mima mound cultivated soils. Mima

mounds generally contained lower metal concentrations than cultivated or forest soils and cultivated soils contained higher metal concentrations than forest soils. Over 50 fungal species and 18 gram+ bacteria (11 rods and 1 coccus identified) have been isolated. Mycorrhizae of SLSP soils have been compared by corn bioassay and evaluation of mycorrhizal diversity is underway. A plant species list has been developed to assess species richness, and an initial plant diversity index has been generated. These studies are informative about pre- and post-restoration features of disturbed Coastal Prairie and essential for studies on successional patterns.

P33 ISOLATION AND CHARACTERIZATION OF FUNGI FROM COASTAL PRAIRIE SOILS AT SHELDON LAKE STATE PARK
Leslie G. Cook, Blythe Parham, Linu Mathew, Stephanie Cabrera, and *Philip C. Lyons, University of Houston-Downtown, Houston, TX

This research is part of the UHD Coastal Prairie Research Project (CPRP) and aims to determine the composition of soil fungal communities at Sheldon Lake State Park (SLSP). It is an essential aspect of efforts to understand how these communities interact with biotic, chemical and physical components of the Coastal Prairie. Both traditional culture techniques and molecular analyses are being used to establish a database for SLSP soil fungi. To date we have established a catalog of more than 850 fungal isolates from these soils representing well over 50 different species. Among the dominant genera are *Fusarium*, *Trichoderma*, *Aspergillus*, *Penicillium*, *Cladosporium*, and *Curvularia*. The majority of isolates are mitosporic fungi, however several ascomycetes and zygomycetes also have been obtained. Many of the isolates are inhibitory to bacterial species cultured from the same SLSP soils.

P34 THE DISTRIBUTION OF THE DIFFERENT DUNG BEETLES THROUGHOUT AN URBAN AREA
Rebecca M Ashdown, Texas Lutheran University

The presence of dung beetles in dog dung has been observed but the distribution of the different dung beetles through out an urban area has not been recorded before. Nine sites were visited in Austin to collect samples of dog dung. Through a Burlese funnel, live organisms were extracted, identified and counted. The species distributions of the different areas were compared. Organisms found in dog dung help break up, bury, and eat the dung to continue in the natural nutrient cycles. Many organisms found are dung beetles that eat the dung and use it as a media for egg laying. The two most abundant species of dung beetles found are *Ataneius* sp., which lives in dung and uses it as a food source, and *Pseudocanthon perplexus*, which roll the dung away and bury it in another location. Other organisms found, such as the rove beetle (Staphlinidae), prey upon the fly larva that live in the dung. Rove beetles were the most common organisms found in the dung. Others present are feeding upon the fungus, although these were found in smaller numbers, they were present at most of the sites. Dung contains many nutrients that can help make the soil healthier for plants and the buried dung will avoid polluting lakes and streams because it is stabilized in the soil nutrient cycle

P35 THE EFFECT OF CITYWIDE RECYCLING PROGRAMS AS A MEANS OF REDUCING RELIANCE ON LANDFILLS
Tricia M. Jarrott*, Sir VanLawrence Franks, Antonio Gomez, Raymond Selby, Kealing Junior High School, Austin, TX

Because the population for the Austin-Round Rock Metropolitan Statistical Area (A-RRMSA) is expected to double in the next 20 years, we will be faced with several potential environmental health concerns, including issues surrounding solid waste disposal. Normal disposal of solid waste produces carbon dioxide and methane, both major contributors to global warming. Carbon dioxide and methane are of major concern because anthropogenic sources can be directly correlated to increases in the atmospheric levels of these gases and global temperature change. In spite of population increases in Austin, local landfills for solid waste disposal have decreased in size and number. This leads us to believe that less solid waste material was subject to incineration for disposal, thus leading to fewer CO2 emissions. We focused on the effect of citywide recycling programs as a means of reducing reliance on landfills. First, we predicted what CO2 concentrations would be without the recycling program. We then produced further estimates based on continuing and expanding the recycling program and the future population of A-RRMSA. Finally, we suggest ways to begin implementation of similar programs in other cities facing the same challenges of growing population and concern for the environment.

P36 ANTIDEPRESSANTS AS EMERGING AQUATIC CONTAMINANTS: INDIVIDUAL AND MIXTURE EFFECTS ON SELECT MICROORGANISMS

Temidayo Fadelu*, Elizabeth A. Glidewell, Rene D. Massengale and Bryan W. Brooks, Departments of Biology and Environmental Studies, Baylor University, Waco, TX

Although the occurrence of multiple classes of pharmaceuticals, including selective serotonin reuptake inhibitors (SSRI), has been reported in municipal effluents and surface waters, information on aquatic community responses to pharmaceuticals is limited, particularly for effluent-dominated stream ecosystems. Some SSRIs such as fluoxetine are reported to have antimicrobial properties. Such an effect on microorganisms warrants investigation because microbial communities are critical components of stream ecosystem functioning. One method of screening microorganism responses to pharmaceuticals is to conduct community-level physiological profiling through carbon-utilization analysis with Biolog ECOplates. Our objectives were to determine the effectiveness of carbon-utilization profiling in detecting microbial population changes following SSRI exposure and to characterize the responses of microbial communities from reference and municipal effluent dominated streams to various concentrations and mixtures of fluoxetine, citalopram and fluvoxamine. This was done by assessing temporal carbon-utilization patterns of these populations under exposure to individual SSRIs at 0, 0.10, 1.0, 10, 100, or 1000 µg/L, or equivalent molar mixture concentrations. In addition, acute toxicity studies were performed with a model marine photoluminescent bacterium, *Vibrio fischeri*, to evaluate individual and mixture SSRI effects. Additive responses of *V. fischeri* were consistently observed for all SSRI combinations. The carbon-utilization analysis successfully characterized increasing differences in carbon-utilization as SSRI concentrations increased. These studies represent a first attempt to characterize aquatic microbial responses to non-antibiotic therapeutics and provide a preliminary approach for assessing environmental effects of SSRIs on freshwater microbial community structure.

P36A RAPID MSE AND HPLC METHOD OF BENZO(a)PYRENE IN FISH

Mohamed H. EL-Saeid*, Biomarkers and Environmental Toxicology Laboratory, Chemistry Department, Texas Southern University, Houston, TX

Several types of fish samples such as fresh, canned, salted (salted cured) and smoked fish samples were collected from Houston local market and analyzed by rapid HPLC determination method. Diode Array detector, 100 % acetonitrile and 2.00 ml/min. as a flow rate were used. The detection and run time of Benzo(a)pyrene (BaP) was 3 min. with only 0.01 ppm as a Minimum Detection Limit (MDL). Microwave Solvent Extraction (MSE) was used with 25ml of acetone petroleum ether (1:1 vv) in 15 min. The averages of the presence of Benzo(a)pyrene in fresh, canned, salted and smoked fish samples will discuss.

FRESHWATER AND MARINE SCIENCES POSTERS

P37 AN ANNOTATED CHECKLIST OF FRESHWATER CLADOCERANS FROM TEXAS, U.S.A.

Carlos Lopez* Departamento de Biologia. Facultad Experimental de Ciencias. Universidad del Zulia. Apdo. 526. Maracaibo 4011-A. Venezuela. Presently Visiting Research Professor, Limnology Laboratory. Department of Biology. Baylor University. Waco, TX, and Owen Lind. Limnology Laboratory. Department of Biology. Baylor University. Waco, TX

The cladoceran fauna of Texas is analyzed in light of available literature in order to establish the current state of knowledge of these animals in this state. A preliminary annotated checklist of 74 taxa belonging to suborders: Anomopoda (67), Ctenopoda (6) and Haplopoda (1) have been organized and updated from literature. In this list, Chydoridae is the most diverse family of the group and represents about 41 % of recorded species.Most records were made during ecological studies that considered that cladocerans are entirely cosmopolitan, and used no detailed species descriptions. In consequence, many species have been confused. At least one third of the recorded species is doubtful and needs detailed analyses. This situation is particularly obvious relative to the families: Daphniidae, Sididae, Moinidae, Macrothricidae and Ilyocryptidae in which about one-half or more of records need revision.

P38 CLADOCERANS (ANOMOPODA AND CTENOPODA) FROM RESERVOIRS IN CENTRAL TEXAS, U.S.A.

Carlos Lopez* Departamento de Biologia. Facultad Experimental de Ciencias. Universidad del Zulia. Apdo. 526. Maracaibo 4011-A. Venezuela. Presently Visiting Research Professor, Limnology Laboratory. Department of Biology. Baylor University. Waco, TX, and Owen Lind. Limnology Laboratory. Department of Biology. Baylor University. Waco, TX

A survey of cladocerans from limnetic and littoral zones of Lake Waco, Lake Belton and Lake Mexia, three reservoirs located in Central Texas, U.S.A., resulted in a preliminary checklist of 23 taxa corresponding to 20 of the suborder Anomopoda and 3 of the suborder Ctenopoda. Of these, *Diaphanosoma fluviatile* Hansen 1899, *Scapholeberis armata* (Herrick 1882), *Simocephalus mixtus* Sars 1903, *Sinobosmina* sp, Kurzia cf. media Birge 1879, and *Camptocercus* sp. are new records for Texas. A checklist of all collected taxa, with descriptions, illustrations and measurements of new or interesting records for Texas are given.

P39 MARINE DIATOM EPIPHYTES IN THE LOWER LAGUNA MADRE, TEXAS

Cheryl Allen Gilpin, Phycologist, Environmental Consultating, Photomicroscopy Services

Diversities of marine diatom epiphytes greater than any ever documented on the Texas Coast were discovered and documented by taxonomic descriptions. Distributions patterns between the epiphytes grouped by their modes of attachment were observed between habitats with and without wetlands. High potential for establishing indicator species for various environmental conditions if research continues.

P40 DETECTION OF ASCORBATE PEROXIDASE ACTIVITY IN *AIPTASIA PALLIDA*

Bui, D., Tran, M.K., Tran, M., and Romagni, J.G., The University of St. Thomas

The sea anemone, *Aiptasia pallida*, maintains a facultative mutualistic relationship with the zooxanthellae, *Symbiodinium* sp. The fact that this symbiotic relationship exists, even though it is not necessary to the survival of either species, gives rise to the question of what factors determine the absence or presence of such mutualism. Ascorbate peroxidase (APX) is an enzyme responsible for detoxification of free radicals under high stress conditions. We have documented its activity in symbiotic and aposymbiotic anemones, in the zooxanthellae *Symbiodinium*, and in isolated mitochondria and chloroplasts. In this symbiotic relationship, the *Symbiodinium* are photosynthetic, and the amount of light that reaches this symbiont is controlled by the host sea anemone. Chloroplasts in the *Symbiodinium* can use ascorbate peroxidase to dispose of hydrogen peroxide that can inhibit the Calvin cycle or destroy membranes. Using native PAGE gels, we have identified APX activity in both apo- and symbiotic anemones. We have begun to quantify APX activity using spectrophotometric assays. We have found that APX activity increases significantly with increasing temperature. However, it is significantly greater in symbiotic anemones. We will continue quantifying APX activity in symbiotic and aposymbiotic sea anemones, mitochondria, and algae using Western blotting in addition to spectrophotometric analysis.

P41 GENETIC EVALUATION OF *HALODULE BEAUDETTEI* DIVERSITY ALONG THE SOUTH TEXAS GULF COAST USING A RANDOMLY AMPLIFIED POLYMORPHIC DNA PROCEDURE

Joyce E. Parker*, Krista L. Storey, Patrick D. Larkin, Department of Physical and Life Sciences, Texas A&M University-Corpus Christi, and Beau Hardegree, Texas Parks and Wildlife Department, Resource Protection Division, Natural Resources Center, Texas A&M University-Corpus Christi

Seagrasses are primary producers, which play a vital role in marine ecosystems. Seagrasses also serve as habitat and nurseries for marine life, improve water quality and serve as a direct and indirect food source for a diverse array of marine fauna. A study is being conducted to assess genetic diversity among 3 populations of the seagrass *Halodule beaudettei* (Fig.1) along the South Texas Gulf Coast. 40 samples were collected at each of three sites in Nueces bay, Redfish bay and the lower Laguna Madre. DNA was isolated and a DNA fingerprinting technique known as the Random Amplified Polymorphic DNA (RAPD) procedure was used to screen the populations for the presence of polymorphism. 18 out of 40 oligonucleotide primers proved polymorphic. Results are preliminary and the data will be used for statistical analysis to determine the extent of genetic similarity and gene flow among populations of *Halodule beaudettei*.

P42 EFFECT OF SMECTITE AND KAOLINITE CLAYS ON PHOSPHORUS UPTAKE BY STREAM PERIPHYTON

June E. Wolfe, III*, TAES/Blackland Research Center, Temple, TX, and Owen T. Lind, Baylor University Biology Department, Waco, TX

This study quantified the affect suspended smectite and kaolinite clay sediments had upon the ability of stream periphyton to uptake, or buffer, soluble reactive phosphorus loads. In-stream biota, primarily attached algae, bacteria, and protozoa (i.e. periphyton) possess the ability to buffer waterborne nutrient loads entering reservoirs by affecting the quantity and form of the entrained nutrients. Eutrophication, caused by natural or human activity, has the potential to negatively impact water quality. Consequently, research examining nutrient coupling factors between watersheds, streams, and reservoirs possesses potential value to water resource managers. Various environmental factors such as light, temperature, water velocity and sediment load affect the health and composition of periphyton communities and their ability to process nutrients. The research was carried out with "laboratory streams" in a greenhouse where cultured periphyton communities were subjected to differing clay concentrations and monitored on their ability to uptake a quantified phosphorus load. During each experiment, environmental conditions, water chemistry, periphyton biomass, and species composition were determined.

P43 CTHE ROLE OF SIGNALING IN THE SYMBIOTIC *AIPTASIA PALLIDA*

Ly Huynh*, Nida Chhotani, University of St. Thomas, Houston, TX

Mutualistic relationships are important to all ecosystems. One economically as well as ecologically important relationship is the facultative symbiosis between corals and algae, *Symbiodinium* sp. In our lab, we are using a model organism, the sea anemone Aiptasia pallida, that contains the same mutualistic relationship as coral to try to understand what causes the breakdown of the symbiosis, or bleaching. We are currently conducting a broad investigation documenting the effects of environmental stress on this symbiosis. We have investigated the role of specific stress enzymes, such as superoxide dismutase (SOD) and heat shock proteins (HSPS) in order to determine the benefits of symbiosis. We found that high stress conditions, such as salinity or chronic temperature stress, required at least 48 hours to induce new SOD isozymes. From this study, it appears that one isozyme is constitutive, although the amounts of the enzyme increase with stress and time. Other isozymes may then be produced for chronic stress situations. We also documented the induction of Hsp 70 and Hsp 60 in both symbiotic and aposymbiotic anemones under acute temperature stress of 25oC (control), 31°C, 33°C, and 35°C using SDS-PAGE and Western Blots. Finally, we are in the process of identifying specific proteins involved in symbiont signaling before and during stress events. Our preliminary data has identified 10 different proteins that seem to be involved in the breakdown of the symbiosis. We are continuing to identify these proteins and trying to determine the sequence of events in the break-up of a mutualistic relationship.

P44 LONG-TERM CHANGES IN ASSEMBLAGES OF LARVAL DRAGONFLIES (ODONATA: ANISOPTERA) IN THE GUADALUPE RIVER BASIN

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Aquatic insect assemblages are frequently used to compare water quality between impacted and non-impacted sites. However, long-term changes in these assemblages at the landscape scale are not well documented. We sampled 22 stream sites in the upper and middle Guadalupe River basin of Texas for dragonfly larvae in 2002-2003. These collections were compared to records from surveys conducted at the same sites in 1973-1974. Our results suggest that dragonfly assemblages are dynamic on this 30-year time scale, with many sites increasing or decreasing in species richness.

P45 COMMUNITY STRUCTURE AND FUNCTION OF MITIGATED VS. NATURAL SEAGRASS BEDS ALONG THE SOUTH TEXAS COAST

Michael Mahala*, Greg Stunz, and Elizabeth Smith, Texas A&M University-Corpus Christi, Corpus Christi, TX

Seagrass beds are highly productive components of coastal ecosystems that provide essential nursery habitat for a diverse community of juvenile/larval fish and crustaceans. Along the Gulf of Mexico increased pressure from anthropogenic sources has led to declines in seagrass cover and changes in seagrass species composition. In this study, we quantified water quality, sediment, and seagrass characteristics combined with immobile (benthic macrofauna) and mobile (juvenile fish and crustaceans) faunal components in April and September 2003. Evaluations were conducted within two natural and two mitigated seagrass sites along the upper Laguna Madre, Texas. Within each site, we measured seagrass percent cover, biomass, shoot density, and shoot length as well as benthic macrofauna, juvenile fish, and crustacean composition, abundance, and

diversity at six different stations. In November 2003, we quantified growth rates of juvenile pinfish (*Lagodon rhomboides*) in the different seagrass beds using in situ field enclosures. We will use the data results to determine if seagrass community structure and function remain consistent between beds with different histories (i.e., mitigated or natural).

P46 SPATIAL VARIABILITY IN TEXAS FRESHWATER FISH DIVERSITY

Molly Dillender*, William Dailey and André M. Landry, Jr., Texas A&M University, Galveston, TX

Distribution and diversity of fishes in Texas freshwater systems reflects that of temperate North America. Although conspicuous in its diversity and endemism, Texas freshwater ichthyofauna is comprised of taxa common to the large ecologically-diverse riverine systems of eastern North America as well as the small discontinuous drainages of the western portion of the continent. Freshwater habitat in the eastern United States is characterized by large and relatively stable environments with considerable species richness. Fish richness in the western U.S. is limited due to its arid climate and numerous barriers to dispersion and movement. This spatial variability is reflected in the rich ichthyofauna of the pineywoods of East Texas and the increasingly depauperate freshwater fauna westward to the valley and farmlands of the Rio Grande. Species composition across this transitional zone is compared at 23 sites from the Sabine River to the Rio Grande in terms of abiotic and biotic factors affecting species diversity. A total of 102 species representing 29 families was sampled from collection sites in the fall of 1998, 1999 and 2002. Species richness ranged from 43 species at the San Jacinto River, Harris County, TX to 3 species at Stockdale Creek, Wilson County, TX in 2002.

P47 VARIATION OF FLIGHT ACTIVITY BEHAVIOR FOR TWO GENERA OF CENTRAL TEXAS DRAGONFLIES

Thomas Chiu, Darrell S. Vodopich, and Sharon A. Conry*, Baylor University, Waco, TX

Adult dragonflies exhibit various flight behaviors to insure their survival and reproduction. In this research, I observed flight behavior of two different species, *Erythemis simplicicollis* and *Libellula luctuosa*, along the shoreline of Battle Lake, a small central Texas reservoir in McLennan County, Texas. I recorded 5-minute observations of four different flight behaviors including time perched, frequency of perching, frequency of aggressive encounters, and frequency of hovers. Flight behaviors differed between species, and these differences were associated with their occupation of different micro-environments. Flights of *E. simplicicollis* occurred primarily over terrestrial environments. Flights of *L. luctuosa* occurred primarily over aquatic environments. Each micro-environment regulates temperature differently, and flight behaviors are associated with temperature. Specifically, total time perched, frequency of perches, and frequency of aggressive encounters were significantly correlated with temperature for *E. simplicicollis*.

P48 INDUCTION AND REALIZATION OF SUPEROXIDE DISMUTASE (SOD) ISOZYMES IN *APTASIA PALLIDA*

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Proteins that act as defense mechanisms under high stress conditions include a variety of heat shock proteins (hsps), ascorbate peroxidase (APX), glutathione reductase (GR), and superoxide dismutase (SOD). The role of SOD is to scavenge free radicals, including singlet oxygen and superoxide radicals, to prevent eventual peroxidation of membranes and cell death. In this study, we are documenting the induction of SOD isozymes in symbiotic anemones, *Aiptasia pallida*, under chronic and acute stress. Our objective is to determine the advantages of the symbiotic relationship under common environmental stresses. We have documented the responses of whole symbiotic, aposymbiotic and isolated algae (*Symbiodinium* sp) to both chronic and acute salinity and temperature stresses. From these SOD data, we have determined that there is a constitutive isozyme in the anemone *A. pallida*. For the induced SOD isozymes we observed, it would appear that a minimum of 48 hours is needed for biosynthesis. In quantifying SOD activity, we found that aposymbiotic anemones have a two-fold increase over controls and symbiotic anemones. Isolated algae exhibit no change under stress conditions. Finally, we are determining the specific locations and forms of SOD (Mn-SOD or Cu/Zn-SOD) using Western Blotting. Since sea anemones are a model system for coral, which have the same symbiotic relationship, better understanding of stress response mechanisms of anemones may give us greater comprehension of the causes of coral bleaching.

P49 IDENTIFYING GENETIC DIVERSITY AND GENE FLOW AMONG POPULATIONS OF *THALASSIA TESTUDINUM* BY A RANDOM AMPLIFIED POLYMORPHIC DNA (RAPD) PROCEDURE

Stephanie R. Salinas*, Elizabeth Quevedo1, Beau Hardegree2 and Patrick D. Larkin1. 1Department of Physical and Life Sciences, 1Texas A&M University-Corpus Christi, 2Texas Parks and Wildlife Department, Resource Protection Division, Natural Resources Center, Texas A&M University-Corpus Christi

Seagrasses are primary producers in many coastal regions, providing habitat and nourishment for a number of marine organisms. Seagrasses help to stabilize sediment and reduce erosion by establishing extensive root systems and reducing wave action. They also improve water quality through sediment trapping and the uptake of toxic substances. As part of a project to determine the extent of genetic diversity among populations of several species of seagrasses along the Texas coast, samples of *Thalassia testudinum* were taken from Redfish Bay and the lower Laguna Madre. DNA was isolated and subjected to a Random Amplified Polymorphic DNA (RAPD) procedure, using 40 different oligonucleotide primers for initial screening for polymorphisms. 18 of the primers produced reproducible banding patterns in the samples taken from the Laguna Madre. Data from this study will be used in a statistical analysis to more precisely estimate the extent of genetic diversity and gene flow among populations of *Thalassia testudinum* along the south Texas Gulf coast.

GEOLOGY AND GEOGRAPHY POSTERS

P50 ASSESSMENT OF AIRBORNE AND SATELLITE MULTISPECTAL IMAGERY FOR CROP IDENTIFICATIONIN IN SOUTH TEXAS

Daniel Salazar*, Kenneth R. Summy, Christopher R. Little, Ruben A. Mazariegos, The University of Texan-Pan American, Edinburg, TX, and James H. Everitt and M. Rene Davis, USDA Agricultural Research Service, Weslaco, TX

Research was conducted to compare the effectiveness of aerial color infrared(CIR) photography and digital multispectral satellite imagery (Enhanced Thematic Mapper Plus sensor on Landsat-7) for identification and mapping of major agricultural crops in the Lower Rio Grande Valley of Texas. Field spectroradiometer measurements, which provided spectral profiles of the major agricultural crops present during the summer period (e.g., cotton, sorghum, sugarcane) facilitated the interpretation of CIR photographs and digital satellite imagery. Several image enhancement procedures (e.g., contrast stretching and principal components analysis) were investigated to determine their effects on visual interpretability of CIR imagery, and thematic maps based on both supervised and unsupervised image classifications were developed and evaluated. The advantages and limitations of aerial CIR photography and digital Landsat imagery as a means for thematic maps of agricultural production in southern Texas is discussed.

P51 A SUB-SURFACE SURVEY OF NORTH EASTERN BRAZIL: THE RECONCAVO BASIN

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Plate reconstructions have shown that South America, Africa, Antarctica, India, and Australia were connected as one large land mass during the Paleozoic era; this land mass is presently referred to as Gondwana. Extensional stress broke up Africa and South America about 130 m.a. The Reconcavo basin, located near Salvador in northeastern Brazil, is a result of a failed rift which occurred during this time period. The goal of this study will be to trace the faults around the Reconcavo Basin from the land surface seaward. Data from seismic, gravity, and magnetic surveys obtained by ocean cruises will be studied to interpret the area. The Reconcavo Basin is bounded by faults on the eastern and the western sides. The basin is filled with sedimentary material, most of which is alluvial fan deposits. The Reconcavo basin is underlain by seaward-facing half grabens which extend from 20-50 km onshore to the offshore environment. This study will aid in the characterization of the sub-surface in the region of the Reconcavo basin. This sub-surface information will lead to a better understanding of the pre-rift environment.

P52 ANALYTICAL GIS AND REMOTE SENSING TECHNIQUES APPLIED TO GEOLOGIC FIELD MAPPING: AN EXAMPLE FROM THE NORTHEASTERN LLANO UPLIFT, BURNET COUNTY, TEXAS

Jace Morris*, Jacob McKinney, and Volker W. Göbel, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

Geologic mapping of Proterozoic magmatic and metamorphic rocks in the western Council Creek Quadrangle, east of Lake Buchanan has recently been completed. It was done on topographic base maps at a scale of 1:10,000, with rock exposures

being the primary means of defining mapping units. Incorporation of analytical GIS and remote sensing techniques proves to be very useful for mapping purposes, in visualizing subsurface geology, and increasing geologic understanding. Such techniques include the correlation of surface geology to remotely sensed image features (DOQQ's and satellite imagery), 3D modeling of subsurface geology (DEM, TIN, and National Elevation Dataset), 2D/3D visualization of surface geology, and the integration of geologic field data with GIS. These methods are applied in an effort to produce geologic 3D diagrams and a geologic map that most efficiently and accurately represent ground data, and allow additional interpretation.

P53 USING REMOTELY SENSED DATA TO MEASURE SURFACE AREA LOSS AND DETERMINE SURFACE MINERALOGY: WALKER LAKE, WESTERN GREAT BASIN, MINERAL COUNTY, NEVADA

Jacob W. McKinney, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

Walker Lake, a terminal, deepwater, saline lake is located 130 km SE of Reno and fed by the Walker River. It experienced major fluctuations in water level due to Quaternary climatic changes and regional agricultural activity during historical times. Walker Lake sedimentary basin is a fault-controlled, closed basin formed at the intersection of three strike-slip fault systems. Modern Walker Lake has roughly 25% the surface area of its Pleistocene precursor. Since 1885, the lake level dropped 43 meters. Recent surface area decrease is related to upstream irrigation of the Walker River in California and Nevada, also the cause of absence of water discharge into Walker Lake during the years 1988-1992. Geologic ground data and temporal remotely sensed data (1974-2001) were used to determine surface area reductions totaling 75% since the Pleistocene. Surface distribution of lake minerals was derived from spectral signatures recovered by satellite imagery (Landsat 7). Unsupervised classifications were performed, and classes were compared with known mineral reflection spectra. Landcover maps were ultimately obtained and correlated with lake reduction data.

MATHEMATICS POSTERS

P54 SPUTNIK 1957 AND TIMSS-R 1999: DANGER OR OPPORTUNITY?

Iris R. Royal, University of The Incarnate Word, Department of Mathematics, San Antonio, TX

The Third International Mathematics and Science Study (TIMSS) indicates the United States secondary students rank below the international average in mathematics. This brings concern about mathematics education in the United States. The 1995 TIMSS created much debate about the middle school curriculum with minimal substantive program modifications. "Now the 1999 results are available and we find evidence of no change" (Schmidt, 2000). Efforts and programs of many organizations, such as the National Science Foundation, and The National Council of Teachers of Mathematics are providing opportunities for improvement. Research suggests that numerous programs today are effective for various learning environments and learning styles. However, TIMSS demonstrates these efforts show little or no curriculum change in forty years, this a time of national reaction to the launching of Sputnik. This study will look at the historical time-period from the launching of Sputnik to the TIMSS results. The conclusion of this paper hopes to provide insight to a better understanding and prevent a duplication of mistakes that might hinder the progress of mathematics education in the twenty-first century.

PHYSICS AND MATERIAL SCIENCE POSTERS

P55 STRUCTURAL CHARACTERIZATION OF A GROUP III-V SEMICONDUCTOR SUPERLATTICE

Daniel A. Brenes*, University of Houston-Downtown, Rebecca L. Forrest, University of Houston-Downtown, Jerry R. Meyer, Naval Research Laboratories, Washington, DC, and Donna Stokes, University of Houston

An investigation concerning the structural characterization of a group III-V based semiconductor superlattice grown by molecular beam epitaxy was conducted. The sample, an InAs/Ga0.74In0.26Sb/InAs/AlSb superlattice, is of interest for infrared detector applications which are intended for room temperature operation. The structural properties were determined from x-ray diffraction analysis. A computer simulation was used which modeled the lattice spacing, composition, thickness of the layers, and allowed for interdiffusion between the layers. The simulation modeled the x-ray diffraction data of the semiconductor using a chi-squared analysis. Our main interest is whether or not there is interdiffusion between the layers.

SCIENCE EDUCATION POSTERS

P56 INVESTIGATING TIMELINES AS A MEASURE OF ACADEMIC ENGAGEMENT: AN INITIAL EXPLANATION FOR STUDENT SUCCESS IN THE UHD SCHOLARS ACADEMY

Scott Slough, Phil Lyons*, Lisa Morano, Poonam Gulati, Deanna McCullough, and Suzette Mouchaty, University of Houston-Downtown, Houston, TX

The UHD Scholars Academy is an academically competitive program in the College of Sciences and Technology that promotes scholarship and student success for undergraduate students majoring in Science, Technology, Engineering and Mathematics (STEM). A project of the faculty in the UHD College of Science and Technology, its mission is to increase the number of academically capable students graduating with degrees in the natural, mathematical and computer sciences, and engineering/engineering technology, and to increase the number of those choosing to pursue graduate study in these fields by participating in a variety of special classes and a wealth of extracurricular projects. This paper analyzes student timelines of early, successful graduates of the Scholars Academy for evidence of academic engagement.

P57 ACTIVITIES TO ENHANCE MICROBIOLOGY EDUCATION

Poonam Gulati, University of Houston-Downtown, Houston, TX

The formation of a student organization in microbiology, The Leeuwenhoek Society, has provided a forum to conduct educational activities. It is composed of an active group of primarily microbiology majors. The first activity is a teaching project where our students teach basic microbiology to local elementary school students. Groups of three to four students visit a science classroom once a week for four weeks, and deliver short lectures and conduct simple experiments. The elementary school students learn more about microbes, have fun and identify with the college students as role models. Our students gain the invaluable experience of teaching, have fun and the satisfaction of helping younger students. Another activity is learning about microbial diversity by field sampling and isolating bacteria. The students visit a site, such as a wetland environment, collect samples and process them in the lab. Some students usually continue the project and isolate and identify microorganisms. A third, recently-begun, very popular and exciting activity is "Microbial Jeopardy.

SYSTEMATICS AND EVOLUTIONARY BIOLOGY POSTERS

P58 PHYLOGENETIC RELATIONSHIPS AMONG TAXA OF THE MIMOSOIDEAE

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The genus *Mimosa* is a major genus of the subfamily Mimosoideae (Fabaceae), probably second only to *Acacia*. There are some 300 species in the tropics of both hemispheres but most occur in the New World, with the greatest number of species found in Texas. The taxonomy of Texas Mimosa has changed repeatedly due to the morphological similarity of the members of the genus. This study focuses on phylogenetic relationships within the subfamily Mimosoideae (Fabaceae), especially those of the Texas Mimosa, using a molecular genetic approach. Phylogenetic relationships are being assessed using nuclear and chloroplast genes. Sampling includes species of *Mimosa* native to Texas as well as outgroups to the hypothesized monophyletic *Mimosa clade*. We have successfully extracted DNA from dried leaves of *Mimosa strigillosa*, *Neptunia pubescens*, *Acacia smallii*, and *Albizia julibrissin*, and others, amplified some of the target genes, cloned and sequenced the genes and created a preliminary phylogenetic tree. Sequences from other Mimosoideae and Fabaceae subfamililes plus more distantly related taxa were obtained from the NCBI database and used for construction of phylogenetic trees. This study is on-going and ultimately hopes to resolve taxonomic ambiguities of the Texas Mimosa.

TERRESTRIAL ECOLOGY AND MANAGEMENT POSTERS

P59 NEST VIGILANCE BY MALE CAROLINA WRENS DURING INCUBATION

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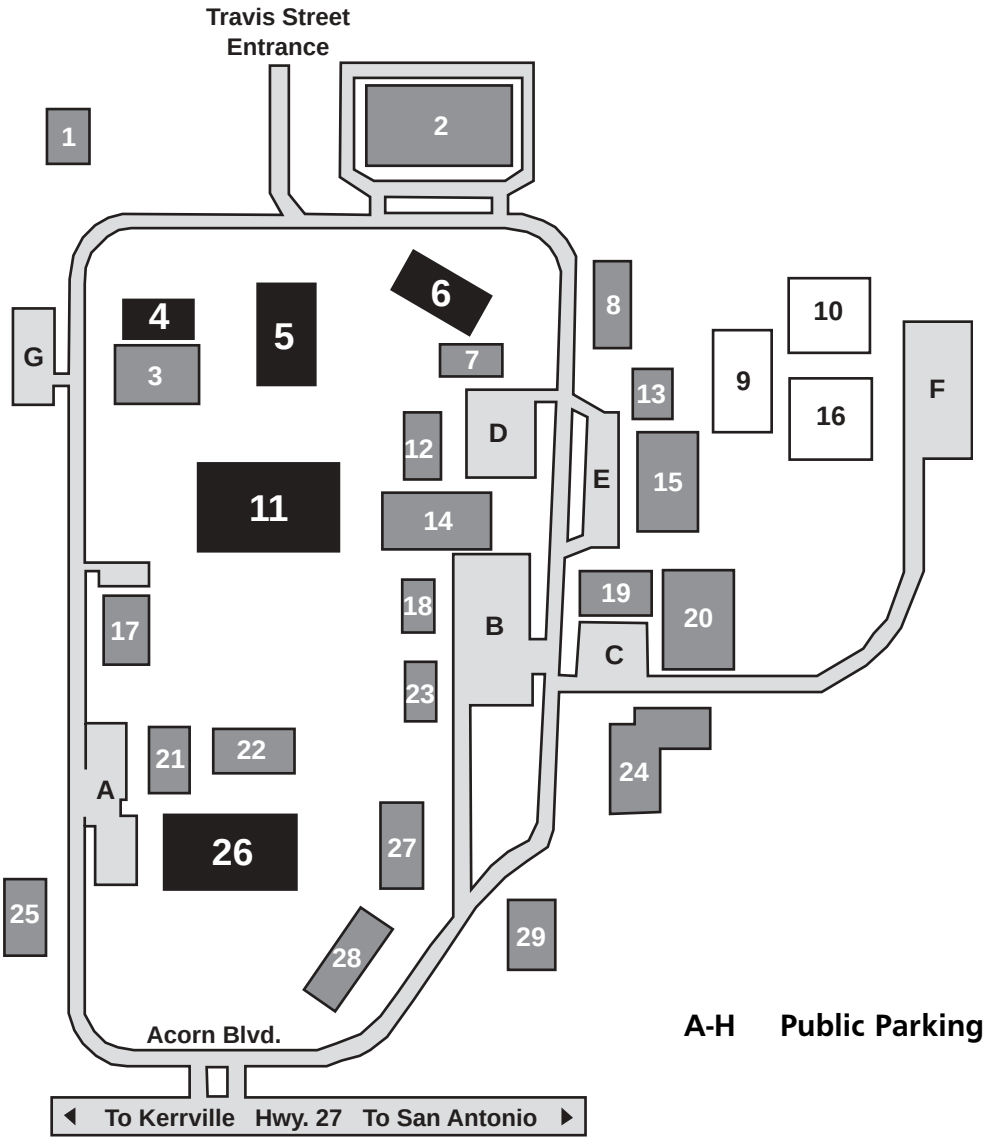
Studies of male-female coordination in cavity-nesting birds have shown that males vocally signal to females when it is safe to leave the nest and forage. If males are able to provide sufficient care for mates and offspring they obtain direct benefits

such as reproductive success and improved fitness. We conducted two experiments at the Center for Biological Field Studies in Huntsville, Texas on a cavity nesting species, the Carolina Wren (*Thryothorus ludovicianus*). Wrens are socially and genetically monogamous songbirds that utilize a number of calls in intra-pair communication. In our first experiment, we quantified male vigilance at the nest during incubation to determine if males signaled vocally to females when it was safe to leave the nest. The total number of times that the female left the box with male vocalizations did not differ from that without male vocalization, although a trend was evident. The frequency that the females entered the nest box with male vocalizations was not different from that without male vocalizations. We also observed the vigilance provided by Carolina Wren males when a predator model was presented near the nest box. In the presence of a predator, females spent just as much time inside as they did when the predator was absent.

LIST OF AUTHORS

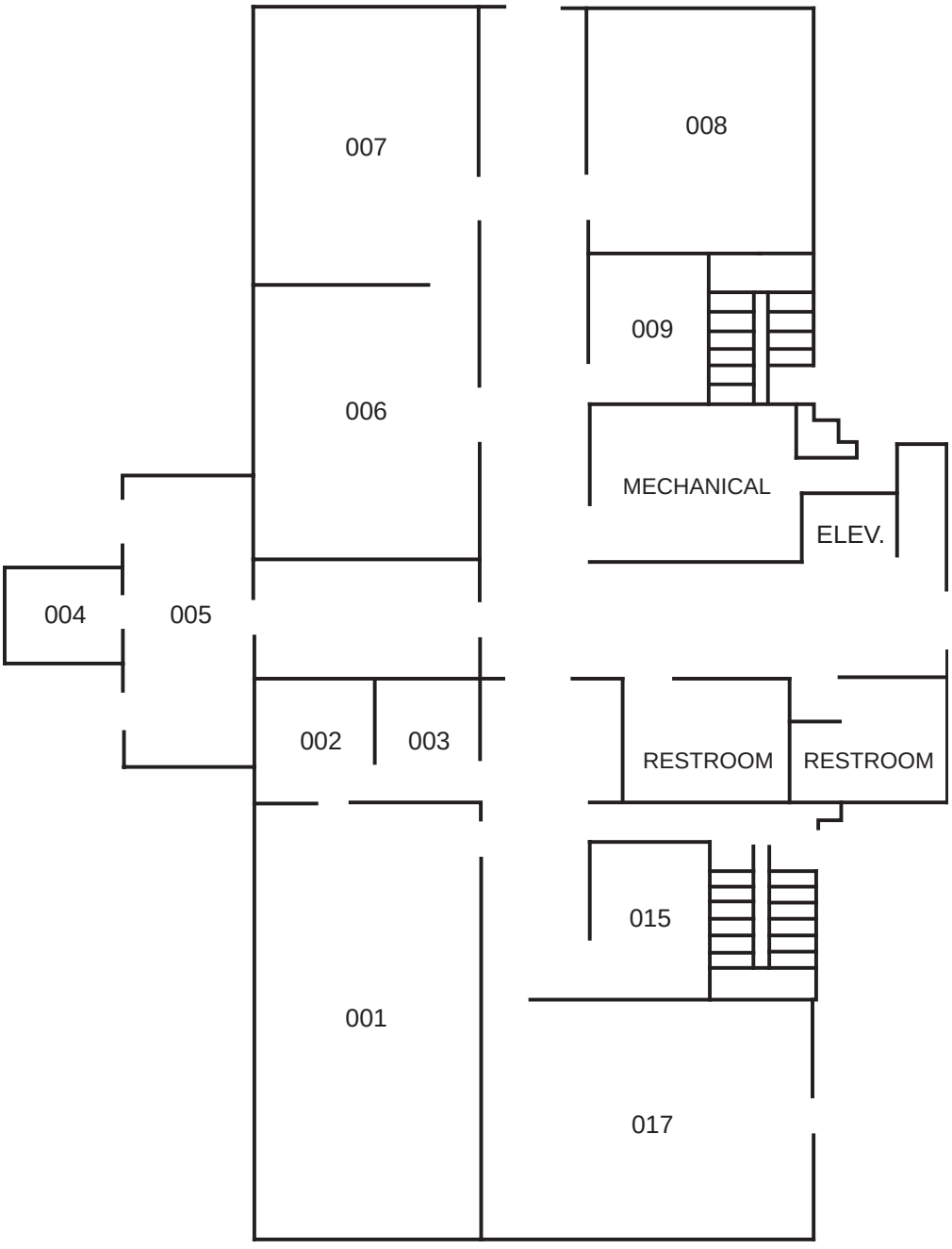
SCHREINER UNIVERSITY
Campus Map



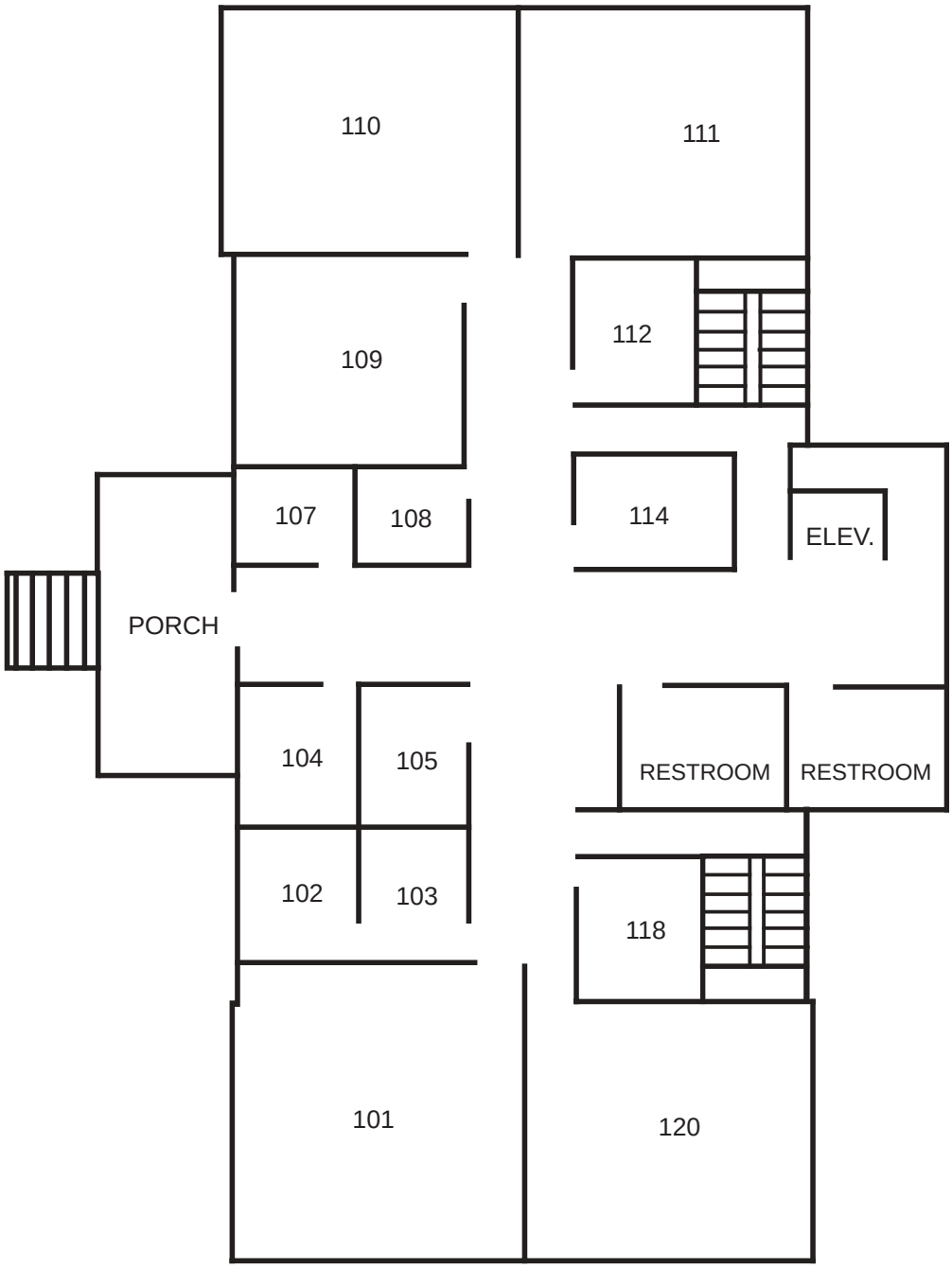
A-H Public Parking Lots

1. Robbins-Lewis Pavilion
2. Pecan Grove Residence Complex
3. Moody Science Building
4. **Trull Science Building**
5. **Dietert Auditorium**
6. **Kathleen C. Cailloux Hall**
7. Alumni House
8. Alice Hanszen Building
9. Track and Soccer Field
10. Lady Mountaineer Softball Field
11. **W. C. Weir Building**
12. Tom Murray Building
13. Rex Kelly Pavilion
14. William Logan Library
15. Edington Athletics Complex
16. Mountaineer Baseball Field
17. Hoon Hall
18. Dickey Hall
19. Swimming Pool
20. Tennis Courts
21. Elaine B. Griffin Welcome Center
22. Gus Schreiner Dining Hall
23. A. C. Schreiner Hall
24. Robert Trull Residence Center
25. Delaney Hall
26. **Floyd and Kathleen Cailloux Activity Center**
27. L. A. Schreiner Hall
28. Flato Hall
29. Guy Griggs Building

WEIR BUILDING
Ground Floor

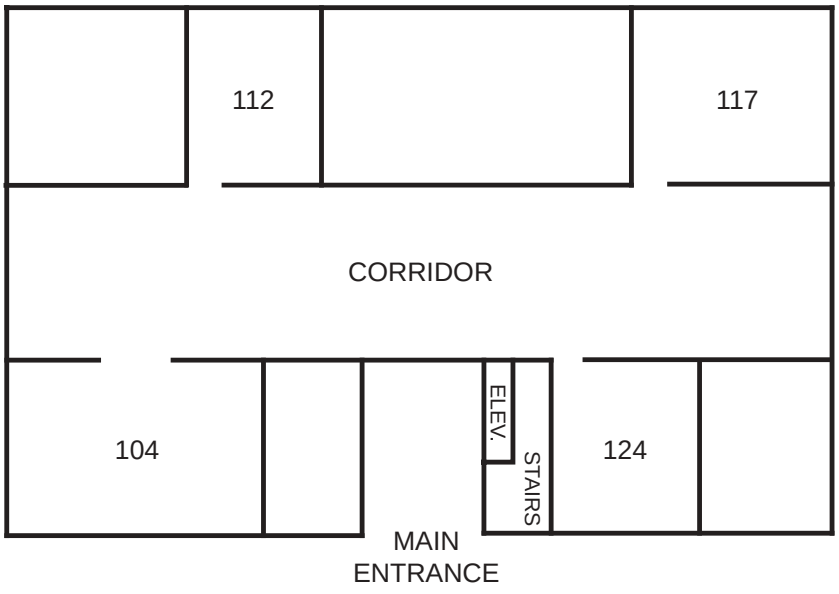


WEIR BUILDING
First Floor

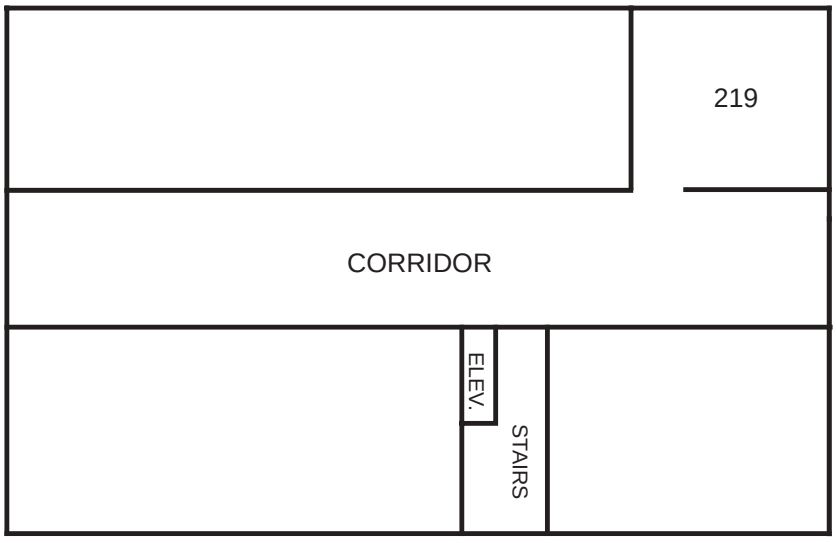


WEIR BUILDING
Second Floor

CAILLOUX HALL



CAILLOUX HALL – FIRST FLOOR



CAILLOUX HALL – SECOND FLOOR

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