BOOK OF ABSTRACTS

COURI CAMPUS OFFICE OF UNDERGRADUATE RESEARCH INITIATIVES

UTEP

BOOK OF ABSTRACTS

ANNUAL 2016

Spring Symposium

April 30, 2016

Laura A. Diaz-Martinez, Editor
Karina Canaba, Associate Editor
Joseph Ramos, Assistant Editor
Nallely Medina, Assistant Editor

EDITOR'S NOTE

This Spring Symposium brought together 104 undergraduate students who presented the results of their research, scholarly or creative activities. The symposium brought together students from very diverse academic backgrounds including Music, Art, Chicano Studies, Philosophy, Psychology, Physical Therapy, Public Health, Speech-Language Pathology, Teacher Education, Mechanical Engineering, Computer Science, Civil Engineering, Electrical & Computer Engineering, Biological Sciences, Chemistry, Geological Sciences, Mathematical Sciences and Physics.

The Spring Symposium took place over two days. The Department of Music 2016 Honors Recital took place on Friday April 29 at the Fox Fine Arts Recital Hall, where 15 undergraduate students performed a variety of musical pieces. Poster and Oral presentations occurred on Saturday April 30. A total of 87 students presented their research results in poster format, and 12 students presented orally. This year marks the first time that the Oral presentation modality is included in the COURI Symposium. Feedback from the presenters, the faculty and others in attendance indicates that the oral presentations were successful and thus this format should be considered for future symposia, as it allows students to further develop their communication skills.

Student presenters represented the Colleges of Education, Health Sciences, Liberal Arts, Engineering and Science. This signals the campus wide participation of undergraduate students in research, and the commitment of faculty in all colleges to mentor undergraduate students and promote their professional and personal development.

Laura A. Diaz-Martinez, Ph.D.
COURI Associate Director
May 3, 2016

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MISSION

Through collaborations with faculty mentors from all disciplines, COURI seeks to enrich the experience of UTEP students by facilitating their training in research, scholarly and creative activities, enhancing their academic success and professional development, and showcasing the results of their work.

COURI CAMPUS OFFICE OF UNDERGRADUATE RESEARCH INITIATIVES

PROGRAM AGENDA

Friday April 29		
1:30-3pm	Department of Music 2016 Honors Recital	Fox Fine Arts Recital Hall
Saturday April 30		
10:00 am - 11:15 am	Poster and Oral Presentations: Session A	UGLC Lobby & Room 128
11:30 am – 12:45 pm	Poster and Oral Presentations: Session B	UGLC Lobby & Room 128
1:00 pm - 2:00 pm	Eminent Guest Speaker: Catarina Mota, Ph.D. Founder & Executive Director Open Building Institute	UGLC Room 128
2:30 pm – 3:30 pm	Awards Ceremony and Concluding Remarks	UGLC Lobby

EMINENT GUEST SPEAKER

Abstract

"More than consumers of technology, we are makers, adapting technology to our needs and integrating it into our lives" - Dale Dougherty wrote these words in 2005. Today, more than ever, they hold true. The one-size-fits-all approach of mass communication has, for several years now, given way to a world in which we create, adapt, repurpose and customize most digital goods we use. And now this approach is spilling into the physical world with a growing community of creators who are no longer content to just be consumers, but take an active role in designing and hacking their lived experience. This is made possible by increased access to sophisticated production technologies, such as 3D printers and laser cutters; the vitality of knowledge-sharing communities; and the growth of open-source hardware—an R&D model in which designers make publicly available all the information necessary to study, change, repurpose and reproduce physical artifacts. As technologies are democratized, as new generations of creators chose to openly share their knowledge, a new age of openness and collaboration begins to unfold. With it comes the promise of world in which we are all co-creators of the future.

Biography

Catarina is co-founder of Open Materials (do-it-yourself smart materials) and AltLab (Lisbon's hackerspace). She is currently launching the Open Building Institute—a new organization dedicated to lowering the barriers to building and making housing more accessible, affordable, and sustainable. Previously, she co-chaired the Open Hardware Summit 2012, served on the board of directors of the Open Source Hardware Association, taught as an adjunct faculty member at ITP-NYU, and was a fellow of the National Science and Technology Foundation of Portugal. Catarina holds a Ph.D. in communication sciences and her research work focuses on the social impact of open and collaborative practices for the development of technologies. She is Research Chair at the Open Source Hardware Association and a TED fellow.

ACKNOWLEDGEMENTS

Institutional Support

Diana Natalicio, President
Richard Adauto, Executive Vice-President
Howard Daudistel, Interim Provost and Vice-President for Academic Affairs
Roberto A. Osegueda, Vice-President for Research
Gary Edens, Vice-President for Student Affairs
Cheryl Torsney, Senior Vice-Provost
John Wiebe, Associate Provost for Research
Steve Wilson, Chair of the Department of Music

Faculty Mentors

Special thanks to all faculty members who mentored students presenting at this symposium for their continuous dedication to the mission of undergraduate research, scholarly & creative activities.

Funding Support for Student Research

UTEP Campus Office of Undergraduate Research Initiatives (COURI)
UTEP On-Campus Student Employment Program
UTEP Border Biomedical Research Center (BBRC)
UTEP Cyber-Share Center of Excellence
UTEP Center for Excellence in Teaching and Learning (CETaL)
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National Institute on Drug Abuse (NIDA)
National Institutes of General Medical Sciences (NIGMS)
National Institutes on Minority Health & Health Disparities (NIMHD)
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United States Department of Agriculture (USDA)
United States Department of Energy
United States Department of Education
United States Department of Defense (DoD)
Howard Hughes Medical Institute (HHMI)
American Educational Research Association (AERA)
University of California's Center for Environmental Implications of Nanotechnology (UC-CEIN)
Nanosystems Engineering Research Center for Nanotechnology-Enabled Water Treatment (NEWT)

Symposium Organization

Herminia Hemmit, UGLC Building Services Coordinator
UGLC Staff and Students
Dr. Peter Golding, CREaTE, Hardware Loan
UTEP Facility Services
Stephen Nordstrom, Assistant Professor of Violin
Faculty and Student Volunteer Judges

Karina Canaba, COURI Assistant Director
Joseph Ramos, COURI Program Manager
Brenda Jimenez, COURI Program Manager
Nallely Medina, COURI Student Assistant
Eduardo Martinez, COURI Student Assistant
Andrea Maravilla, COURI Student Assistant
Diego Burciaga, COURI Photographer
Dr. Laura Diaz-Martinez, COURI Associate Director
Dr. Lourdes Echegoyen, COURI Director

COURI Workshop Facilitators

Dr. Laura Diaz-Martinez, COURI Associate Director
Dr. Lourdes Echegoyen, COURI Director
Karina Canaba, COURI Assistant Director
Nick Zweig, Coordinator, University Career Center

MUSIC HONORS RECITAL PROGRAM

Department of Music 2016 Honors Recital

(Organized by the Department of Music)

^ Undergraduate presenter * Faculty mentor

Havanaise, Op. 83, Camille Saint-Saëns (1835-1921)
Sandra Rivera, violin
Patricia Provencio, piano

Variations on a Theme by Haydn, Johannes Brahms (1833-1897)
Op. 56b, for Two Pianos
Theme: Andante
Variation I: Andante con moto
Variation VII: Grazioso
Finale: Andante
Mario Monteros, primo
Benjamin Stringer, secondo

Sonatina for Flute & Piano Eldin Burton (1913-1981)
I. Allegretto
II. Allegro giocoso
Jesus Candela^, flute
Judi Wilkinson, piano

Presser Scholar Award – Dr. Steve Wilson
Esai Cantu^

Pi Kappa Lambda Inductees – Dr. Dena Kay Jones
Dr. Stephanie Meyers
Nathan Black
Eduardo Garcia

"Willow Song" from *The Ballad of Baby Doe* Douglas Moore (1893-1969)
Jessica Yvette Rodriguez^, soprano
Flor de la Garza, piano

Forbearance, Esai Cantu^ (b. 1996)
Dr. Dominic Dousa, piano

Introduction et variations sur une ronde populaire, Gabriel Pierné (1863-1937)
UTEP Quatuor Première
Oscar Prieto^, Soprano Saxophone
Lourdes Salazar^, Alto Saxophone
Daniel Garcia^, Tenor Saxophone
Derek Andrade^, Baritone Saxophone

Jar Of Hearts/Turning Tables Christina Perri (b. 1986) and Adele Adkins (b. 1988) *Arranged by Hennah Rodriguez*

Soloist - Hennah Rodriguez^
ENSEMBLE
Tiffany Davis^, Soprano
Valeria Parada^, Mezzo Soprano
Rocio Manriquez^, Mezzo Soprano
David Herring^, Tenor
Edward Rodriguez^, Tenor
J.D. Guevara^, Tenor
Ivan Lopez^, Baritone

Outstanding Music Students – Presented by Dr. Stephen Nordstrom, Dr. Steve Wilson

Jewell Black, Outstanding Senior in Music Education
Eric M. Howell, Outstanding Senior in Commercial Music
Rocio A. Martinez Penner, Outstanding Senior in Music Performance
Benjamin T. Stringer, Outstanding Graduate Student in Music Performance

Outstanding Performers – Presented by Dr. Stephen Nordstrom, Dr. Steve Wilson

Reception will follow

TECHNICAL PROGRAM – ORAL PRESENTATIONS

Oral Presentations

1 A **Off the wall: An exhibition and study of five artists who made a difference in the community**
Areli Rocha^, Kerry A. Doyle*

2 A **Screening measures for bilingual children in El Paso**
Cassandra Curtis^, Connie Summers*

3 A **CCR7 Regulates Antibody Titers During the Secondary Immune Response**
Christina A. Alvara^, Jaisel Cervantes, Colin A. Bill, Charlotte Vines*

4 A **Identification of cognitive and non-cognitive predictors of Latin@ students' development of scientific process skills in an introductory biology course**
Dania Yin^, Lynnsay A. Marsan, Jeffrey T. Olimpo*

5 A **Cutting through selfishness: The selfless philosophies of Levinas and Machig Labdrön**
David J. Anderson^, Jules Simon, Kim Diaz*

6 A **Bilingual and Monolingual Patterns of Language Production in Reading**
Elena I. Munoz^, Stephanie N. Escobar, Connie Summers*

1 B **Electronic structure of smaragdyrin/porphyrin and fullerene/graphene-oxide complexes**
Ember L. Sikorski^, Rajendra Zope, Gloria Cardenas-Jirón, Tunna Baruah*

2 B **A safe learning environment: Perceptions and recommendations of the UTEP community about carrying handguns on campus**
Jason R. Cagann^, Patricia M. Juarez-Carrillo*

3 B **Evaluating the Effectiveness of an Interpreter-Use Training in Rehabilitation Sciences**
Joanna Velasco^, Connie L. Summers, Celia Pechak*

5 B **Remediation of Water Using Magnetic Metal-Organic Frameworks with Boron Nitride Nanosheets**
Roy A. Arrieta^, Karen Ventura, Dino Villagrán*

6 B **Bilingual and Monolingual Patterns of Language Production in Reading**
Elena I. Munoz, Stephanie N. Escobar^, Connie Summers*

^ Undergraduate presenter * Faculty mentor

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Evelyn Villarreal^, Celia Pechak*

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Israel Fernandez^, Octavio Miranda, Marina I. Villacis*

3 A **Association between life satisfaction, physical functionality, and opportunities for social and educational participation of the older adults in Los Guido de Desamparados, Costa Rica**
Jasmine Flores^, Gabriel Ibarra, Norma Lau*

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5 A **Antioxidant Scavenging Capacity of Chaparral extract in various in vitro assays**
Carlos A. Valenzuela^, Rachid Skouta*

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Andrea A. DeMay^, Karine Fenelon, Rachid Skouta*

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11 B **Constructing a co-expression vector for human p53 and human Period2**
Jennie Choi^, Alejandro Gonzalez, Neha Chauhan, Ray Supriyo, Chuan Xiao*

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Matthew A. Chavez^, Gabriel Ibarra-Mejia, Shirley K. Vargas-Chaves*

^ Undergraduate presenter, * Faculty mentor

Music Abstracts

0

Jar of Hearts and Turning Tables

Hennah E Rodriguez^, Tiffany Davis^, Valeria Parada^, Rocio Manriquez^, David Herring^, Edward Rodriguez^, John Guevara^, Ivan Lopez^, Chris Reyman*, Elisa Wilson*

Department of Music, The University of Texas at El Paso.

This piece is an a capella mashup of two famous songs: “Jar of Hearts” by Christina Perri and “Turning Tables” by Adele Adkins. Both songs are powerful pieces about finding inner strength after being hurt time and again. It's a feeling to which everyone relates. In crafting an arrangement that would have the highest expressive impact, I chose to bring out the words and highlight the statement one makes when they declare that they will no longer be used and pushed around. This is why it was so important for me to arrange it as an a capella piece. No piano, no guitar, just voices all stating how they were once broken, but now are stronger.

Recommended Citation:
Rodriguez, Hennah; Davis, Tiffany; Parada, Valeria; Manriquez, Rocio; Herring, David; Rodriguez, Edward; Guevara, John; Lopez, Ivan; Reyman, Chris; Wilson, Elisa. "Jar of Hearts and Turning Tables " (2016). COURI Symposium Abstracts, Spring 2016, ID= 815

Jesus Candela, UTEP Music Department Honors Recital Soloist, performs Sonatina for flute & piano by Eldin Burton

Jesus T Candela^, Judi Wilkinson, Melissa Colgin Abeln*

Department of Music, The University of Texas at El Paso.

American composer Eldin Burton (1913-1981), originally submitted the Sonatina for Flute and Pianoas piano solo for a class assignment during his training at the Julliard School of Music. Encouraged by the vision of his teacher, Burton refashioned the work to include the flute as the primary solo instrument. Burton dedicated the Sonatinato his friend, flutist Samuel Baron, who premiered the piece in 1947 in New York City. A year later, the newer version of the work was submitted to a competition for new compositions under the auspices of the New York Flute Club. It captured the Grand Prize.
The three-movement work reflects the influence of 20th-century Romantic and Impressionistic tendencies. (For the Honors' Recital performance, the outer movements will be performed.) Movement I. Allegretto grazioso, is cast in the key of E minor. This waltz-like movement lifts the gracefulness of lyrical tendencies over the expanse of the flute's full range, interwoven with flourishing technical passages as well. Movement III. Allegro giocoso quasi fandango, the most energetic and bold of the movements, seizes the essence of the famous 18th-century Spanish dance, fandango,with allusions to guitars, castanets and clicking heels. This work thrives in the standard performance repertoire of flutists throughout the world.
Jesus Candela, flutist, is a Senior Music Education major in the studio of Dr. Melissa Colgin Abeln. He has performed with the UTEP Marching Miner Regiment, serving as Drum Major during his sophomore year, as well as the Symphonic Winds and Symphony Orchestra. He has performed regularly with the UTEP Dinner Theatre pit orchestra since 2011.

Recommended Citation:
Candela, Jesus; Wilkinson, Judi; Colgin Abeln, Melissa. "Jesus Candela, UTEP Music Department Honors Recital Soloist, performs Sonatina forflute & piano by Eldin Burton." (2016). COURI Symposium Abstracts, Spring 2016, ID= 819

Selections from Johannes Brahms' Variations on a Theme by Haydn: A performance for two pianos.

Mario Monteros, Benjamin Stringer, Oscar Macchioni*

Department of Music, The University of Texas at El Paso.

Johannes Brahms' career as a composer and performer spanned most of the latter half of the 19th century. In a time when Wagner, Liszt and other composers embraced new musical approaches, Brahms sought to innovate in ways that affirmed the tradition of functionality in music. This set of variations is based on a piece for wind ensemble entitled the Saint Anthony Chorale, attributed to Franz Joseph Haydn. Despite the attribution, research has indicated that the chorale was probably not composed by Haydn. Nevertheless, Brahms found the theme compelling enough to warrant exploration. Although Brahms' orchestral version of this work is more recognized, the medium of two pianos is especially suitable for bringing out the interplay between contrasting rhythmic and textural elements. The theme itself is stately and assured, yet vibrant. The beat is confident and unambiguous, providing Brahms with a metrical anchor around which he could weave the polyrhythms, displaced accents, hemiolas, and other rhythmic adventures found throughout these variations. For this performance, we have selected four (out of ten) movements which exemplify Brahms' demiurgic power to cast imaginative moods while retaining fealty to an orthodox musical germ. The Theme is presented in a traditional chorale arrangement. Variation 1 intertwines arching melodies in cross-rhythm for a shimmering effect. Variation 7 has the character of a lullaby (and a charming disregard for bar lines). The Finaleevolves from a hushed choral melody to sonorous chords and flowing figuration, culminating with the return of the Saint Anthony Chorale.

Recommended Citation:
Monteros, Mario; Stringer, Benjamin; Macchioni, Oscar. "Selections from Johannes Brahms' Variations on a Theme by Haydn: A performance fortwo pianos." (2016). COURI Symposium Abstracts, Spring 2016, ID= 810

The experience of composing my first formal work

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In composing my first formal piece, I experienced for the first time the level of craft and attention to detail required to create a piece of art that not only effectively communicates my artistic intent, but also stands up to the level of scrutiny that is pervasive amongst music scholars. Because I was entering the realm of formal composition for the first time, I allowed myself to submit to the process; I forebore the unfamiliar method that, initially, seemed cumbersome, but very soon revealed itself to be exhilerating. I composed this piece in such a way that the dynamic level, range, as well as various other musical elements express the movement from forbearance to an eventual release, where these elements are taken from conservative use to their extremes. Once it was completed, I at last felt that it served as an effective analog to my experience composing formally for the first time. The process of composing "Forbearance" has provided me with a deep insight into the work and attention necessary to create a piece of art that communicates my intentions successfully.

Recommended Citation:
Cantu, Esai; Dousa, Dominic. "The experience of composing my first formal work" (2016). COURI Symposium Abstracts, Spring 2016, ID= 813

UTEP Quatuor Première Presents: Pierne's Introduction et Variations

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The purpose of the UTEP Quatuor Première is to perform original saxophone compositions from the instruments conception in 1846 to the present. Consisting of the saxophone section of the University of Texas at El Paso's premiere concert band, the Symphonic Winds, the ensemble strives for musical excellence both in concert and abroad. The piece prepared is Gabriel Pierne's Introduction et Variations sur une Ronde Populaire (1934) which features both a sedated introduction and a more lively rondo and variation. Having been dedicated to the Marcel Mule Quartet, one of the best saxophone quartets of its time, it is the epitome of true saxophone composition. Consequently, over the course of the semester, the members of the ensemble devoted not only designated class time, but additional rehearsal outside of class to prepare the work, as well as perform for Music Department functions and fellow peers. This is our rendition of Pierne's brilliant work.

Recommended Citation:
Prieto, Oscar; Salazar, Lourdes; Garcia, Daniel; Andrade, Derek; Luffey, Gregory . "UTEP Quatuor Première Presents: Pierne's Introduction et Variations" (2016). COURI Symposium Abstracts, Spring 2016, ID= 817

Violin Performance of Havanaise

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Camille Saint-Saëns composed the Havanaise having the opera Carmen in mind. The piece has dance elements from the Habana, Cuba and the rhythm foundation is similar to the Habanera by George Bizet. Havanaise has contrasting episodes combining warm and lyrical melodies with bright virtuosi passages. The main theme creates an exotic atmosphere by combing duple and triple meter between the violin and the accompaniment line. The first episode is a minor key and the energetic tempo showcases non-stop sixteen-notes. The following section is harmonically unstable but it manages to be lyrical and perhaps resemble sad nostalgia. Consequently, the dotted rhythm in the accompaniment returns in a more bittersweet character; and the violin melody, written in lower register, helps recreate the emotional atmosphere. The mood of the piece is drastically changed in texture and tempo. Doubles stops with chromatic harmony are followed by ascending patterns, and creates tension for a few bars. Then, another slow section arrives with a variation in the key signature but it serves as a transition to most technical section of the entire work. The tempo speeds up and ascending chromatic double stops, consecutive octaves, prolonged tenths, and fast sixteen-note passages sections go by in no time. The piece finishes with a sweet melody in a playful mood. Saint-Saëns dedicated this work to Diaz Albertini, a violinist that joined him on tours.

Recommended Citation:
Rivera, Sandra; Meyers, Stephanie. "Violin Performance of Havanaise" (2016). COURI Symposium Abstracts, Spring 2016, ID= 818

Willow Song from The Ballad of Baby Doe by Douglas Moore

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In this scene, Elizabeth "Baby" Doe is playing the piano and singing to herself while looking back at her failed marriage with Harvey Doe. It was Harvey's drinking and promiscuity that forced the ending of their marriage, and in its wake, mistrust in her life. In this song, Baby is speaking to the willow, a trustworthy figure that can do her no harm. She begins by remembering how she felt at the beginning of her marriage, and knows that she can never go back. She finishes her prayer-like conversation with an empowering message to herself; the times before won't ever come again. She has made the decision to never be hurt that way again. She thinks these newfound vows are private, but Horace Tabor is listening to her song and begins to fall deeply in love with her, a lovely piece of romantic irony. I find that the most beautiful part about this piece is that although she is hurting at the moment, the last few notes reflect a hint of hope in her heart that things will eventually work themselves out for the better. To me, this song reiterates a thought of tenacity. I have found in my life, and in this song, that just because things might not go how you expected, there is hope for brighter days as long as you continue to work to persevere.

Recommended Citation:
Rodriguez, Jessica; Duke, Cherry. "Willow Song from The Ballad of Baby Doe by Douglas Moore" (2016). COURI Symposium Abstracts, Spring 2016, ID=812

Creative Arts, Social Sciences and Humanities Abstracts

A safe learning environment: Perceptions and recommendations of the UTEP community about carrying handguns on campus

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Senate Bill 11 will be in effect on August 1, 2016, and Texas is now the eighth state allowing licensed owners to carry concealed handguns at public colleges and universities. Over 33,000 firearm deaths occur in the U.S. annually; however, college campuses are eight times safer than general community areas. Understanding perceptions and attitudes of our campus community is a necessary starting point to maintain a safe learning environment. Our goals are to identify perceptions, concerns, and recommendations of the UTEP community. Participants were selected randomly, from common spaces and offices, or UTEP's email lists, including 120 face-to-face interviews and three focus groups with faculty, staff and students. We used SPSS for statistical analysis and open coding to identify emerging themes. Preliminary results show 8% are current gun owners and 81% think they are not likely to carry a handgun on campus in the future. 77% are opposed to SB11 and 83% said they will feel less safe when enacted. Two thirds of respondents said concealed carrying will alter the learning environment. Focus groups findings suggest limited knowledge about SB11 and UTEP strategies, fear of promoting discussion on certain topics, the need to educate young people to manage emotions and avoid violence, and ample communication on campus. Strategies on Texas campuses will require high levels of transparency, communication and monitoring, enhancing security policies, offering responsible options (i.e. trainings and counseling) while more risk and gun free laws are implemented, engaging differing opinions, and addressing context-specific campus needs to prevent inequalities.

Recommended Citation:
Cagann, Jason; Juarez-Carrillo, Patricia. "A safe learning environment: Perceptions and recommendations of the UTEP community about carrying handguns on campus " (2016). COURI Symposium Abstracts, Spring 2016, ID= 730

Cognitive mechanisms of Post-Traumatic Stress Disorder: Emotion and memory

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This study examines the social-cognitive mechanisms of different types of threat on memory-based tasks. Each participant completed a Post-Traumatic Stress Disorder Symptom (PSS) and Generalized Anxiety Disorder (GAD) questionnaire prior to the tasks. For the first task, participants were asked to view and encode a series of emotional photographs (stimuli). Participants' recognition memory for these emotional photographs was then tested after a brief delay. Participants were then randomly assigned to one of three threat conditions: controlled threat via response pad (threat 1), uncontrolled threat via adhesive electrodes attached to participants (threat 2) or a non-threat condition. Participants assigned in either threat condition were told that they would be shocked if enough errors or delayed responses were detected during the recognition memory test. Participants assigned to the non-threat condition proceeded with the test without the consequence of being shocked. We predicted that participants who scored high on the PSS/GAD questionnaire scale would demonstrate greater memory and faster reaction times for negative stimuli under threat 2, but slower reaction times under threat 1. With a total of 98 participants, the results support our hypothesis. People under the uncontrolled threat condition via adhesive electrodes demonstrated significantly faster reaction times and people under the controlled threat condition via response pad demonstrated significantly slower reaction times to negative stimuli they accurately remembered. Thus, suggesting greater attention to negativity under uncontrolled threat. The results also show that there is no relationship between GAD and PSS on memory.

Funding Source: MERITUS

Recommended Citation:

Gasca, Stephanie; Enge, Luke; Smith, Brandt; Zarate, Michael. "Cognitive mechanisms of Post-Traumatic Stress Disorder: Emotion and memory" (2016). COURI Symposium Abstracts, Spring 2016, ID= 759

Cutting through selfishness: The selfless philosophies of Levinas and Machig Labdrön

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Buddhism is often associated with things like happiness, nonviolence, vegetarianism, and meditation. Less often appreciated is its complex and even demanding ethical system. The Buddhist ideal of the bodhisattva exalts compassion and wisdom as the inseparable highest pursuits, even going as far as demanding self-sacrifice. What grounds this sacrifice and how is Buddhism's ethic of unconditional self-giving useful and applicable to modern non-Buddhists or those with no religious beliefs? Buddhist philosopher and laywoman Machig Labdrön (1055-1149) demonstrated through her Chöd practice that one need not be a monk to attain the highest compassion. The key is to deconstruct selfish constructs of identity which obscure the reality of interconnectedness. Labdrön's teaching has much in common with the ideas of later Jewish philosopher Emmanuel Levinas (1906-1995) who, writing in the aftermath of the Holocaust, articulated a radical ethics of unconditional responsibility to the Other. Like Labdrön, Levinas envisions an ethics in which true self is constructed through the process of self-emptying. Although from radically different religious and philosophical traditions, Levinas and Labdrön invite the modern world to cut through selfishness by questioning notions of personal identity which give rise to fear and anger. The present study explores the similarities of Labdrön and Levinas surrounding the themes of compassion, sacrifice, self-wounding, hospitability, and openness. Several possible applications to modern non-religious problems such as immigration are discussed.

Recommended Citation:
Anderson, David; Simon, Jules; Diaz, Kim. "Cutting through selfishness: The selfless philosophies of Levinas and Machig Labdrön" (2016).
COURI Symposium Abstracts, Spring 2016, ID= 785

Do the Write Thing challenge program in El Paso, TX

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Thousands of school-aged children in the United States suffer from violence-related experiences at home and/or school. The short-term effects of violence can include school failure, ineffective work habits, emotional dysregulation, and cognitive difficulties. Given these negative consequences, it is very important that schools implement programs that address students' experiences with violence and their aftereffects. One such program is Do the Write Thing (DTWT), which has as its goal to help students understand violence and to commit to work toward ending violence. Current research being conducted on DTWT, provides us with the opportunity to record, observe, and interpret how students feel about their experiences with violence and how beneficial the program has been in their relation with their parents and teachers. The questionnaires being used to collect data address four general areas of interest: (1) information about the participants, (2) their thoughts about violence, (3) their commitment to reduce and stop violence, and (4) how they feel about certain behaviors related to violence. Specifically, the questions to be addressed through this research are: (a) What is the impact of DTWT in El Paso on students and teachers? (b) How is the program being implemented in classrooms, schools, and local communities? (c) What program elements/activities are making a difference in the lives of children, teachers, and parents? A mixed methods approach will be used to collect and analyze data via surveys and focus group interviews with students and teachers participating in the DTWT Program in El Paso, Texas.

Funding Source: AERA (American Educational Research Association)

Recommended Citation:
Meraz Pantoja, Cinthia; Tinajero, Josefina. "Do the Write Thing challenge program in El Paso, TX" (2016). COURI Symposium Abstracts, Spring 2016, ID= 791

Expectation in Complex Visual Attention: The Role of Aging and Attending "On Time"

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Isochronous rhythms can be used to generate temporal expectancies that increase attention at specific moments in time and lead to benefits in simple visual attention tasks (Large & Jones, 1999). This study will investigate if these benefits occur for more complex visual tasks that require selective attention. Seventy-two college-aged students completed a visuo-spatial stroop task. This task involved squares with a gap in one side located in one of four locations on the screen. The color of the square cued participants to either respond to the location of the square or the location of the gap in the square. For congruent trials, the side of the gap in the square and the location of the square on the screen were the same. For incongruent trials gap side and square location were mismatched. Prior to each trial, participants heard a set of seven isochronous tones each spaced 600 ms apart. The trial was then presented either on time (at the moment an 8th tone was expected), slightly earlier than expected or slightly later than expected. We predicted that people will show better performance for incongruent trials presented on time rather than early or late. There was a main effect of presentation time (signal) as we can see $F(2, 142) = 11.699$, $p = .001$. Participants seem to exercise selective attention most for congruent trials however, show most interference for incongruent trials. Entrainment occurs for congruent trials since attention peaks, thus increasing the inability to inhibit irrelevant information during incongruent trials.

Recommended Citation:

Perez, Andrew; Bangert, Ashley. "Expectation in Complex Visual Attention: The Role of Aging and Attending "On Time"" (2016). COURI Symposium Abstracts, Spring 2016, ID= 788

Identification of early cognitive impairments apparent before motor deficits in Parkinsonian rats provides insight for possible early diagnosis/intervention

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Parkinson's disease (PD) is characterized by signature motor deficits as a result of the demise of dopaminergic neurons. However, these motor deficits only become obvious after the depletion of 80-90% of dopamine (DA) due to DA cell death. Interestingly, approximately 80% of patients exhibit cognitive deficits throughout the onset of PD, often at earlier time points as compared to when motor deficits surface. Therefore, we hypothesize that cognitive abnormalities manifest at moderate levels of DA depletion, whereas motor deficits manifest at more severe DA depletions in a model of PD. In the current study, a rat model of PD is created by infusing the dopaminergic neurotoxin, 6-hydroxydopamine (6-OHDA), bilaterally into the substantia nigra pars compacta of the midbrain. To evaluate cognitive abilities, the rats are tested in behavioral paradigms for associative learning, response learning, strategy shifting, and working memory. Following behavioral assessment, the extent of DA depletion in prefrontal cortex, striatum, and nucleus accumbens is verified by post-mortem tissue assay using HPLC-ECD. Preliminary results indicate the presence of subtle cognitive deficits with moderate DA depletions during the pre-motor phase of PD onset. Specifically, a deficit during the acquisition phase of learning may be an important diagnostic criterion for early stage PD. Future studies will explore the possibility of using pharmacological interventions to strengthen the viability of DA neurons during the early stages of PD.

Funding Source: Vulnerability Issues in Drug Abuse (VIDA) Project

Recommended Citation: Hernandez, Edith; Gutierrez, Lizette; Perez, Adriana; De La Torre, Luisa; Avila, Cassandra; Ramos, Jeremiah; Castañeda, Eddie. "Identification of early cognitive impairments apparent before motor deficits in Parkinsonian rats provides insight for possible early diagnosis/intervention" (2016). COURI Symposium Abstracts, Spring 2016, ID= 784

Mom-Talk types: how do they affect their daughter's reproductive decisions

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Although contraceptive use is perceived by both parents and adolescents to be one of the most important health topics to discuss, there is a large amount of variance in style and effectiveness of communication (Akers, et al, 2010). Current research on the effects of these contrasting styles has yielded contradictory results. For this study, we are concerned with bringing clarity to the differing "mom-talk" types and how they govern the reproductive choices of their daughters. Interview data from twenty undergraduate Latina women at the University of Texas at El Paso (UTEP) were used in this analysis. Several categories were made to classify these communication types. These included mothers who did not talk about contraception or sex at all, mothers who would be supportive of their daughters when they have "responsible" sex, and a small category of mothers who were completely open and offered access to contraception to their daughters. Upon examination, we found that there is no direct relationship between these talk types and whether or not they are sexually active. Only women with mothers in the final category spoke to their mothers about sex and contraception. Moreover, only one mother shifted her conversation type based on her daughter's sexual and reproductive activities. All other mothers were rigid in their views on contraceptive discussions. Future analysis will include examining the influence of these conversations on contraceptive behaviors.

Funding Source: COURI

Recommended Citation: Jenkins, Virginia; Leyser-Whalen, Ophra. "Mom-Talk types: how do they affect their daughter's reproductive decisions" (2016). COURI Symposium Abstracts, Spring 2016, ID= 768

Off the wall: An exhibition and study of five artists who made a difference in the community

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This research looks at three ways of working with the community by tracing the professional paths of artists who have had a sociopolitical impact on the border region of El Paso-Juárez. These three areas are identified by direct service, active agent, and subject. Furthermore, the study culminates in an exhibition documenting the work and involvement on the part of the subjects. Taking place at the Stanlee and Gerald Rubin Center for the Visual Arts, the exhibition adds a visual component relevant to the contemporary art space in which it is showcased and makes the information accessible to current students and the larger binational community. The primary focus is to provide a model of professional development for current undergraduates who are pursuing a Studio Art degree and for emerging artists in the region, however, the research and exhibition are also intended to create a platform for critical thinking and open discourse. The research of the subjects' work, which ranges widely in discipline and approach of engagement with the community, involves the documentation of planning, development, funding, networking, and contribution of the arts that directly affect the transborder community from which the subjects launched into their professional paths and in which they continue to work with and for.

Funding Source: Campus Office of Undergraduate Research Initiatives

Recommended Citation:
Rocha, Areli; Doyle, Kerry. "Off the wall: An exhibition and study of five artists who made a difference in the community" (2016). COURI Symposium Abstracts, Spring 2016, ID= 738

Societal gender roles bias evaluations of women in academic settings

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In academic settings, women participate less in Science, Technology, Engineering, and Math (STEM) fields than men. Previous research has identified negative gender stereotypes, and subtle and overt negative biases, as causes of the gender gap of women in STEM fields. We investigated attitudes towards male and female applicants when failure in an academic field is congruent or incongruent with perceived stereotypical gender-roles. We hypothesized individuals are "allowed" to fail in gender incongruent roles, a subtle bias that may push people toward gender-role congruent career trajectories. For example, we hypothesized women who failed in education (a gender-role congruent major) but went on to apply to an engineering program (a gender-role incongruent major) would be seen less favorably. We predicted these effects may be moderated by sexist attitudes which uphold traditional gender roles as a virtue. We tested our hypothesis with a mixed experimental design in which we manipulated target applicant gender as a within-subjects factor, success or failure in undergraduate major (within-subjects), and academic graduate program applied to as a between-subjects factor (Master's in Engineering or Education, randomly assigned). Participants reviewed the transcript of 16 ostensible applicants, 8 of which were fillers. Hypotheses were partially supported; preliminary results suggest that people tend to rate women less favorably when they failed in education and were applying to engineering, compared to men who did the same and compared to women who failed in engineering and applied to an education program. Adherence to gender roles, however, mostly affected attitudes toward women, not men.

Recommended Citation:

Armendariz, Melissa; Frankowski, Scott; Zarate, Michael. "Societal gender roles bias evaluations of women in academic settings " (2016). COURI Symposium Abstracts, Spring 2016, ID= 760

The Role of Gender and Ethnicity on Alcohol Use and Injury

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Alcohol use is the third leading cause of death in the US and an ongoing public concern. Gender and ethnicity play a crucial role in alcohol use behavior. Studies have found that males report higher alcohol use in comparison to women. Males are also of greater risk of injury which is commonly associated with alcohol use. Studies have also shown a link between ethnic status and alcohol use. These findings are problematic as the NIH reports that individuals who exceed the low-risk drinking recommendations are at increased risk for alcohol use disorder, health problems, and injuries. Despite the extensive literature on the effects of gender and ethnicity on alcohol use, few studies have investigated how gender, ethnicity and alcohol use may contribute to injuries. For this reason, the current project seeks to investigate the relationship between alcohol use as a function of ethnicity and gender. Additionally, we will examine the intent of injury by gender and ethnic group.

Recommended Citation:
Portillo, Carlos; Alvarez, Miriam; Field, Craig. "The Role of Gender and Ethnicity on Alcohol Use and Injury" (2016). COURI Symposium Abstracts, Spring 2016, ID= 779

Biomedical and Health Sciences Abstracts

Antioxidant Scavenging Capacity of Chaparral extract in various in vitro assays

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Antioxidants have re-gained tremendous interest in the last decade, due to their properties to mitigate oxidative stress. Oxidative stress have been linked to many neurodegenerative diseases such as Alzheimer's disease (AD), Parkinson's disease (PD), Huntington's disease (HD), Traumatic Brain Injury (TBI) and Amyotrophic Lateral Sclerosis (ALS). Chaparral plant, also known as creosote bush and Larrea tridentatais an evergreen desert shrub and abundant plant of northern Mexico and Southwestern United States deserts (the Chihuahua desert). Chaparral have been used by the native population of the Chihuahua desert in the treatment of various illnesses. In this study, the chaparral leaf were extracted in three different solvents ((1) ethanol, (2) water and (3) ethanol: water mixture) then the extracts were evaluated for their antioxidant properties in 4 different in vitro colorimetric assays including DPPH, ABTS , Nitric oxide and phenolic content assays.

Our investigation demonstrated that the most potent radical scavenger was the extract of ethanol: water (60:40), which has the highest phenolic content (209.4 mg Gallic Acid Equivalent (GAE)), and good radical inhibition (IC_{50}= 64.39 µg/mL DPPH, IC_{50}= 8.54 µg/mL ABTS and IC_{50}= 49.77 µg/mL $NO\bullet^{-}$. In addition, there was a strong correlation between phenolic content and antioxidant activity in all assays, suggesting that phenolic compounds are the major contributor for antioxidant scavenging activity in Chaparral. Overall, study showed clearly that chaparral leaf is effective in scavenging a variety of radical species which could potentially be used against free radical mediated diseases such as AD, PD, TBI and ALS.

Funding Source: BBRC_NIMHD/G12MD007592; URI; NIH/NIGMS grant # R25GM069621-11

Recommended Citation:
Valenzuela, Carlos; Skouta, Rachid. "Antioxidant Scavenging Capacity of Chaparral extract in various in vitro assays" (2016). COURI Symposium Abstracts, Spring 2016, ID= 746

Association between life satisfaction, physical functionality, and opportunities for social and educational participation of the older adults in Los Guido de Desamparados, Costa Rica

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Background: Social participation of older adults creates opportunities to share experience and find a support group that will help them through hardships in a setting away from the family spectrum.
Purpose: To conduct a secondary data analysis and determine the association between life satisfaction, physical functionality, and participation in social and educational groups in elderly population of Los Guido de Desamparados, Costa Rica.
Methods: Secondary data analysis was conducted on a dataset that included previously collected data from 101 men and women, 60-years-of-age and older through two questionnaires that included the participant's life satisfaction, physical functionality, and the aspects of social and educational opportunities
Results: The results showed that there was no association between gender and attendance to social groups, gender and participation in educational courses, attendance to groups and physical functionality, or course participation and life satisfaction.
Conclusions: While no significant associations were found it is still important to note that motivation for the elderly to keep participating or to start participation in social and educational opportunities is of utmost importance. However, previous studies have shown that social participation of the older adult improves certain aspects of health. It is also crucial that national associations for the elderly start providing more opportunities for the older adults who do not have easy access to these opportunities. Furthermore, further research is needed to identify associations on the benefits and limitations elderly have for attending social groups and educational courses in areas like Los Guido de Desamparados, Costa Rica.

Funding Source: National Institute of Health

Recommended Citation:
Flores, Jasmine; Ibarra, Gabriel; Lau, Norma. "Association between life satisfaction, physical functionality, and opportunities for social and educational participation of the older adults in Los Guido de Desamparados, Costa Rica" (2016). COURI Symposium Abstracts, Spring 2016, ID= 740

Bilingual and Monolingual Patterns of Language Production in Reading

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Previous studies have demonstrated that bilingual individuals have more maze productions than monolingual individuals in spoken language. The term “maze” refers to repetitions, revisions, and filled pauses that disrupt the flow of speech in language production. The current study examined the use of mazes in bilingual and monolingual adults in both English and Spanish. Patterns of maze use were examined across languages for bilinguals (English/Spanish) and across proficiency groups. Eighty participants were divided into 3 groups: 20 monolingual English speakers, 20 monolingual Spanish speakers, and 40 Spanish/English speakers. The participants were instructed to read a short story out loud. The monolingual groups were assigned to read a story in their language, while the bilingual group read a story in both languages. These reading samples were then coded for different types of mazes. Participants also completed a language history questionnaire. Preliminary results but the patterns were not the same for all types of mazes. They used more grammatical revisions, phonological revisions, part-word repetitions, word repetitions and substitution of words in Spanish. These results were consistent with other studies of both child and adults. Bilingual adults may not have as much practice reading in Spanish as they do in English. Therefore, they might be transferring elements from their dominant language into their less dominant language during a reading context.

Funding Source: N/A

Recommended Citation:
Munoz, Elena; Escobar, Stephanie; Summers, Connie. "Bilingual and Monolingual Patterns of Language Production in Reading" (2016). COURI Symposium Abstracts, Spring 2016, ID= 749

Cholesterol biosynthesis pathway regulates red blood cell differentiation

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The cholesterol biosynthesis pathway synthesizes both cholesterol and isoprenoids. Recent studies have demonstrated that cholesterol and isoprenoids have distinct non-overlapping cellular functions. Further, there is indirect evidence linking cholesterol to red blood differentiation. However, whether isoprenoid synthesis is important for red blood cell function is currently not known. To begin to test this possibility we used pharmacological inhibition and genetic loss of function analysis in the developing zebrafish. We recently obtained zebrafish harboring mutations in the hmgcs1 gene, which encodes the first enzyme of the cholesterol synthesis pathway. Mutation of this gene abolishes both cholesterol and isoprenoid synthesis. In order to understand the cellular consequences of this mutation during blood cell development, we analyzed the number and location of hemoglobinized red blood cells using o-dianisidine staining. Preliminary analysis of the hmgcs1mutant demonstrated an accumulation of red blood cells in the cardinal vein and cardinal artery at day 3 post fertilization. In addition we observed hemorrhaging in the eye of mutant animals indicative of an endothelial cell defect. Further, by day 4 post fertilization, mutant embryos exhibited a loss of hemoglobinized red blood cells. Pharmacological inhibition using atorvastatin, which inhibits the rate limiting step of the cholesterol synthesis pathway, confirmed our observations in hmgcs1 mutant fish. These data confirm previously published results and future experiments will determine the cellular deficits associated with cholesterol, isoprenoids, or both.

Recommended Citation:
Castro, Victoria; Hernandez, Jose; Quintana, Anita. "Cholesterol biosynthesis pathway regulates red blood cell differentiation" (2016). COURI Symposium Abstracts, Spring 2016, ID= 764

Constructing a co-expression vector for human p53 and human Period2

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Most organisms have an intrinsic clock that drives daily physiological rhythms. This clock maintains synchronization between external environmental cues and internal biochemical events, ultimately ensuring the organism uses energy and resources efficiently and effectively. Consequently, long-term circadian rhythm disruption can be detrimental to overall health. In humans, circadian related diseases include obesity, diabetes, sleep disorders, and a higher risk for cancer. As atomic structure conveys molecular function, knowing the structure of circadian rhythm proteins will provide a better understanding of the process. Period2 (Per2) is a core circadian protein that associates with p53, a tumor suppressor protein. Initial co-expression of Per2 and p53 in a dual expression vector were successful but there was no reliable method for purifying the Per2/p53 complex using traditional chromatography. In order to purify the protein complex, a 12x histidine tag will be introduced to the N-terminal of Per2 using traditional molecular cloning techniques so that the protein complex can be initially purified using affinity chromatography. Once the Per2/p53 complex of high purity is obtained, crystallization trials will begin in preparation for X-ray crystallography to determine its structure. The structure of this complex will facilitate investigation of the details of circadian rhythm at the molecular level and understanding the details will aid in drug and therapeutic developments for circadian related diseases.

Funding Source: NIH

Recommended Citation:
Choi, Jennie; Gonzalez, Alejandro; Chauhan, Neha; Supriyo, Ray; Xiao, Chuan. "Constructing a co-expression vector for human p53 and human Period2" (2016). COURI Symposium Abstracts, Spring 2016, ID= 796

Design of a Questionnaire to Identify Perceived Barriers for Active Aging of the Elderly in the District of Goicoechea, San Jose, Costa Rica

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Background: Active aging is defined as "the process of optimizing opportunities for health, participation and security in order to improve the quality of life as people age". People with disabilities have poorer health outcomes, worse academic results, less economic participation and higher rates of poverty than people without disabilities.
Purpose: The overall project consists of four phases. This project is considered as the first phase, with the goal of developing questionnaire to identify the determinants of active aging and indicators of their determinants in the Cantón Goicoechea, specifically in the regions of Golfito and Montelimar in San Jose, Costa Rica.
Methods: This study includes a systematic review of literature. After the review of literature was conducted a pilot questionnaire was drafted by reviewing previous questionnaires with similar topics, seeking to to identify the barriers at the community and household levels that limit the active aging of the elderly.
Results: A pre-pilot test was conducted in the Golfito in order to make any necessary modifications after the recording of the questionnaire was transcribed. Once modifications were completed, a final pilot test was perfomed in the Montelimar region, where the recorded interview was also transcribed.
Conclusions: A questionnaire was developed and pilot-tested, trends were able to be identified through pilot tests of the questionnaire, the perceived barriers to active aging of the elderly will be able to be identified through the use of the questionnaire, and future studies should consider using this questionnaire if applied on similar populations.

Funding Source: Hispanic Health Disparities Across Cultures in Latin America: Collaborative Research For The 21st Century

Recommended Citation:
Chavez, Matthew; Ibarra-Mejia, Gabriel; Vargas-Chaves, Shirley. "Design of a Questionnaire to Identify Perceived Barriers for Active Aging of the Elderly in the District of Goicoechea, San Jose, Costa Rica" (2016). COURI Symposium Abstracts, Spring 2016, ID= 719

Dietary supplementation with fish oil delays high fat chow-induced enhancement of sensitivity to the behavioral effects of dopamine D2/D3 receptor agonist quinpirole in adolescent male rats

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Eating a diet high in fat can lead to severe negative health consequences, including obesity and insulin resistance. Dietary supplements that are rich in omega-3 polyunsaturated fatty acids (e.g., fish oil) prevent high fat diet-induced obesity and insulin resistance in rats. Eating high fat chow also enhances sensitivity of rats to the behavioral effects of drugs that act on dopamine systems (e.g., cocaine, quinpirole). To test the hypothesis that dietary supplementation with fish oil prevents high fat diet-induced enhanced sensitivity to the behavioral effects of quinpirole (0.0032-0.32 mg/kg), a dopamine D_2/D_3receptor agonist, adolescent male rats ate standard laboratory chow (17% kcal from fat), high fat chow (60% kcal from fat), or high fat chow supplemented with 20% fish oil (w/w; 68% kcal from fat). After 3 weeks, rats eating high fat chow without fish oil were more sensitive (e.g., leftward shift of the quinpirole dose-response curve) than rats eating standard chow to yawning induced by quinpirole. Dietary supplementation with fish oil prevented this effect. That is, quinpirole dose-response curves were not different between rats eating high fat chow supplemented with fish oil and standard chow-fed controls. While diets high in fat increase sensitivity of individuals to drugs acting on dopamine systems in ways that might be relevant to drug abuse, these results suggest that dietary supplementation with fish oil prevents this effect. These data add to a growing literature demonstrating the complex relationship between diet and drug abuse, and the health benefits of fish oil.

Recommended Citation:
Hernandez-Casner, Caroline; Ramos, Jeremiah; Serafine, Kathrine. "Dietary supplementation with fish oil delays high fat chow-induced enhancement of sensitivity to the behavioral effects of dopamine D2/D3 receptor agonist quinpirole in adolescent male rats" (2016). COURI Symposium Abstracts, Spring 2016, ID= 748

Elucidating the role of the acyl-CoA dehydrogenases FadE26-FadE27 and FadE34 of Mycobacterium tuberculosis in cholesterol side-chain and fatty acid catabolism.

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The causative agent for tuberculosis (TB) in humans is a pathogen known as Mycobacterium tuberculosis (Mtb), which is the cause for an annual count of over 2 million deaths worldwide. The proliferation of drug-resistant Mtbstrains has urged the discovery of therapeutic targets in the unknown metabolic pathways. Studies have suggested that cholesterol catabolism plays an important role during and throughout infection. Aliphatic side-chain degradation in cholesterol, despite recent advancements, is not a fully understood process, which therefore might provide insight into Mtbvirulence. Here, we report on elucidation of the role of the acyl-CoA dehydrogenases, FadE26-FadE27 and FadE34 in cholesterol side-chain catabolism using LC/MS. Analysis revealed FadE26-FadE27 to catalyze (25S)-3-oxocholest-4-en-26-oyl-CoA (C27), 23,24-bisnor-3β-hydroxy-5-cholen-24-oyl-CoA (C22), and with lesser affinity 3β-hydroxy-5-cholen-24-oyl-CoA (C24) to their dehydrogenated products. FadE34 revealed to have a similar activity for C24 and C27 substrates, with lesser affinity for the C22 thioester derivative. Both enzymes interestingly exhibited prominent activity for long-chain fatty acyl-CoAs. To confirm the role of these enzymes in vivo, Mtb deletion mutants for fadE27 and fadE34were generated through allelic replacement using specialized-transducing mycobacteriophages. Analysis revealed the ΔfadE34mutant showed a moderate growth defect on cholesterol and failed on a growth attempt of cholest-4-en-3-one. The ΔfadE27mutant interestingly, revealed to have no growth defect on cholesterol derivatives and showed poor growth when provided glycerol as the only carbon source. To summarize, cholesterol degradation contains some overlapping between the two acyl-CoA dehydrogenases; FadE26-FadE27 seemingly plays a key role in maintaining acetyl-CoA levels through degradation of fatty acids.

Recommended Citation:
Ellis, Cameron; Escalante, Veronica; Abou-Fadel, Johnathan; Ouellet, Hugues. "Elucidating the role of the acyl-CoA dehydrogenases FadE26-FadE27 and FadE34 of Mycobacterium tuberculosis in cholesterol side-chain and fatty acid catabolism." (2016). COURI Symposium Abstracts, Spring 2016, ID=742

Evaluating the Effectiveness of an Interpreter-Use Training in Rehabilitation Sciences

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With the increase of individuals with limited English proficiency in the United States, health professionals must meet the needs of culturally and linguistically diverse patients. Being aware of and competent in linguistic differences is part of linguistic safety. The purpose of this study was to implement and evaluate the effectiveness of an Interpreter-Use Training with three graduate programs in Rehabilitation Sciences. We examined potential increases in interpreter knowledge and interprofessional knowledge across disciplines. Participants included 71 students from the following programs: Doctor of Physical Therapy Program (32), Master's of Occupational Therapy Program (21), and the Speech-Language Pathology Master's program (18). The study followed a pre-test/post-test design. The training included both role-playing with students acting as clinicians, patients, and interpreters and a structured discussion on ethical and legal issues of interpreter-use pertaining to individual Spanish proficiency levels. Students completed pre- and post-tests for knowledge of interpreter use and interprofessional skills. They also completed an evaluation of the training. Results showed on overall increase in interpreter use knowledge and interprofessional knowledge for all students ($p<.05$), while each program exhibited a different pattern of growth. Such differences may be the result of variations in program curriculum. Student evaluations contained positive feedback. The participants gained a greater understanding of the need to work with interpreters, and a better understanding of the importance of interprofessional collaboration.

Funding Source: SoTl Award awarded to Dr. Connie Summers and Dr. Celia Pechak

Recommended Citation:
Velasco, Joanna; Summers, Connie ; Pechak, Celia. "Evaluating the Effectiveness of an Interpreter-Use Training in Rehabilitation Sciences" (2016). COURI Symposium Abstracts, Spring 2016, ID= 739

Identification of Cognitive and Non-Cognitive Predictors of Latin@ Students' Development of Scientific Process Skills in an Introductory Biology Course

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In an effort to engage students in authentic aspects of scientific inquiry and to prepare them to be competitive in an increasingly globalized STEM workforce, recent efforts within the science education community have focused on the implementation and evaluation of curricula designed to enhance novices' development of scientific process skills in the STEM domains. Despite these efforts, little remains known about the various factors that predict the development of these skills, particularly among students who self-identify as Latin@. To address this concern, we adopted a quantitative approach to examine the extent to which various demographic, cognitive, and non-cognitive factors were predictive of novices' abilities to design an experiment (E-EDAT) and analyze biologically relevant findings (Analysis Task) – two components identified as constituting scientific process skills development within the literature. To that end, attitudinal and motivation data generated as a result of administration of the CLASS-Bio, Biology Motivation Questionnaire II (BMQ), and Attitudes Toward Mathematics Inventory (ATMI), coupled with collected demographic data, were utilized as inputs within a series of multiple linear regression models. Preliminary analyses indicate that while gender and GPA positively predict both experimental design and data analysis abilities, ATMI variables (such as math anxiety) uniquely predict student performance on the Analysis Task, and problem-solving skills/biology self-efficacy uniquely predict performance on the E-EDAT. Collectively, these data offer a foundation for guiding future curriculum development and teaching approaches in the biological sciences in a manner best designed to enhance novices' development of scientific process skills in the domain.

Recommended Citation:
Yin, Dania; Marsan, Lynnsay; Olimpo, Jeffrey. "Identification of Cognitive and Non-Cognitive Predictors of Latin@ Students' Development of Scientific Process Skills in an Introductory BiologyCourse" (2016). COURI Symposium Abstracts, Spring 2016, ID= 718

Identification of early cognitive impairments apparent before motor deficits in Parkinsonian rats provides insight for possible early diagnosis/intervention

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Parkinson's disease (PD) is characterized by signature motor deficits as a result of the demise of dopaminergic neurons. However, these motor deficits only become obvious after the depletion of 80-90% of dopamine (DA) due to DA cell death. Interestingly, approximately 80% of patients exhibit cognitive deficits throughout the onset of PD, often at earlier time points as compared to when motor deficits surface. Therefore, we hypothesize that cognitive abnormalities manifest at moderate levels of DA depletion, whereas motor deficits manifest at more severe DA depletions in a model of PD. In the current study, a rat model of PD is created by infusing the dopaminergic neurotoxin, 6-hydroxydopamine (6-OHDA), bilaterally into the substantia nigra pars compacta of the midbrain. To evaluate cognitive abilities, the rats are tested in behavioral paradigms for associative learning, response learning, strategy shifting, and working memory. Following behavioral assessment, the extent of DA depletion in prefrontal cortex, striatum, and nucleus accumbens is verified by post-mortem tissue assay using HPLC-ECD. Preliminary results indicate the presence of subtle cognitive deficits with moderate DA depletions during the pre-motor phase of PD onset. Specifically, a deficit during the acquisition phase of learning may be an important diagnostic criterion for early stage PD. Future studies will explore the possibility of using pharmacological interventions to strengthen the viability of DA neurons during the early stages of PD.

Funding Source: Vulnerability Issues in Drug Abuse (VIDA) Project

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Recommended Citation:

Hernandez, Edith; Gutierrez, Lizette; Perez, Adriana; De La Torre, Luisa; Avila, Cassandra; Ramos, Jeremiah; Castañeda, Eddie. "Identification of early cognitive impairments apparent before motor deficits in Parkinsonian rats provides insight for possible early diagnosis/intervention" (2016). COURI Symposium Abstracts, Spring 2016, ID=784

Mid-Curricular evaluation of the effects on Doctor of Physical Therapy students of an integrated Spanish language training model

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Limited English proficient Spanish-speaking individuals face increased health disparities. In response, the University of Texas at El Paso (UTEP) Doctor of Physical Therapy (DPT) Program has integrated Spanish training across their curriculum. The purpose of this study was to evaluate the effects of this training. Thirty-four students enrolled in an 8-week, 1-credit Spanish medical terminology course. Additionally, they practiced Spanish during laboratory and service-learning experiences. The students completed pre-tests in the first semester and post-tests in their fifth semester: self-ratings of their ability to speak, understand, read, and write Spanish; a written Spanish vocabulary test; and a questionnaire about their beliefs and attitudes about Spanish language training. A repeated measures 2-way ANOVA was used to analyze self-ratings and vocabulary test scores. Descriptive statistics and paired t-tests were used to analyze the data from the pre- and post-questionnaires. There were significant improvements in self-ratings of speaking, understanding, reading, and writing Spanish ($P<.001$). There was significant improvement in vocabulary test scores ($P<.001$); no significant difference in improvement was seen between beginning and advanced students ($P=.097$). Results from the questionnaires suggest that students recognize personal and professional benefits from learning Spanish. This study supports that the UTEP DPT Program's Spanish language training model improved self-ratings of Spanish proficiency and increased Spanish vocabulary. Additionally students had an overall positive attitude about learning Spanish. Future research is indicated to determine if self-ratings of proficiency are correlated with observed Spanish proficiency in a clinical setting.

Recommended Citation:
Villarreal, Evelyn; Pechak, Celia. "Mid-Curricular evaluation of the effects on Doctor of Physical Therapy students of an integrated Spanish language training model" (2016). COURI Symposium Abstracts, Spring 2016, ID= 716

Natural Sources of Antioxidants Against Nitrosative Stress

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Brain disorder diseases such as Epilepsy, Alzheimer's disease (AD), Parkinson's disease (PD), Huntington's disease (HD), affect millions of individuals worldwide. It has been estimated that the number of patients affected by neurodegenerative diseases will increase over time, due to the growing size of the elderly population (Willis, 2015). It is well documented that under nitrosative stress, an excess of nitric oxide (NO) radical species induced extensive neuronal cell loss and cause neurodegenerative disorders. One potential strategy to combat nitrosative stress, is to use antioxidant sources which may inhibit the neuronal cell death pathways and may slow the development of neurodegeneration. However, discovering small molecule inhibitors of neuronal cell death remains a significant challenge. We recently reported that a small molecule named Fer-1 was protective in cellular models of HD (Skouta et al., 2014) and PD (Kabiraj et al., 2015). From ancient time's humans beings have used plants for treatment of various different diseases. Currently, plants continue to be of major interest in drug discovery and natural source of antioxidants due to the fact that they are safer to consume and to the perception of their high therapeutic value protecting against neurodegenerative diseases which are derived from nitrosative stress. Here, we are assessing the antioxidant properties of selected set of plant extracts such as Hamamilis virginiana, Cretageous oxyacantha, Hydrastis canadensisfrom various solvents using our developed in vitro assays including nitric oxide assay. In addition these plant extracts will be evaluated for their neuroprotection in epileptic brain slices.

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Optimization of expression and purification of hCLOCKt and hBMAL1t

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Our health depends heavily on the circadian rhythm, an approximate 24-hour cycle that controls many important physiological and behavioral processes in the body. Disruptions of circadian rhythm often lead to sleep disorders that are linked to obesity, diabetes, and high risks of cancers. Human Circadian Locomotor Output Cycle Katput (hCLOCK) and human Brain Muscle ARNTL like 1 (hBMAL1) are two core proteins that play critical roles in the circadian rhythm. They have been shown to bind the DNA and initiate the expression of other circadian proteins. Determining the structures of the hCLOCK and hBMAL1 will help elucidate how these proteins interact with each other as well as with DNA and decipher the circadian mechanism at the molecular level. Truncated hCLOCK (hCLOCKt) and truncated hBMAL1 (hBMAL1t) containing the N-terminal DNA binding domains were cloned into the same bacterial expression system, expecting that co-expression both of them would stabilize mutually to obtain the complex. Both truncated proteins were successfully expressed and initial tests confirmed the complex formation. However, some difficulties have been occurring during the expression and purification. Therefore, experiments have been focused on optimization of expression and purification methods. Once ultra-pure hCLOCKt/hBMAL1t complex are obtained, X-ray crystallography will be used to determine its atomic structures. Analyses of these structures will help us understand hCLOCK's functions in the circadian system and help us develop future therapeutics against circadian related diseases.

Funding Source: National Science Foundation

Recommended Citation:
Acosta, David; Choi, Jennie; Ray, Supriyo; Xiao, Chuan. "Optimization of expression and purification of hCLOCKt and hBMAL1t" (2016). COURI Symposium Abstracts, Spring 2016, ID= 797

Screening measures for bilingual children in El Paso

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A language screener is a tool that differentiates typically developing children from those who need further language assessment (Guiberson & Rodriguez, 2010). Finding an efficient screener for linguistically diverse populations may be difficult because bilingual children produce linguistic features that may mimic characteristics of language impairments. It is essential that language screeners be psychometrically sound for these populations. The purpose of this study was to determine what language screeners were being used by Speech Language Pathologists (SLP) to identify risks for language impairment in English-Spanish bilinguals from the El Paso region. It is important that this population be administered language screeners that are linguistically and culturally appropriate. Seventy-three SLPs in the El Paso region responded to an online survey via Qualtrics. SLPs reported on the populations they screened, the screening tools they used, and indicated why they used the specified screening tools. The survey also explored the strengths and weaknesses about their screening practices. Results indicated that 64% of the survey participants, who currently work with children, administer language screeners. Seventy-seven percent said they screen the bilingual English-Spanish population. Overwhelmingly, the most common screening practice was to use informal observations and checklists. SLPs also reported on commonly used formal screening tools. Only 30% of participants reported the screeners they used provided accurate results. Overall, SLPs in the El Paso region expressed a need for accurate, culturally appropriate language screening tools that can identify risks in the bilingual English-Spanish population that they serve.

Recommended Citation:
Curtis, Cassandra; Summers, Connie. "Screening measures for bilingual children in El Paso " (2016). COURI Symposium Abstracts, Spring 2016, ID= 782

Chemistry and Biological Sciences Abstracts

A bioinspired photocatalytic nanocomposite for the removal of persistent organic pollutants in water

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Recalcitrant organic pollutants in water generated from fossil fuels derivatives such as the plastic industry represent a growing environmental concern. Current technologies employ TiO2 materials that photo degrade organic compounds under UV radiation and warrant improvement in kinetics and oxidative strength. This project involves the synthesis of a nanocomposite material bioinspired in cytochrome P450 with potent oxidative properties that can react with persistent contaminants in water. Multi-layered material with iron (II) porphyrin and fullerene C_{60}stabilized gold nanoparticles on titania dioxide nanocomposite displays photoactivity through the generation of reactive oxygen species.

Synthesis of titania-gold nanoparticles demonstrated the capability of generating hydroxyl radicals as shown by a terephthalic acid fluorescent probe. Introduction of an iron-porphyrin moiety into the nanocomposite allows for the generation of a hypervalentiron oxo species with very strong oxidative properties. We will present the characterization of the new material and the reactivity towards hard-to-oxidize organic pollutants such as polycyclic aromatic hydrocarbons.

Funding Source: USDA

Recommended Citation:
Hernandez, Cesar ; Alarcon, Hugo ; Noveron , Juan . "A bioinspired photocatalytic nanocomposite for the removal of persistent organic pollutants in water " (2016). COURI Symposium Abstracts, Spring 2016, ID= 792

Alcohol-induced alterations of Gβγ-cytoskeleton dependent pathway in PC12 cells

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Background: Alcohol addiction is a major public health problem, and, therefore, understanding the molecular mechanisms of alcohol addiction is crucial for addressing the problem. Recent reports indicate the involvement of Gβγ (an important component of GPCR pathway) and cytoskeletal restructuring in the processes that modulate drug addiction. Results from our laboratory indicated that Gβγ is involved in neuronal outgrowth and differentiation by modulating MT assembly and in vitro alcohol exposure disrupted microtubules (MTs) and neurite outgrowth. Research Question: The goal of the present study is to determine if ethanol modulates the expression of cytoskeletal proteins and Gβγ, and thereby, interferes with the cytoskeletal organization and neuronal differentiation. Methods: PC12 cells were used to conduct the study because they respond to nerve-growth-factor (NGF) with growth arrest and induce neuronal differentiation. NGF-differentiated PC12 cells were exposed to acute (1hr) and chronic (24hr) treatment with 100mM ethanol followed by cell lysis and immunoblotting. Since overexpression of Gβγ induced neuronal differentiation of PC12 cell in the absence of NGF, PC12 cells were co-transfected with mCherry-β_1 and YFP-$\gamma_2$to further understand the role of ethanol in Gβγ-cytoskeletal mediated pathway. Results and discussion: We found that chronic ethanol treatment significantly increased Gβ and tubulin expression in NGF-differentiated PC12 cells. Specifically, the expression of Gβ and tubulin were increased by 78% and 300% respectively in response to chronic ethanol treatment. Confocal microscopic analyses are currently underway to determine the effect of ethanol in Gβγ-cytoskeletal association and neurite outgrowth in NGF-differentiated and Gβγ overexpressed PC12 cells.

Funding Source: BBRC (NIH)

Recommended Citation:
Castro, Roberto; Varela, Jose; Roychowdhury, Sukla. "Alcohol-induced alterations of Gβγ-cytoskeleton dependent pathway in PC12 cells" (2016). COURI Symposium Abstracts, Spring 2016, ID= 756

Aquatic Macroinvertebrate Communities from Rio Bosque Wetland.

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Abstract.Wetland areas are keystone ecosystems that can provide services such as nutrient retention, increased biodiversity and can reduce levels of many pollutants. They provide habitat for a variety of aquatic invertebrates, which play an important role in these ecosystems and can be important site-specific indicators of environmental change. The Rio Bosque Desert Wetland (El Paso, TX) is a restoration wetland created in 1998. Water deliveries have been spotty since its creation; however, the recent construction of a more reliable water source will result in the wetland being one of the most productive areas in the region, and monitoring the aquatic macroinvertebrates is essential to its rehabilitation. The purpose of this study was to compare current macroinvertebrate communities to previous data (2009 to 2011). Samples were collected from three different sites at Rio Bosque in March 2016, when water temperatures were approximately 18.9°C and pH near 8.2. Dragonflies (Odonata) and mayflies (Ephemeroptera) were the predominant aquatic species found at Rio Bosque, followed by snails, worms, and beetles. Species composition varied among sites, with more dragonflies found at a site dominated by cattails and more planktonic species found in open water sites. Since dragonflies and mayflies are predators, it is thought that they are the reason why smaller organisms were not found at the time of data collection. These results will be compared with previous data sets in order to determine how much the aquatic communities have changed over time in the Rio Bosque Wetlands.

Recommended Citation:
Orona, Viridiana; Walsh, Elizabeth; Lougheed, Vanessa. "Aquatic Macroinvertebrate Communities from Rio Bosque Wetland." (2016). COURI Symposium Abstracts, Spring 2016, ID= 755

Attachment of Giardia to Epithelial Cells as a Model for Host-Parasite Interactions

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Giardiasis, caused by Giardia lamblia,is characterized by diarrhea, steatorrhea(fatty stool), abdominal pains, vomiting, and other irritable bowel conditions. This parasite has a simple two-staged life cycle—i.e., a replicative trophozoite and a relatively dormant but infective cyst. When humans are infected with giardial cysts, they commonly experience symptoms of giardiasis and this is most likely caused by the attachment and interactions of giardial trophozoites with intestinal epithelial cells (IECs), after the cysts have excysted to trophozoites in the stomach. Because Giardiais a non-invasive parasite, and the mechanism by which it causes disease is not clear, the ability of Giardiato attach on host cells could be considered its "virulence determinant." Therefore, the objective of this project is to examine the mechanism of attachment of giardial trophozoites to two intestinal epithelial cell lines, HT-29 and Caco 2. The experiment will be carried out by culturing IECs on a 24-well plate overnight and then adding giardial trophozoites for various time ranges from 0-24 hours. The attachment will then be counted and observed using standard procedures. The results of this attachment study will be useful for future experiments involving Giardiaand these two IECs to gain an understanding of the mechanism of giardial infection. For example, we will explore the possibility whether glycosphingolipids secreted by Giardia(unpublished) influences the cytokine and chemokine release by IECs during the host-Giardiainteractions. The outcome of the proposed experiments may lead to the discovery of new targets for therapeutic interventions in the future.

Funding Source: RISE, NIH

Recommended Citation:
Enriquez, Vanessa; Salazar, Christiancel; Chatterjee, Atasi; Das, Siddhartha. "Attachment of Giardia to Epithelial Cells as a Model for Host-Parasite Interactions " (2016). COURI Symposium Abstracts, Spring 2016, ID= 763

CCR7 Regulates Antibody Titers During the Secondary Immune Response

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Under normal conditions, signaling through C-C chemokine receptor 7 (CCR7) and its ligands, CCL19 and CCL21, promotes homing of leukocytes to the T cell zones of lymph nodes and secondary lymphoid organs. In contrast, loss of expression of CCR7 protein induces elevated counts of high affinity antibodies during the secondary immune response in mice homozygously deleted for the CCR7 locus, as compared to their wild-type counterparts. It is thereby not surprising that misregulation of CCR7 has been linked to Sjögren's syndrome, systemic sclerosis, Crohn's disease, and systemic lupus erythematosus in humans. Yet, the role that CCR7 and other chemokines play in limiting the secondary immune response is largely unknown; consequentially, their potential applications have yet to be explored. In this study, we investigate the mechanisms by which CCR7 signals through one of its ligands, CCL19, to promote a delayed but enhanced immune response. We hypothesize that signaling through CCR7/CCL19 normally limits the secondary immune response; however, in its absence, this regulation is lacking and results in a delayed response characterized by significantly higher titers of affinity matured antibodies. The secondary immune response will be induced in mouse models homozygously deleted for the CCL19 locus or the CCR7 locus conditionally knocked out in B cells, T cells, and dendritic cells through the use of LoxP sites and Cre recombinase technology. Insight into these mechanisms, we anticipate, could have novel implications for improving therapeutic approaches to autoimmune disease and adjuvants for vaccination.

Funding Source: NIH FC1GM111172, Star Award

Carbo nanotubes-Cotton: The Treatment of Water contaminated with organic molecules through electrochemistry.

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Carbon nanotubes have been proved to have a unique type of nanostructure, and unique structural mechanical and electronic properties. The properties of carbon nanotubes include high chemical and thermal stability, high elasticity, and high tensile strength. These properties have increased interests in the focus of construction of carbon nanotube functional devices and processes for practical applications. The nanocomposites studied here were synthesized by first functionalizing the hydroxyl groups of the cellulose in cotton through an esterification reaction with benzoyl chloride. The benzyl group was used to bind the nanotubes to the cotton via pi-pi stacking.

Funding Source: Department of Agriculture

Recommended Citation:
Melendez, Joshua; Padilla, Julio; Noveron, Juan. "Carbo nanotubes-Cotton: The Treatment of Water contaminated with organic molecules through electrochemistry." (2016). COURI Symposium Abstracts, Spring 2016, ID= 820

Design and Testing of Hybrid Composite Materials for Cryogenic Fuel Tanks

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Cryogenic fuel tanks carry and store cryogenic propellants (oxygen, methane, hydrogen) at subfreezing temperatures in order to generate highly combustible liquids. This tank is exposed to an extremely cold temperature in its interior and to ambient temperature on its external surface creating a large temperature gradient across the wall thickness. Hybrid textile composites with carbon-Kevlar® fabric are explored as means to reduce the thermal gradient effect and enhance the material performance under cryogenic conditions.

Previous studies indicated that carbon-Kevlar® textile composites are suitable materials for cryogenic temperatures (77 K). The pristine mechanical properties of carbon composites changed a maximum of 3-4% after cryogenic exposure, while ≈17% for Kevlar® composites. Computational models of hybrid carbon-Kevlar® composites were subjected to cryogenic temperature for extended periods to study the thermal gradient and optimize the design of layups. Six combinations were selected that resulted in low interface stresses and fewer number of peak stresses through the composite thickness. Subsequently, analysis of cryogenic exposure to one surface of hybrid composites was performed computationally to simulate the composite wall containing the liquid fuel.

Computational and experimental work was conducted to determine the optimum composite wall designs. An ABS plastic insulating holder was designed and 3D printed to hold the specimens such that only one surface is exposed to LN2. Eight composite layups were exposed to LN2 using the holder to study their response to thermal gradient cryogenic exposure. Based on the results obtained computationally and experimentally, optimum hybrid layups of composites for cryogenic exposure were determined.

Funding Source: HBCU/MI Department of Defense Basic Research Grant (Grant No.: W911NF-15-1-0430)

Recommended Citation:
Avila, Raudel; Islam, Md; Prabhakar, Pavana. "Design and Testing of Hybrid Composite Materials for Cryogenic Fuel Tanks" (2016). COURI Symposium Abstracts, Spring 2016, ID= 717

Chemoarchitecture of the rat hypothalamus: mapping of three peptidergic neuronal populations (α-MSH, nNOS, and MCH) in multiple animals

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The hypothalamus is a small but important structure located at the bottom of the brain. It participates in the control of homeostatic functions, including blood pressure, water balance, temperature, heart rate, breathing, sleep/wake cycles, feeding, and drinking; and reproductive behaviors (both sexuality and parenting), autonomic nervous system activity (including fight vs. flight behavior), and the release of a wide range of hormones from the pituitary gland (including reproductive hormones, growth hormone, thyroid-stimulating hormone, and stress hormones). The hypothalamus is implicated in many diseases, including hypopituitarism, polycystic ovary syndrome, hypo/hyperthyroidism, Cushing's disease, adrenal insufficiency, gigantism, precocious puberty, narcolepsy, depression, Alzheimer's, Huntington's, Parkinson's, and metabolic syndrome. Unraveling the hypothalamus' role in disease and designing therapeutic strategies will require a sophisticated knowledge of the intricate circuitry whereby the hypothalamus executes its tasks. Currently, studies investigating hypothalamic functionality are limited in their explanatory power by this lack of basic knowledge. Our goal is to begin to remedy this situation by creating a high-resolution map of chemical populations in the hypothalamus, akin to a Google Street Maps view of the hypothalamus. We have chosen three signaling molecules to begin with, and are mapping their distribution in 6 different rat brains, to the popular Swanson atlas. This allows our maps to be easily integrated with all data mapped to the same atlas, and permits an analysis of the individual variation in distribution, which has never before been attempted. Preliminary data show a surprising degree of variation between brains, further complicating the elucidation of a precise circuitry.

Recommended Citation:
Escapita, Alexa; Wells, Claire; Khan, Arshad. "Chemoarchitecture of the rat hypothalamus: mapping of three peptidergic neuronal populations (α-MSH, nNOS, and MCH) in multiple animals" (2016). COURI Symposium Abstracts, Spring 2016, ID= 794

Communities of Macroinvertebrates in the US Desert Southwest

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Aquatic macroinvertebrates live on, under, and around rocks and sediments on the bottom of lakes, rivers, and streams. These communities of macroinvertebrates are useful in monitoring biological systems because they may occupy an aquatic system long enough to reflect the chronic effects of pollutants, and respond acutely to changes in water quality. Research done in 2015 by Martell discovered that macroinvertebrate communities in West Texas and South Central New Mexico were structured by water availability; however he did not compare his results to others collected in the region. The goal of this project was to create a database of macroinvertebrate communities located in desert wetlands, springs, rivers and ponds throughout the northern Chihuahuan Desert, and to identify drivers of community composition. Preliminary results indicate that the most diverse site was Squaw Spring at UTEPs Indio Mountains Research Station, while the sites with the most sensitive EPT taxa were the coolwater streams in the Sacramento Mountains, NM. The most common orders observed were Coleptera, Diptera, Hemiptera and Odonata, which are active dispersers and able to leave an environment when living conditions deteriorate, such when water becomes scarce or more saline. These are conditions that could amplify with future predicted drought, amplifying the importance of baseline synoptic surveys such as these.

Recommended Citation:
Torres, Isabel; Martell, Ector; Lougheed, Vanessa; Walsh, Elizabeth. "Communities of Macroinvertebrates in the US Desert Southwest" (2016). COURI Symposium Abstracts, Spring 2016, ID= 789

Do voles affect carbon and nutrient cycling in arctic tundra?

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Microtine rodents (voles) are an abundant herbivore on the arctic tundra with a cycling population that results in large numbers of voles every 5-7 years. Through their feeding activities they have a large potential to affect carbon and nitrogen cycling, yet carbon models currently don't consider their activities. Our goal is to examine how vole herbivory on tussocks of vegetation impacts carbon and nutrient cycling in arctic tundra ecosystems. We sampled soil from the organic and mineral layers beneath Cottongrass tussocks which had been damaged by voles and those which had not and examined effects on soil nutrient availability, C to N ratios, and microbial exoenzyme activity. Organic soils, compared with mineral soils, had higher soil nutrient availability (ammonium and phosphate), microbial exoenzyme activity and soil microbial biomass. Overall, we found few effects of voles on soil properties particularly in the mineral soil layer. In the organic layer, there was no difference in either ammonium or phosphate availability between tussocks used by voles and those with no visible vole damage. Similarly, there were no differences in enzyme activity between vole and no-vole tussocks. There was a trend towards higher microbial biomass in vole modified soils as measured both by microbial biomass carbon and nitrogen. In the mineral soils, there were no effects of vole activity for available nutrients, microbial exoenzyme activity or soil microbial biomass. Despite the visible impact of voles on vegetation there were few effects on soil properties, perhaps due to the short time span of this study.

Funding Source: NSF, UTEP

Recommended Citation:
Morrow, Daniel; McLaren, Jennie. "Do voles affect carbon and nutrient cycling in arctic tundra?" (2016). COURI Symposium Abstracts, Spring 2016, ID= 745

Effects of Two Commercial Zinc Oxide Nanomaterials on Red Kidney Bean Seeds

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As the utilization of engineered nanomaterials in the commercial industry continues to increase, so does the interest of whether nanoparticles (NPs) and their respective properties can potentially harm the enviornment. This study evaluates the effects of two commercial ZnO NPs, Z-COTE and Z-COTE HP1 as well as bulk ZnO, and ZnCl2 on red kidney bean (Phaseolus vulgaris var. Red Hawk) plants in natural soil. Control plants as well as each compound baring four replicates at exposures of 62.5, 125, 250, and 500 mg/kg were evaluated after a ~100 day growth cycle for their mature seed yield, and nutrient composition. Macro and micronutrients were quantified using inductively couple plasma optical emission spectroscopy (ICP-OES), and ultraviolet visible spectroscopy (UV-Vis). The results indicate no statistical significance in the percentage of mature seeds produced when compared to controls for all treatments. The elemental composition in the mature seeds showed increased levels of Zn in the highest treatment while other nutrients including P, and Ni were also affected. The results did not show changes in the sugar and starch content when compared to controls.

Funding Source: USDA

Recommended Citation:
Dominguez, Osvaldo; Medina-Velo, Illya; Hernandez-Viezcas, Jose; Peralta-Videa, Jose; Gardea-Torresday, Jorge. "Effects of Two Commercial Zinc Oxide Nanomaterials on Red Kidney Bean Seeds" (2016). COURI Symposium Abstracts, Spring 2016, ID= 805

Evaluation of small molecule inhibitors of methionine aminopeptidase-1 on the murine model of cutaneous Leishmaniasis.

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The trypanosomatids of the genusLeishmania are the etiologic agents of Leishmaniasis, a neglected infectious disease that is caused by more than 20 species of the genus Leishmania. This disease presents a wide arrange of clinical manifestations ranging from ulcers in the skin to swelling of the spleen and liver. Currently, Leishmaniasis is present in more than 80 countries with approximately 4 million new cases every year. In addition, current treatments employed present high toxicity and minimal efficacy, clearly highlighting the urgency to develop new and better treatments for Leishmaniasis. Our study focuses on validating the antiparisitic activity of Leishmania major Methionine Aminopeptidase 1 (LmMetAP1) inhibitors OJT006, OJT007 and OJT008 as chemotherapeutic agents in the murine model of cutaneous Leishmaniasis and to assess the biochemical and molecular characterization of the enzymatic activity of LmMetAP1 in order to identify the type of inhibition induced by the OJTs inhibitors. LmMetAP1 catalyzes the removal of the N-terminal methionine residue of synthesized peptides and proteins. Disruption of LmMetAP1, caused by the binding of cobalt ion, induces improper protein folding, post-translational modifications, and translocation of newly synthesized proteins. Furthermore, previous studies conducted using aminopeptidases have shown promising results against malaria and tuberculosis. In order to assess the enzymatic activity and validate LmMetAP1 as a chemotherapeutic target, we amplified the gene by PCR and cloned into the expression vector pRSET A. Transformation, expression and purification by affinity chromatography and dialysis of the LmMetAP1 was carried out.

Funding Source: VPSA On-Campus Student Employment Opportunity Program

Recommended Citation:
Manriquez, Claudia; Iniguez, Eva; Maldonado, Rosa. "Evaluation of small molecule inhibitors of methionine aminopeptidase-1 on the murine model of cutaneous Leishmaniasis." (2016). COURI Symposium Abstracts, Spring 2016, ID= 774

Genomic characterization of a newly isolated arthrobacteriophage, Nahla

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Arthrobacter is typically found in humid environments; therefore we compared the frequency of these phages in two geographically close areas that drastically differ in climate. Fifty soil samples were harvested in El Paso, located in the Chihuahuan desert, and five soil samples in Cloudcroft, which is part of the Lincoln National Forest, and assayed for phage activity. Importantly, none of the samples collected in El Paso were positive however one from Cloudcroft exhibited potent phage activity. The absence of Arthrobacteriophages in El Paso area, although expected, is in marked contrast with the high frequency of Mycobacteriophages reported in this area by other phage hunter groups from our University.

Eight independent phages isolates were obtained from the positive sample by multiple rounds of plaque purification and subjected to electron microscopy analysis and DNA restriction fingerprinting. Based on this characterization, two independent groups of phages were identified and one phage representative of each group was sequenced and annotated. Here we describe phage Nahla. Capsid morphology identifies it as a member of the Siphoviridae, and its genome is circularly permuted with defined ends and a series of reversely oriented genes at the 3' end. Initial BLAST comparisons to known phage genomes reveal that Nahla is a class AO1 Arthrobacterium phage. There are currently only four other examples of this phage subclass. Analysis using Glimmer and GeneMark identified 72 protein coding genes and no tRNA genes. A gene was inserted at gene number 56 for a total of 73 protein coding genes.

Funding Source: UTEP/HHMI

Recommended Citation:
Ontivero, Carlos; Torres, Grecia; Llano, Manuel. "Genomic characterization of a newly isolated arthrobacteriophage, Nahla" (2016). COURI Symposium Abstracts, Spring 2016, ID= 803

Genomic characterization of a newly isolated arthrobacteriophage, Piccoletto

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Arthrobacter is typically found in humid environments; therefore we compared the frequency of these phages in two geographically close areas that drastically differ in climate. Fifty soil samples were harvested in El Paso, located in the Chihuahuan desert, and five soil samples in Cloudcroft, which is part of the Lincoln National Forest, and assayed for phage activity. Importantly, none of the samples collected in El Paso were positive however one from Cloudcroft exhibited potent phage activity. The absence of Arthrobacteriophages in El Paso area, although expected, is in marked contrast with the high frequency of Mycobacteriophages reported in this area by other phage hunter groups from our University.

Eight independent phages isolates were obtained from the positive sample by multiple rounds of plaque purification and subjected to electron microscopy analysis and DNA restriction fingerprinting. Based on this characterization, two independent groups of phages were identified and one phage representative of each group was sequenced and annotated. Here we describe phage Piccoletto. Capsid morphology identifies it as a member of the Myoviridae, and its genome is circularly permuted with defined ends and a series of reversely oriented genes at the 3' end. Initial BLAST comparisons to known phage genomes reveal that Piccoletto is a class AO1 Arthrobacterium phage. There are currently only four other examples of this phage subclass. Analysis using Glimmer and GeneMark identified 73 protein coding genes and no tRNA genes.

Funding Source: UTEP/HHMI

Recommended Citation:
Sanchez, Brianna; Echeverri, Jose; Llano, Manuel. "Genomic characterization of a newly isolated arthrobacteriophage, Piccoletto" (2016). COURI Symposium Abstracts, Spring 2016, ID= 804

Immunoreactivity of the serotogenic nervous system of the colonial rotifer

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Reconstruction of invertebrate nervous structures are important when evaluating and understanding architecture and development of all taxa. Gnesiotrochan rotifers encompass unique body plans and simple organ systems, while exhibiting numerous morphologies and feeding behaviors that may be associated with the nervous system. In this study, we use immunohistochemistry in order to evaluate the neural structures of the rotifer species Lacinularia flosculosaas it undergoes indirect metamorphosis from a motile larva into a sessile adult. Specifically we used primary polyclonal anti-serotonin antibodies, and secondary polyclonal anti-rabbit IGg antibodies in order to visualize the serotonergic neurons in larval stages of L. flosculosa to help provide an evaluation of neurological structures. Identifiable structures in all larvae processed (n = 3) included the cerebral ganglion (brain) and lateral neurites. However, neural features of adult L. flosculosahave yet to be determined and compared. Once evaluated we expect to find some differences as well as similarities in neural features based on the development of feeding behavior, the corona of adults, and differences in mobility. These results may provide insights to metamorphic processes of invertebrates during development.

Funding Source: NSF DEB 1257068

Recommended Citation:
Walsmith, Robert; Preza, Elizabeth ; Walsh, Elizabeth. "Immunoreactivity of the serotogenic nervous system of the colonial rotifer " (2016). COURI Symposium Abstracts, Spring 2016, ID= 772

Impacts of temperature and human development on zooplankton communities in Arctic tundra ponds.

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Warming and human impacts are important drivers in changing Arctic fresh water ecosystems. Near Barrow, AK, a high percentage of the total land area is covered by ponds and lakes, which thaw every summer leaving only a few months for reproduction and growth of living organisms. Studying zooplankton community composition and their densities in these ponds can help us understand the impacts of urbanization and climate change in zooplankton. Our study includes ponds in four different regions at different distances from the city of Barrow, AK, one located within the city with direct human enrichment (UTIQ); two relatively nutrient poor sites (IBP-X, WL-3); and a nutrient rich thermokarst pond, impacted by permafrost thaw and soil slumping (TK-2). All ponds were sampled in late summer (2010-2013). It was predicted that the nutrient rich ponds will have greater species density. The results show that the TK-2 pond, which is nutrient-rich, had the highest zooplankton densities but lowest species diversity. Pond WL-3 showed the highest species diversity but low density compared with thermokarst. Pond IBP-X, which is nutrient-poor, was mainly composed of Daphnia middendorffiana, and pond UTIQ showed a high density of Diaptomus spp. only in the year 2012. Every pond showed a unique density and diversity of organisms. Overall results indicate that an increase in nutrient inputs may result in an increase in zooplankton production, which could have important implications on predator densities.

Recommended Citation:
Garcia Gamboa, Maryflor; Vargas, Mariana; Lougheed, Vanessa. "Impacts of temperature and human development on zooplankton communities in Arctic tundra ponds. " (2016). COURI Symposium Abstracts, Spring 2016, ID= 737

MALDI-TOF-MS Approaches to Identify Neotropical mosquito vectors of Human Plasmodium

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Mosquitoes are important vectors of human pathogens worldwide. One of the possible causes of the resurgence of malaria is a change in species composition of mosquito vector because of demographic changes and climate disturbances that have occurred in the country during the last decades. There are some studies to solve the problem of species identification, such as the morphology and DNA barcode, but there is a need to find and develop new tools to quickly and accurately identify mosquitoes. For this kind of experiment we used one of the most innovative tools in science the Matrix – Assisted Laser Desorption Ionization Time of Flight mass spectrometry (MALDI-TOF-MS) is a technique that allows the ionization of complex molecules, such as proteins, peptides, nucleic acid, among many others. The study aims were be the first ones in the neotropic to work with the MALDI and the mosquito vectors of human Plasmodium. Another study aim was to set a protocol for different type of insects. Results showed that the use of the middle leg of the mosquito will give us the spectra needed, and we will be able to save the rest of the mosquito for other type of studies. This study also demonstrated that protein profiles allow to discriminate between the vector species of the human malaria. This study is the base for future taxonomic studies, which will help to create a database for the quickly identification of mosquitoes.

Funding Source: National Institute on Minority Health & Health Disparities (NIMHD), part of the National Institute

Recommended Citation:
Cervantes, Norma; Loaiza, Jose. "MALDI-TOF-MS Approaches to Identify Neotropical mosquito vectors of Human Plasmodium" (2016). COURI Symposium Abstracts, Spring 2016, ID= 731

Measuring CO2 and CH4 Flux in Different Habitat Types of Natural Wetlands

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Despite the vast research on natural wetlands most studies on carbon dioxide (CO_2) and methane (CH_4) concentrations and flux are from marshlands and peatlands. Few studies have looked at and compared multiple habitat types such as lakes, rivers, ponds and vegetation in ponds, so little is known in the difference of the magnitude flux among these habitat types. In order to see if a difference is observed among these four different habitat types, an INNOVA photo-acoustic sensor attached to a closed floating chamber was used to gather readings of CO_2 and CH_4 from sites near Barrow, AK Alaska during the last week of July and the first weeks of August, 2015. All data were collected at 1-minute time steps over a 30-minute period, with change in gas concentrations through time used to calculate flux. We also aimed to determine the relationship between $CO_2$and CH_4 flux, as well as the appropriate time step to sample $CO_2$and CH_4in these Arctic aquatic systems. Preliminary results indicate high variability within CH_4 fluxes, and CO_2 indicates stability.

Recommended Citation:
Ronquillo, Rocio; Tweedie, Craig; Lougheed, Vanessa. "Measuring CO2 and CH4 Flux in Different Habitat Types of Natural Wetlands" (2016). COURI Symposium Abstracts, Spring 2016, ID= 783

Method Development for the Analysis of Bisphenol A (BPA) in Milk

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Endocrine Disrupting Chemicals (EDCs), such as Bisphenol A (BPA), have raised a great concern among the scientific community due to their ability to imitate human hormones and cause health and developmental issues in infants. BPA is commonly detected in food such as milk and breast milk which is the main food source for infants. To ensure infant welfare, it is important to monitor BPA and other EDCs in milk. There are different methods to detect BPA in milk and breast milk; however these methods are tedious and require the use of organic solvents. The objective of the project was to develop a simple and sensitive method for analyzing BPA in milk using a solventless sample preparation technique called stir-bar sorptive extraction (SBSE) coupled with Thermal Desorption/Gas Chromatography/Mass Spectrometry. Since BPA has high affinity to the lipids in milk, the extraction of BPA is hindered. We hypothesized that the lipid contents in milk can be hydrolyzed by acid or base and that made BPA in milk to be released into the aqueous portion of milk, and be extracted from the matrix more effectively. Other factors, such as hydrolysis time and EDTA addition on the recovery of BPA in water and milk were also investigated. The result showed that BPA recovery from milk increased under two-hour sonication in basic conditions while the addition of EDTA does not enhance the recovery of BPA. This method will be further tested for the analysis of BPA in breast milk samples.

Funding Source: TIERA

Recommended Citation:
Encerrado, Angela; Lee, Wen-Yee. "Method Development for the Analysis of Bisphenol A (BPA) in Milk" (2016). COURI Symposium Abstracts, Spring 2016, ID= 728

Nicotine exposure involves the alteration of Gβγ-cytoskeletal dependent pathway and neurite outgrowth.

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Background:Nicotine is the main addictive agent in tobacco. Nicotine has been connected to mood altering effects in brain which temporarily has the rewarding effect that leads to nicotine dependence. However, the underlying molecular mechanism of nicotine addiction is not well understood. Previous studies from our laboratory indicate that Gβγ (an important component of the G-protein signaling pathway) is involved in the regulation of microtubule (MT) assembly, and the induction of neurite outgrowth. Research Goal:The goal of the present study is to determine if nicotine interferes with Gβγ-cytoskeletal mediated pathway and modulate neurite outgrowth. Methods:Experiments were conducted in PC12 cells (a model cell line to study neuronal differentiation) and primary neurons in culture from rat brain. PC12 cells were treated with Nerve Growth Factor (NGF) for two days to induce neuronal differentiation followed by chronic treatment (24h) with 5μM and 10μM nicotine. Samples were subsequently subjected to whole cell lysis followed by immunoblotting, as well as confocal microscopy. Primary cortical neurons in culture were treated with 0.1-50μM of nicotine followed by confocal microscopy. Results and discussion: We found that the expression of tubulin was decreased by ~43% in the presence of 5μM and 10μM nicotine. Gβ expression was also slightly decreased 14.8% and 17.2% by 5μM and 10μM nicotine respectively. Confocal microscopic analysis indicates that in vitro nicotine exposure reduced neurite length in NGF-differentiated PC12 cells by 22%. Confocal microscopic examination of cortical primary neurons is currently underway to determine the possible morphological changes following nicotine exposure.

Recommended Citation:
Ramirez, Mireya; Miranda, Manuel; Roychowdhury, Sukla. "Nicotine exposure involves the alteration of Gβγ-cytoskeletal dependent pathway and neurite outgrowth. " (2016). COURI Symposium Abstracts, Spring 2016, ID= 775

Presence of LRV1 in Leishmania guyanensis and Leishmania panamensis strains from patients with cutaneous leishmaniasis in Panama City, Panama.

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Background: Leishmaniasis is an important infectious disease endemic in 98 countries with a prevalence of 12 million cases of infection and 350 million people living at risk. It is caused by a protozoan parasite, Leishmania, which is transmitted to vertebrates, by the bite of female sandflies. Some studies have found an association between a high burden of an RNA virus infecting Leishmania and the severity of the infection. This particular study will focus in the detection of LRV1 in L. guyanensisand L. panamensis strains from patients with cutaneous leishmaniasis from the leishmaniasis clinic at the ICGES.
Methods: Patients in the study were selected based on a positive diagnostic for cutaneous leishmaniasis. A total of 30 strains were analyzed for the detection of LRV1. The study is divided into two phases. During phase I, RNA extraction of 24 samples was made using Trizol, followed by a one step-RT-PCR, electrophoresis and sequencing. For phase II, 13 samples were grown in Schneider medium from which 6 continued the process of RNA extraction using QIAamp Viral RNA MiniKit (QIAGEN), RT, PCR, and electrophoresis. Results: A total of 7 samples of L. panamensis and 1 sample of L. guyanensis gave an identity with LRV1 above 90%. Conclusions: More time would be needed to effectively work on a bigger fragment and to standardize the methodology. The Gorgas Institute is currently working on this, but if their results support our conclusions, this would be the first report of Leishmania virus in a L. panamensis strain.

Funding Source: NIMHD MHIRT Program

Recommended Citation:
Komiyama, Diana; Sosa, Nestor. "Presence of LRV1 in Leishmania guyanensis and Leishmania panamensis strains from patients with cutaneous leishmaniasis in Panama City, Panama." (2016). COURI Symposium Abstracts, Spring 2016, ID= 729

Presence of microbial indicators of pollution and susceptibility pattern of antibiotics of the wastewater treatment plant of Las Palmas, Ciudad Colon, Costa Rica

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Water is essential to life. Water is the most important of all compounds and one of the main constituents of living matter. However, its availability is not universal, since more than 750 million people worldwide do not have access to potable water. The term wastewater defines a type of water, including sewage and contaminated that contain detergents, industrial waste, toxic substances among other things. Contaminated water is one of the pathways of transmission of diseases, generating outbreaks that can affect a million people in a short period of time. The most common and useful indicators of water quality regarding the presence of human pathogens are the fecal and total coliforms. The purpose of this study is to review the efficiency of the wastewater treatment plant in Las Palmas Residential Boulevard in the district of Colon, San José, Costa Rica. The Most Probable Number was used to analyze the presence of fecal coliforms and E. coli. A double layer agar technique was used to analyze the coli-phages in the water quality since phages can be detected in larger volumes of water and may serve a valuable role as indicator of the sanitary quality of water. Finally, the Kirby- Bauertechnique was used to determine the sensibility or resistance of a microbial agent to an antibiotic.

Funding Source: National Institute on Minority Health & Health Disparities (NIMHD), UTEP MHIRT Program

Recommended Citation:
Arciniega, Alexandra; Chacón Jiménez, Luz María. "Presence of microbial indicators of pollution and susceptibility pattern of antibiotics of the wastewater treatment plant of Las Palmas, Ciudad Colon, Costa Rica" (2016). COURI Symposium Abstracts, Spring 2016, ID= 725

Remediation of Water Using Magnetic Metal-Organic Frameworks with Boron Nitride Nanosheets

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The continuous growth in the population of the earth has caused a great demand of energy and food sources, this has also caused a rapid increase of pollutants in the environment. The removal of contaminants such as heavy metals and toxic organic chemicals from water sources is critical due to its continuous need around the world. The development of nano-technology, such as iron magnetic nanoparticles, has been reported as a potential solution for this problem. The use of iron magnetic nanoparticles gave rise to the utility of magnetic nanoparticles as a new generation of cost-effective nanomaterials for contaminated water. Because of this, a novel series of nanocomposites based on iron oxide (Fe_3O_4) magnetic nanoparticles, boron nitride nanosheets and metal-organic frameworks of the type $M_3(BTC)_2$(where M = Cu, Zn, Co, Ni; BTC = 1,3,5-benzenetricarboxylate) were synthesized and tested for their ability to adsorb and remove hazardous materials from aqueous solutions. The nanocomposites were tested for adsorption capacity and uptake time at different concentrations. To illustrate the potential and garner fundamental insight of this frameworks we used Transmission Electron Microscopy, Scanning Electron Microscopy, Powder X-Ray Diffraction, Infrared Spectroscopy, Thermogravimetric Analysis and BET surface area analysis.

Funding Source: National Science Foundation

Recommended Citation:
Arrieta, Roy; Ventura, Karen; Villagrán, Dino. "Remediation of Water Using Magnetic Metal-Organic Frameworks with Boron Nitride Nanosheets" (2016). COURI Symposium Abstracts, Spring 2016, ID= 771

Seasonality of phosphorus availability in Arctic Tundra soils.

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In recent years, temperatures in the Arctic are increasing due to global warming. This is likely to cause an increase in phosphorus, one of the limiting nutrients for plant growth in the Arctic. Nutrient availability is not constant throughout the growing season, and links between the timing of nutrient release and the timing of plant growth may affect ecosystem functioning. In this study we examined the seasonality of phosphorus availability under high and low nutrient conditions. We collected soil water weekly from fertilized and control plots from a chronosequence of fertilization experiments, fertilized since 1989, 1996, or 2006 and tested for phosphate concentration. In the control plots phosphate was highest at soil thaw, but immediately decreased and stayed at low concentrations for the rest of the growing season. We attribute early high concentrations to microbial turnover at thaw. Across all experiments, on average, fertilized plots had higher levels of phosphate than control plots. In the longest fertilized plots, phosphate levels remained high throughout the season, likely due to oversaturation of these plots with nutrients. In more recently fertilized plots, phosphorus levels decreased mid-growing season, indicating increased phosphorus uptake by plants in these plots. Increased nutrients due to global warming could change this seasonal pattern of phosphorus availability resulting in a potential discrepancy between the timing of nutrient availability and the timing of the nutrient needs of the plants.

Funding Source: UTEP -Start up funds, National Science Foundation

Recommended Citation:
Aguirre, Daniela; McLaren, Jennie. "Seasonality of phosphorus availability in Arctic Tundra soils." (2016). COURI Symposium Abstracts, Spring 2016, ID= 723

Synthesis and Characterization of an Electron Rich Guanidinate System

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In our group, we have been investigating the design and synthesis of new guanidinate $[(R_2N)C(NR')_2]^-$ and imidazolin-2-iminato (Im^RN-) ligands. These ligands are of particular interest to us as they are highly modular, easily synthesized, and excellent electron-donors. Recently, we have succeeded in combining the two ligand systems by appending an Im^RN-group onto a guanidinate scaffold to give the imidazolin-2-iminato guanidinate $[Li(THF)_2][(Im^{tBu}N)C(Ndipp)_2]$ (1) in good yields. In an effort to quantify the electron donating abilities of 1, we synthesized the iron(II) complex $[(Im^{tBu}N)C(Ndipp)_2]FeBr]_2$(2) and investigated its electrochemical properties using cyclic voltammetry. Comparison of 2to related iron systems shows 1to be a competent electron donor. These results and future directions in ligand design, including the synthesis of a "super bulky" imidazolin-2-iminato, will be presented.

Recommended Citation:
Barrea, Omar; Castillo, Maximiliano; Fortier, Adrian. "Synthesis and Characterization of an Electron Rich Guanidinate System" (2016). COURI Symposium Abstracts, Spring 2016, ID= 754

Synthesis and Characterization of Molybdenum Bimetallic Complexes with Non-Symmetric Formamidinate Ligands

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Mixed-valence systems consist of a multimetallic complex where two or more metal centers present different oxidation states.These systems can be manipulated to affect the selectivity of the molecule, thus, allowing their use in redox catalysis for small molecule activation (e.g. CH_4, NH_3, H_2O). The ease of functionalization and stablished electrochemical properties of quadruply bonded dimolybdenum compounds make them suitable to enhance the formation of such systems. Moreover, the non-symmetrical: N-(3-methoxyphenyl)-N'-(4-methoxyphenyl) formamidine, N-(4-Chlorophenyl)-N'-(2,6-diiso propylphenyl) formamidine, N-(2,6-Diisopropyl phenyl)-N'-(3-methoxyphenyl) formamidine, and N-(2,6-Diisopropylphenyl)-N'-(2,4,6-trimethyl phenyl) formamidine will be used as structural ligands. It is proposed that the lack of symmetry in these ligands will disturb the electronic properties of the bimetallic system due to the different substituents in the phenyl ring. Both ligands and bimetallic complexes were synthesized and characterized by Nuclear Magnetic Resonance, Liquid Chromatography/Mass Spectrometry, UV-Vis Spectroscopy, and X-Ray crystallography. Electrochemical techniques (e.g. Cyclic Voltammetry) were used to study the electronic properties of these mixed-valence systems. The compounds m,p- DAniF, m-ADF, Mo_2(m,p-DAniF)$_4$ and Mo_2(m-ADF)$_4$ have been synthetized and properly characterized.

Funding Source: COURI

Recommended Citation:
Cervantes-Martínez, Iván; Villagrán, Dino; Rodríguez, Nancy; Villagrán, Dino. "Synthesis and Characterization of Molybdenum Bimetallic Complexes with Non-Symmetric Formamidinate Ligands" (2016). COURI Symposium Abstracts, Spring 2016, ID= 787

Synthesis of antimicrobial photoactive nanomaterials from phenyl-C61- butyric acid methyl ester and decylpyridinium bromide

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Photoactivated nanomaterials with antimicrobial properties can be implemented in various fields including water treatment, food safety, and photoactivated medicines. In this project, phenyl-C_{61}-butyic acid methyl ester (PCBM), a compound used in organic solar cells due to its photoreactive formation of highly reducing compounds, and decylpyridinium bromide were used to form PCBM encapsulated micelle emulsions in water.

Nanoscale aggregates of PCBM and decylpyridinium bromide were formed in water by the reverse emulsion method. It was observed that nanoaggregates of PCBM formed only in the presence of decylpyridinium bromide surfactant. Atomic Force Microscopy (AFM) revealed the formation of spherical monodispersed micelles of 10 nm in diameter. UV-vis optical absorption measurements and dynamic light scattering (DLS) were carried out for further characterization of the nanoaggregates.

PCBM nanoaggregates in water, formed with the help of decylpyridinium bromide surfactant, were found to exhibit antimicrobial activities. This experiment revealed that the nanocomposites exhibit antibacterial properties against E. coli and S. aureus, with a stronger effect against the S. aureus bacteria.

Pyridinium halides like quaternary bromine salts have antimicrobial properties and absorption properties on negatively charged solids. Futhermore, under light exposure, PCBM can be highly toxic and is an efficient singlet oxygen sensitizer. Under UV-visible irradiation and in the presence of O_2, PCBM solutions can be highly toxic through reactive oxygen species formation. Synthesized PCBM nanoaggregates were tested for antimicrobial activity in the presence and absence of visible light exposure.

Funding Source: USDA-NIFA, NSF PREM, NSF, NSF NEWT

Recommended Citation:
Alvarado, Daisy; Mena, Matthew; Islam, Tariqul; Dominguez, Delfina; Noveron, Juan. "Synthesis of antimicrobial photoactive nanomaterials from phenyl-C61- butyric acid methyl ester and decylpyridinium bromide " (2016). COURI Symposium Abstracts, Spring 2016, ID= 744

Synthesis of Fullerene Derivatives for Use in Perovskite Solar Cells

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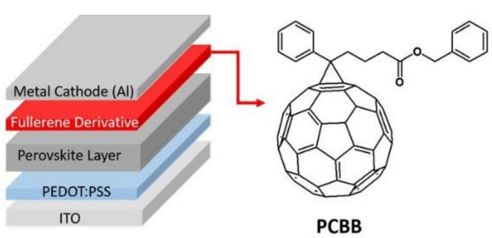
Solar energy harvesting technologies are one of the 20th century's most important discoveries. From solar farms to the International Space Station, photovoltaic cells have been used to power all sorts of devices. Commercial solar harvesting technologies, or photovoltaics, require expensive materials, most commonly silicon, and complicated production methods. The goal of this project is to synthesize novel fullerene materials to be used in hybrid perovskite cells. Fullerenes and their derivatives are of interest in perovskite solar cell research since they exhibit efficient electron transport capabilities when used in a solar cell. This allows the cell to yield relatively high efficiencies. The fullerene derivative molecules were synthesized using cyclopropanation and 1,3-dipolar cycloaddition reactions under reflux conditions. These compounds are expected to lead to high solar conversion efficiency when used in perovskite solar cell devices.



Funding Source: NSF

Recommended Citation:
Betancourt, German; Echegoyen, Dr. Luis; Tian, Chengbo; Echegoyen, Luis. "Synthesis of Fullerene Derivatives for Use in Perovskite Solar Cells" (2016). COURI Symposium Abstracts, Spring 2016, ID= 778

Synthesis, Characterization, and Reactivity of Bimetallic W2^n Complexes, (n=0,4,6)

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The electronic configuration of group six elements is suitable to the formation of bimetallic complexes with a high bond order. Thus, the chemistry of dichromium and dimolybdenum (Cr_2, Mo_2) complexes is very rich spanning oxidation states of 4+, 5+, or 6+ and hundreds of different complexes. On the other hand, the chemistry of ditungsten (W_2) complexes is modest, in part, because of its more difficult synthetic pathways and increased reactivity. Carboxylates, formamidinates, and guanidinates have been successful ligands used to synthesize bimetallic complexes. Among them, guanidinates have been the focus of interest due to their high basicity which allows them to stabilize M_2units with high oxidation states. In this study we present the synthesis and characterization of two tungsten complexes with cores spanning from W_2^0 to W_2^{6+} coordinated with guanidinates and formamidinates. The reactivity for the highly reduced W_2^0 is also studied. Characterization includes electrochemical measurements, NMR spectroscopy, UV-Vis spectroscopy, and raman spectroscopy.

Funding Source: National Institute of Health

Recommended Citation:
Prat, Jacob; Ventura, Karen; Villagran, Dino. "Synthesis, Characterization, and Reactivity of Bimetallic W2^n Complexes, (n=0,4,6)" (2016). COURI Symposium Abstracts, Spring 2016, ID= 802

Tagging of endogenous cell division genes in Giardia intestinalis

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The tetraploid protozoan Giardia intestinalisis a parasite affecting predominantly developing countries. Infection by Giardia can result in giardiasis, a largely ignored, acute and chronic intestinal disease. Giardiasis reduces the quality of life and can result in death in some cases, primarily in children due to diarrheal dehydration. Studying Giardia's biology and pathogenicity will increase our understanding of this disease and potentially identify new treatment. Giardia has been studied from an infectious and immunological perspective, but little is known about the biology of this parasite. Giardia is evolutionarily distant from any other species and has several unique characteristics, including the presence of two nuclei rather than one. Studying how the organism synchronously divides both of its nuclei can help us understand its reproduction patterns . This unusual characteristic complicates the already complex process of chromosome segregation during mitosis, since Giardia must accurately segregate not one but two sets of chromosomes. This process is tightly regulated by a safety mechanism called the spindle checkpoint, which ensures that all chromosomes are correctly captured before allowing the cell to initiate chromosome segregation. However, very little is known about this process in Giardia. MAD2, is an essential spindle checkpoint protein required to arrest sister chromatid segregation from metaphase to anaphase. To further study the role of Mad2 we will tag the endogenous gene through homologous recombination with a triple Hemagglutinin tag [3 HA] or a triple Myc [3 Myc] tag. The tagged proteins will allow us to analyze Mad2 expression and localization.

Funding Source: RISE, NIH

Recommended Citation:
Gonzalez, Pavel; Salazar, Christiancel; Diaz-Martinez, Laura; Das, Siddhartha ; Diaz-Martinez, Laura. "Tagging of endogenous cell division genes in Giardia intestinalis" (2016). COURI Symposium Abstracts, Spring 2016, ID= 753

Towards New Generation of Lithium Batteries via MoS2-Graphene nanocomposites

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The increase in global demand for high performance portable electronics, along with the simultaneous search for substitution of current combustion engines with electric vehicles has driven extensive research towards finding high density energy sources. Li-ion batteries (LIBs) have attracted great attention due to their great potential to meet these high energy requirements. Current commercially available Li-ion batteries are made from $LiCoO_2$ as the cathode material and graphite as the anode. However, these LIBs have been demonstrated to be limited by the inherent low energy density of graphite (372 mAh/g). Thus, a new solution is needed which could increase the energy density of the anode material. Our molecular design for the anode material consists on functionalizing graphene with nitrogen and sulfur sites, then using those to anchor MoS_2 nanostructures via chemical bonds. This design improves Li-ion batteries by increasing the energy density of MoS_2, as well as the charging/discharging cyclability. We will present XRD, TEM, SEM, Raman Spectroscopy analysis and electrochemical measurements of these anode materials.

Recommended Citation:
Garcia, Jacobo; Dominguez, Noemi; Lin, Yirong ; Chianelli, Russell ; Noveron, Juan. "Towards New Generation of Lithium Batteries via MoS2-Graphene nanocomposites" (2016). COURI Symposium Abstracts, Spring 2016, ID= 790

Towards photoactive antimicrobial fabrics via gold-titanium oxide nanocomposites supported on cotton textiles to sterilize water used in livestock

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Across the world, livestock are exposed to soil bacteria that may include infectious pathogens and spread them out to other animals when they drink water from draft containers. These bacteria multiply exponentially through the digestive tract and can continue to multiply in untreated manure, which is used as fertilizer in crops, thus spreading infectious bacteria in agriculture. Stopping bacteria growth in the water drafts of livestock will inhibit this cycle. We are developing a titanium oxide-gold nanoparticle composite bonded on a solid-support that will photocatalyze the conversion of oxygen to peroxides upon exposure to visible light. The gold nanoparticles with the titanium dioxide allows the composite to absorb in the visible light range, allowing for reactive oxygen species to be generated by exposure to the sunlight. The gold-titanium dioxide composite will be supported on cotton textiles with high surface area. In addition, cationic species are bound to the cotton, which draws negatively charged bacteria towards the reactive oxygen species. We will present scanning electron microscope images of the cotton impregnated with the gold-titanium dioxide nanoparticle composite. We will demonstrate that these nanoparticles coated cotton textiles will have antimicrobial activity through the generation of reactive oxygen species. Finally, we will demonstrate that these textiles can be used repeatedly and that reactive oxygen species generation is not greatly diminished with repeated usage.

Funding Source: USDA, NSF NEWT

Recommended Citation:
Smith, Jonathan; Hernandez, Cesar; Mena, Matthew; Alvarado, Daisy; Zambrana, Raul; Barrera, Luis; Noveron, Juan. "Towards photoactive antimicrobial fabrics via gold-titanium oxide nanocomposites supported on cotton textiles to sterilize water used in livestock " (2016). COURI Symposium Abstracts, Spring 2016, ID= 776

Transgenerational effects of chronic alcohol exposure

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Alcoholism is a major medical and social problem and is influenced by genetic, social and environmental factors. Chronic alcohol consumption can trigger homeostatic adaptations in the brain such as the development of tolerance and dependence. Ethanol, a major form of alcohol in alcoholic beverages, not only modifies the brain by disrupting neurotransmitter systems such as GABA, glutamate and dopamine but it also affects gene expression that contributes to addiction. The aim of this study is to clarify whether the effects of chronic alcohol intake can be transmitted from a parent to offspring using Drosophilaas a model organism. When exposed to ethanol, flies exhibit various types of ethanol-induced behaviors including loss of motor coordination, sexual disinhibition and sedation as well as addiction-associated tolerance and sensitization. In order to measure initial sensitivity and tolerance development, male flies were transferred into plastic containers with clear tops called Flypub and exposed for six consecutive days to ethanol vapor until sedation. On the seventh day flies were crossed with virgin females. Offspring (male and female) were then exposed for six consecutive days to ethanol to measure a sedation profile. Initial sensitivity and ethanol tolerance of the offspring of chronic ethanol-exposed and control parents will be compared. This will determine whether alcohol effects are inherited.

Funding Source: National Science Foundation via the S-STEM Program Award No. NSF DUE-1153832.

Recommended Citation:
Olivas, Idaly; Han, Kyung-An . "Transgenerational effects of chronic alcohol exposure " (2016). COURI Symposium Abstracts, Spring 2016, ID= 807

Tungsten and Cobalt Formamidinate Complexes as Potential Small Molecule Catalysts

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A novel $K^+W_2(MesF)_3^-$ complex with open coordination sites was synthesized by reaction of the bulky ligand HMesF (HMesF = bis-2,4,6-timethylphenyl formamidinate) with WCl_4 and KC_8 in a dry N_2 atmosphere. The UV-Vis of $K^+W_2(MesF)_3^-$ shows two absorption bands at 452 and 528 nm in THF. The ^{1}HNMR shows that $K^+W_2(MesF)_3^-$ is paramagnetic, seen by broadness in all signals. Similar reactions of another bulky ligand HDippF(DippF = bis-diisopropylphenyl formamidinate) with $CoCl_2$ yields the monometallic complex, $Co(MesF)_2MeCN$. $Co(MesF)_2MeCN$ was structuraly characterized by single crystal diffraction The crystal structure of $Co(MesF)_2MeCN$ reflects a mononuclear pseudo-square planar $Co^{II}(DippF)_2MeCN$ complex. Cyclic voltammetry was carried out to study the standard reduction potential of this complex. The voltammetry experiment shows three oxidation events at 0.019 , 0.701, and 1.26 V, and two reduction events at -2.7 and -2.997 V (vs. $Fc^{+/0}$). In UV-Visible absorption spectroscopy this complex shows three absorption bands at 576, 618, and 685 nm. We plan to explore the reactivity of these two compounds towards small molecules to produce molecules of energy concern.

Recommended Citation:
Aguirre Quintana, Luis; Ventura, Karen; Villagran, Dino. "Tungsten and Cobalt Formamidinate Complexes as Potential Small Molecule Catalysts" (2016). COURI Symposium Abstracts, Spring 2016, ID= 801

Understanding the role of p68 in the regulation of the androgen receptor

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Prostate cancer is the most common type of cancer among men and the second leading cause of death related to cancer. Since growth of prostate cancer cells is driven by the androgen receptor (AR), androgen ablation therapy is effective during the early stages of prostate cancer. However, after a period of time, the patient develops castration-resistant prostate cancer cells (CRPC), which are able to overcome androgen ablation therapies by activating the functional androgen receptor and its pathway through the transcriptional co-factor β-catenin. Research has shown that β-catenin interacts with p68 to activate AR controlled genes. Furthermore, our lab has demonstrated the interaction of the 52-kDa FK506-binding protein (FKBP52) with β-catenin to promote β-catenin interaction with AR resulting in the synergistic up-regulation of AR activity. Therefore, we hypothesize that a multi-protein complex is formed between p68, β-catenin and FKBP52 to potentiate the activity of the androgen receptor. Plasmid pCMV6-XL4 containing p68 was acquired and PCR amplified. After restriction digest using Xho I and Sma I, the gene insert and the yeast vector P423 GDP were ligated and introduced into E. colicells. Ligation of the insert p68 with the vector P423 GDP was unsuccessful. Upon further analysis it was concluded that vector P423 GDP ligated back on itself before allowing a successful ligation with p68. A reevaluation of the restriction enzymes used to perform the digestion of P423 GDP and pCMV6-XL4 will be performed. Our results do not support or refute our hypothesis due to a lack of sufficient data.

Recommended Citation:
Martinez, Rodrigo; Payan, Ashley; Cox, Marc. "Understanding the role of p68 in the regulation of the androgen receptor" (2016). COURI Symposium Abstracts, Spring 2016, ID= 758

Unraveling the function of serine-palmitoyltransferase in Giardia will make enteric parasite great again

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Giardiasis, caused by Giardia lamblia, is a major public health problem, worldwide. It is associated with poverty, poor hygiene, and lack of access to clean drinking water. Symptoms of giardiasis include watery diarrhea, irritable bowel syndrome, malnutrition, indigestion, gastric pain, and stunted growth in children. Although anti-giardial drugs such as metronidazole, albendazole, and nitazoxanide could be effective in controlling the infection, the incidence of drug-resistance giardiasis is on the rise and thus it is important to identify new molecular targets to develop effective anti-giardial therapies. Previously our laboratory has demonstrated that a majority of sphingolipids (SLs) are not synthesized by Giardia and acquired from the environment via endocytic pathways. We also reported that serine- palmitoyltransferase (SPT), a rate-limiting enzyme of SL biosynthesis is involved in regulating the clathrin-dependent endocytosis of ceramide, which is converted to glucosylceramide during encysation. The goal of the current experiment is to further characterize SPT (especially SPT2) in Giardia and test the possibility if SPT can be a target for drug development. For this, we will express the endogenous levels of SPT2 after adding a tag (3HA) at the C-terminus end of SPT2 using plasmids we have received from Dr. Alex Paradez of the University of Washington at Seattle. Tagging endogenous SPT2 will allow us to study its expression and localization at different morphological stages, and will also allow us to identify binding partners and thus identify potential novel members of the sphingolipid biosynthesis pathway.

Recommended Citation:
Salazar, Christiancel Joseph; Gonzalez, Pavel; Diaz-Martinez, Laura; Das, Siddharta. "Unraveling the function of serine-palmitoyltransferase in Giardia will make enteric parasite great again" (2016). COURI Symposium Abstracts, Spring 2016, ID= 766

Vole effects on soil nutrient availability in Alaskan Tundra

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In the Tundra, rodents (like voles) are important consumers of vegetation and play a strong role in determining nutrient levels. Vole activities, such as feeding and haying, can change plant biomass, and therefore soil nutrient availability. We hypothesized that vole activity in arctic tundra affects soil nutrient availability. We sampled both organic and mineral soil from plots in moist acidic tundra in northern Alaska in which voles were present, and those that had no vole activity (fenced) for 19 years. Soils were examined using colormetric microplate procedures to determine soil nutrient availability including ammonium, nitrate and phosphate. Soil properties did differ between soil layers, with higher levels of available nutrients and soil microbial biomass in upper organic soils than deeper mineral soils. There were few effects of voles, however, on soil nutrient availability. Plots without vole activity tended to have higher ammonium availability in all soil layers, and higher nitrate availability in deeper layers, but no effects on phosphorus. There were also few effects of voles on soil microbial biomass, although microbial biomass nitrogen did tend to increase with vole presence in deeper soil layers. We suggest that lower nutrient availability with vole activity may be due to increased uptake by plants recovering from vole damage, or to shifts in plant composition with vole activity. Although effects of voles on nutrients were few, these results suggest the potential for voles to impact biogeochemical cycling in tundra soils over the long term.

Funding Source: UTEP

Recommended Citation:
Alfaro, Jacqueline; McLaren, Jennie. "Vole effects on soil nutrient availability in Alaskan Tundra" (2016). COURI Symposium Abstracts, Spring 2016, ID= 770

Physics, Geology and Environmental Sciences Abstracts

Deriving the Maxwell Equations in Dense Quark Matter with a Density Wave Condensate in a Magnetic Field

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Starting from the Lagrangian of dense quark matter in the presence of an external magnetic field and with a density-wave chiral condensate, we dervie the Euler-Lagrange equation for the Maxwell field. Using relativistic tensor algebra and calculus of variations we demonstrate that the Maxwell equations for this system correspond to those of the so-called axion electrodynamics, thus they are similar to those describing novel materials as topological insulators and Weyl semimetals.

Recommended Citation:
Hodson, Erin; Vallejo, Kevin; Williams, Jeffery; Incera, Vivian. "Deriving the Maxwell Equations in Dense Quark Matter with a Density Wave Condensate in a Magnetic Field" (2016). COURI Symposium Abstracts, Spring 2016, ID= 808

Effects of Copper Nanoparticles in Zucchini

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The impact of metal nanoparticles (NPs) on agriculture is still not well understood. Although, nanotechnology is being experimented as an option to enhance agricultural production, concerns have been raised about its potential adverse effects. In this study, the effects of four different copper compounds (Cu NPs, CuO NPs, CuO, commercial Cu(OH)2) on Zucchini (Cucurbita pepo) were investigated. A three-week long experiment was conducted using five different treatments, including control, at two different concentrations (50 and 200 ppm). Copper concentration in roots, stems and leaves were determined by Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES). Chlorophyll content was determined by spectroscopic assay and physiological measurements were obtained after the treatment. The results show that there was no significant difference in the fresh tissue mass of treated samples compared to controls. The treatments did not have any effects in plant growth or root length. There was Cu uptake by the root, and translocation to the aerial tissues. Nutrient content analysis and measurement of stress indicators (Catalase and Ascorbate Peroxidase enzymes) will be conducted in the future.

Funding Source: UC-CEIN

Recommended Citation:
Hernandez Molina, Mariana; Tamez, Carlos; Hernandez, Jose; Gardea-Torresdey, Jorge. "Effects of Copper Nanoparticles in Zucchini" (2016).
COURI Symposium Abstracts, Spring 2016, ID= 800

Effects of dominant shrub species on semi arid soils in the Chihuahuan Desert

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The Chihuahuan Desert Environment has had a substantial increase in the amount of shrub species present on many previous grassland areas. Yet the focus, although the change in our environment is important, must be placed on what these changes in dominant plant species in our environment really means for soil quality and further plant development in our area. Different plants perform different function for an area and the nutrient cycling of two dominant shrub species in the Chihuahuan Desert, Mesquite (Prosopis glandulosa) and Creosote (Larrea tridentata), were studied to see what their effect on nutrient availability and organic carbonates would be, that is their carbon and nitrogen cycling patterns. To do so soil samples were taken from Jornada Experimental Range and a method was developed for measuring the amount of carbon and nitrogen available in the soil. Upon attaining readings for nutrient levels, it was observed that readings for carbon and nitrogen in the soils was coming back fairly normal for a semi-arid desert environment. Nutrient cycling of the dominant shrub species in this area was dominated by mesquite and followed by creosote, of course followed by bare ground which would have the lowest levels of nutrients cycled. This would give some evidence that shrubs aren't only expanding slowly in the desert but they are thriving.

Recommended Citation:
Uribarri, Fabian ; Darrouzet-Nardi, Anthony. "Effects of dominant shrub species on semi arid soils in the Chihuahuan Desert" (2016). COURI Symposium Abstracts, Spring 2016, ID= 751

Electronic structure of smaragdyrin/porphyrin and fullerene/graphene-oxide complexes

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With so many potential donor-acceptor combinations for organic photovoltaics, computation provides an invaluable tool for fine tuning desired properties and selecting optimal complexes for experimentation. By comparing combinations of one of the selected donor moieties and one of the acceptors, we can closely examine how the properties of the complexes change while the donor is held constant while the acceptor changes and vice versa. We present the charge transfer for the four complexes while the absorption spectra is concurrently studied. We compare the electronic structure of porphyrin based complexes with fullerene and graphene oxide with the similar ones based on smaragdyrin. The smaragdyrin is an extended porphyrin-like macrocycle that consists of five pyrrole rings. The smaragdyrin and its derivatives have been touted for photodynamic therapy, MRI contrast agent, and for nonlinear optics. The calculations use our in house methodology: the Naval Research Laboratory Molecular Orbital Library (NRLMOL) code based on density functional theory (DFT), that utilizes the generalized gradient approximation (GGA) to the exchange-correlation functional.

Funding Source: NSF

Recommended Citation:
Sikorski, Ember; Zope, Rajendra; Cárdenas-Jirón, Gloria; Baruah, Tunna. "Electronic structure of smaragdyrin/porphyrin and fullerene/graphene-oxide complexes " (2016). COURI Symposium Abstracts, Spring 2016, ID= 799

Examining Soil Conditions at The Rio Bosque Wetland Park using Geophysical and Geological Techniques

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Over the past 15 years there has been considerable environmental restoration work at at the Rio Bosque Wetland Park located in southeastern El Paso. Soil conductivity and resistivity studies were conducted from 2000-2002 in the northeastern portion of the park to collect base line information on soil characteristics. Grain size and salinity analysis, along with geologic descriptions of core, were completed for a number of shallow (< 9 m deep) monitoring wells and hand augered boreoholes. In the summer of 2015 we returned to the park to collect additional conductivity and resistivity data. This allows us to compare changes in soil properties as restoration of native vegetation and establishment of wetland cells has occurred at the park. It was expected that areas with high conductivity in 2000 would also be high in 2015; and areas of low conductivity would also be low if the major variations in geophysical properties of the soils were related to grain size variations. Our preliminary results indicate that this general pattern is observed, although there appear to be a few changes that could be attributed to changes in vegetation or groundwater salinity.

Recommended Citation:
Rodriguez, Ahinoam; Doser, Diane. "Examining Soil Conditions at The Rio Bosque Wetland Park using Geophysical and Geological Techniques" (2016). COURI Symposium Abstracts, Spring 2016, ID= 793

Exploratory data analysis in comparing measured sedimentary grain size distributions with and without organics

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In this project we test whether removal of organic matter, a common step used when measuring sedimentary grain-size, is required for accurate measurement. Grain size measurement is a common proxy for interpreting environmental change. Our samples were collected from the surface of the marginal playa dune, constructed of aggregated silt and clay pellets during deflation of the exposed playa surface during dry conditions, of Rimrock Lake playa, located in Southeast Oregon. A total of six hundred surface sediment samples were collected as part of a geomorphic study of the playa. From that sample set, sixteen randomly selected samples were sub divided into organics and non-organics. The removal of organics was achieved by pretreating the sample with hydrogen peroxide (H202) on a hot plate for 24 hours. Samples without the removal of organics were placed directly on shaker with sodium hexametaphosphate for sediment deflocculating; samples with removal of organics, had the H202 extracted with the laboratory centrifuge before being placed on shaker. Both subsets were then measured using the Malvern Mastersizer laser diffraction particle-size analyzer equipped with a Hydro 2000G pump accessory.

Grain size measurements between organic and inorganic sub samples were compared using analyses of variance (ANOVA) and standard deviation of the means of all sub samples compared with the inorganic sub set. Preliminary results show no significant difference between organic and non-organic samples. Research can conclude removal of organic matter to be an expendable process when measuring sediment grain size.

Recommended Citation:
Villalobos, Brianna; Collins, Joe; Gill, Thomas. "Exploratory data analysis in comparing measured sedimentary grain size distributions with and without organics" (2016). COURI Symposium Abstracts, Spring 2016, ID= 798

Locating epicenters generated near the San Miguel Volcano using the cross-correlation of monochromatic tremors

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The San Miguel Volcano, located in El Salvador, is a highly active stratovolcano that last erupted in December 2013. San Miguel has not been extensively studied and presents a significant hazard to the region actively releasing volcanic gases, historic flank eruptions, and fissure activity. To investigate the internal processes of the volcano, we used data collected from a network of six UTEP seismic sensors recording ground movement from 2007-2008 near the volcano. In this project we focused on better understanding and locating the monochromatic tremors. Monochromatic tremors are characterized by a low frequency harmonic oscillating seismic signal. The signal is believed to be the result of internal magmatic activity. These events last about 15 minutes and gradually increase and decrease in amplitude. It is challenging to identify the source of these signals due to a lack of easily distinguishable phase arrivals. Cross correlating the signals and using the time difference between peak phase arrivals we located these events and found that they originated from the volcano itself.

Funding Source: Cybershare

Recommended Citation:

Soto, David; Velasco, Aaron; Alfaro-Diaz, Richard; Patlan, Ezer; Velasco, Aaron. "Locating epicenters generated near the San Miguel Volcano using the cross-correlation of monochromatic tremors" (2016). COURI Symposium Abstracts, Spring 2016, ID= 722

Numeric Analysis of the Electromagnetic-Matter Quantum Interaction from Moderate to High Energies

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The absorption of radiation in a medium can be produced by several physical quantum phenomena depending on the range of energy of the applied electromagnetic radiation. Among them, we have the photoelectric effect, the Compton effect and the pair creation. In particular, the Compton scattering is the more effective absorption mechanism for radiation energies larger than the binding energy that tied the particles in the medium and smaller than twice the rest mass of the particle interacting with the radiation. The Compton effect, on the other hand, is a multiple parameter phenomenon, whose parameters are linked by the corresponding quantum-relativistic equations. In this study, we performed a numerical analysis of the Compton scattering using the Mathematica software. The results of this study are presented in a set of graphs that relate the different characteristic parameters. The graphs illustrate four different relationships, the first graph shows the relationship between the initial and final photon energies when scattered by an electron, the second graph shows the relationship between the initial photon energy and the gained kinetic energy of the interacting particle and the third graph represents the relationship between the scattering angle of the photon and the scattering angle of the electron. An additional graph was added to observe how the particle rest energy affected the photon scattering. These results can be of interest for nuclear physics and environmental science studies dealing with the interaction of matter with electromagnetic radiations.

Recommended Citation:
Guzman, Joscelyne; Ferrer, Efrain. "Numeric Analysis of the Electromagnetic-Matter Quantum Interaction from Moderate to High Energies" (2016). COURI Symposium Abstracts, Spring 2016, ID= 809

Photosystem stress in a northern Chihuahuan Desert shrubland: temporal variation and Inter-species differences.

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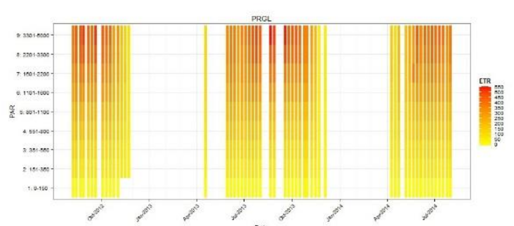
Dryland ecosystems are expected to be the largest biome on Earth by mid-century due to climate change and anthropogenic disturbances. Relative to other ecosystems drylands have been understudied, which is critical since recent studies suggest dryland ecosystems are important for global biogeochemical cycling, and is strongly linked to plant phenology, the timing of growth stages in key plant species. This study, conducted in a creosote shrubland plant community on the USDA Jornada Experimental Range in Southern New Mexico during 2012-2015, explores how chlorophyll fluorescence, which is an indicator of plant stress and function, varies seasonally between key plant species. ETR (rapid light curves) sampled with a Walz MINI-PAM twice monthly were analyzed. At each sampling, five replicate measurements were made for five key plant species. Data was processed in Microsoft Excel and Access and are visualized in multidimensional plots showing the seasonal change in ETR under varying light levels for each species. Overall, ETR was found to be highest October and lowest in January respectively, with Muhlenbergia porteri(Bush Muhly) having the lowest ETR and Prosopis glandulosa (Mesquite) displaying the highest ETR. While phenophases are currently to be tied to these ETR levels. Results suggest that if seasonal timing of plant phenology or the cover and abundance of plant species shifts with climate and with other environmental change then consequently regional scale land-atmosphere interactions will be impacted. This study highlights the need for further understanding relationships and controls of biophysical factors in environment and plant ecosystem functions in dryland ecosystems.



Recommended Citation:
Mcafee, Ashley; Luna, Naomi; Song, Xia; Tweedie, Craig. "Photosystem stress in a northern Chihuahuan Desert shrubland: temporal variation and Inter-species differences." (2016). COURI Symposium Abstracts, Spring 2016, ID= 762

Three dimensional topographic model of the east Potrillo Mountains fault scarp.

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Unmanned Automatic Vehicles (UAVs) are being used more widely in the geosciences field. Commercial UAVs in geoscience research are mostly used to take photographs of areas and create electronic topographic maps. In this study, UAVs created by students from UTEP are used to map local geologic features because we can manipulate the flight time, weight, and movement of the robot. We plan to use the UAV over a fault zone in the East Potrillo Mountains, and then use the aerial photographs it captures to create a 3-dimensional topographic map of the area. At this time, we are in the testing stage and have flown the UAV on campus and collected photographs to work with the software. The photographs have been processed with a program called Photoscan™ in order to merge the photographs, find common points in between them, calculate elevations, and stack them to create a 3-dimensional map. This process of developing a 3-D map will be used to interpret the area of the fault scarp in the Portrillo Mountains when we perfect the UAV and the data will be compared with the actual site to observe if the fault scarp can be mapped in detail with this technique.

Recommended Citation:
Martinetti, Luis; Vargas, Guillermo; Serpa, Laura. "Three dimensional topographic model of the east Potrillo Mountains fault scarp." (2016). COURI Symposium Abstracts, Spring 2016, ID= 702

Trends in Dissolved Organic Carbon (DOC) in Arctic Tundra Waters

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In the Arctic lies a layer of permanently frozen ground called the permafrost, which is estimated to hold about 50% of the earth's carbon. With warming, the top layer of the permafrost is thawing, resulting in the deepening of the active layer and release of nutrients, including dissolved organic carbon (DOC), into a bio-available form. The purpose of this research was to determine how much DOC is entering arctic tundra waters, and how this differs among water body types. Samples were taken from eight different freshwater (groundwater, ponds, streams, lakes) and salt water (estuary, lagoon, coastal ocean) bodies. Because it originates from decomposing soil organic matter, it was predicted the groundwater and water bodies with greater groundwater inflow would show the highest levels of DOC. DOC was measured using a Lachat IL500 TOC-TN or the Shimadzu TOC-V analyzers. Lability of the DOC, estimated as Humic Color, SUVA, and Spectral Ratio, was determined on a spectrophotometer. Thermokarst ponds and groundwater had the highest levels of DOC, while saline sites had the lowest DOC. Thermokarst ponds receive extra soil organic matter through slumping, and accelerated thaw. DOC closer to its groundwater source tended to be less labile than that in surface waters. It is important to know the levels of DOC in arctic waters because the DOC is susceptible to mineralization and can enter the atmosphere as CO_2, a powerful greenhouse gas.

Recommended Citation:
Mendoza, Monica; Lougheed, Vanessa. "Trends in Dissolved Organic Carbon (DOC) in Arctic Tundra Waters" (2016). COURI Symposium Abstracts, Spring 2016, ID= 733

Using major ion analysis and Sr isotopes to characterize changes in Rio Grande River chemistry and pinpoint sources of salinity

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Water quality and availability is important especially for desert environments such as the greater El Paso region. In the Rio Grande River, high salinity has been a concern for some time due to its negative effect on crop productivity and soil health. We know from previous studies that various sources of salinity exist from both anthropogenic and natural sources. Major ion analysis of water samples collected monthly in 15 sites along the Rio Grande from Elephant Butte, NM to El Paso, TX help us view spatial and temporal changes in river chemistry. In the summer, during irrigation season, major ion concentrations are more or less similar because the river is flowing and everything is well mixed. During non-irrigation season, major ion concentrations increase. SO_4increases during non-irrigation season possibly due to the presence of fertilizers used in the fields. High TDS values from the field indicate that salinity of the river increases downstream and this could be due to agriculture activities and human activities such as releasing waste effluent into the river. $^{87}Sr/^{86}Sr$ ratio depends on the type and age of the source rock. Gypsum fertilizers which are commonly used in the fields, have distinct ratios from rocks of natural origin. In order to obtain $^{87}Sr/^{86}Sr$ ratios, Sr purification and separation was carried out using Sr column chemistry. Samples will be analyzed for $^{87}Sr/^{86}Sr$ ratios using MC-ICP-MS. This study helps understand variations in river chemistry and is the first step in determining and fingerprinting sources of salinity into the Rio Grande.

Recommended Citation:
Reyes, Carlos; Garcia, Sandra; Ma, Lin. "Using major ion analysis and Sr isotopes to characterize changes in Rio Grande River chemistry and pinpoint sources of salinity" (2016). COURI Symposium Abstracts, Spring 2016, ID= 715

Validation of a sonar method to classify marine sublittoral habitats in a coastal lagoon near Barrow, Alaska.

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Arctic coastal environments are recognized as some of the most threatened ecosystems on Earth. With warming, accelerated permafrost thaw is resulting in substantial amounts of soil organic carbon being transferred to the coastal Arctic Ocean via coastal erosion and riverine inflow. The objective of this study was to classify and map the nature of sediment in a coastal lagoon of the Beaufort Sea (Elson Lagoon, Barrow, AK) and relate this to high spatial resolution sonar data in order to create a detailed map of the sublittoral habitats in the region. Sonar data and soil samples were collected throughout the lagoon in August 2015. A subset were dried and homogenized and sieved to classify particle size. Percent organic matter was determined after combustion at 500°C. Preliminary results indicate a higher concentration of organic matter in offshore areas, with most of the sampled areas containing a high amount of fine sand. Sonar intensity was highly correlated with organic matter content and percent sand; however, samples along a wider range of particle sizes need to be analyzed. Our results indicate that lighter smaller and organic particles may be transported to the offshore due to scouring action of waves and ice. Sonar may be a viable option to classify sublittoral habitats on a broad spatial scale.

Funding Source: TIERA

Recommended Citation:
Andreu, Nuria; Tarin, Gabriela; Tweedie, Craig; Lougheed, Vanessa. "Validation of a sonar method to classify marine sublittoral habitats in a coastal lagoon near Barrow, Alaska." (2016). COURI Symposium Abstracts, Spring 2016, ID= 743

Variation in Calcium Carbonate and Soluble Salt Formation Between an Irrigated Pecan Field And an Undisturbed Control Site

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Agricultural practices in the El Paso region commonly use flood-irrigation with Rio Grande waters. High salinity from the Rio Grande, high evapotranspiration, and variations in soil textures contribute to an increase in calcium carbonate (calcite) formation in dryland environments. Soils are rendered unproductive due to development of hardpans, inhibiting plant growth. Calcium carbonate formation produces carbon dioxide contributing to greenhouse emission. A comparison and contrast of soils from a sandy-rangeland control site in Fabens, Texas to soils of a seasonally flood-irrigated pecan field in Tornillo, Texas, may identify key differences in calcium carbonate formation, and calcium sources. Relatively high levels of calcium carbonate and soluble salts are expected to be found at the pecan orchard mainly due to the seasonal irrigation input of salts, specifically calcite. In contrast, calcium carbonate and soluble salts in the control site are predicted to be transported by dust storms and rainfall. Results for sequential extraction of water soluble salts, cation exchange capacity, and carbonate content from both the control and pecan field will be compared to assess the effects of flood irrigation versus dust deposition. Pecan site has higher levels of clay with an average conductivity of 2.73 mS/cm, while control site has low clay content yet average conductivity of 4.48 mS/cm. Soluble salt analysis indicates higher salinity in control site, therefore, calcite levels can also be expected to be higher than levels in pecan field. Future work is strontium isotope analysis to trace the sources of calcite in both sites.

Recommended Citation:
Lopez, Andrea; Ortiz, Anna; Jin, Lixin. "Variation in Calcium Carbonate and Soluble Salt Formation Between an Irrigated Pecan Field And an Undisturbed Control Site" (2016). COURI Symposium Abstracts, Spring 2016, ID= 769

Vole effects on soil nutrient availability in Alaskan Tundra

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In the Tundra, rodents (like voles) are important consumers of vegetation and play a strong role in determining nutrient levels. Vole activities, such as feeding and haying, can change plant biomass, and therefore soil nutrient availability. We hypothesized that vole activity in arctic tundra affects soil nutrient availability. We sampled both organic and mineral soil from plots in moist acidic tundra in northern Alaska in which voles were present, and those that had no vole activity (fenced) for 19 years. Soils were examined using colormetric microplate procedures to determine soil nutrient availability including ammonium, nitrate and phosphate. Soil properties did differ between soil layers, with higher levels of available nutrients and soil microbial biomass in upper organic soils than deeper mineral soils. There were few effects of voles, however, on soil nutrient availability. Plots without vole activity tended to have higher ammonium availability in all soil layers, and higher nitrate availability in deeper layers, but no effects on phosphorus. There were also few effects of voles on soil microbial biomass, although microbial biomass nitrogen did tend to increase with vole presence in deeper soil layers. We suggest that lower nutrient availability with vole activity may be due to increased uptake by plants recovering from vole damage, or to shifts in plant composition with vole activity. Although effects of voles on nutrients were few, these results suggest the potential for voles to impact biogeochemical cycling in tundra soils over the long term.

Funding Source: UTEP

Recommended Citation:
Alfaro, Jacqueline; McLaren, Jennie. "Vole effects on soil nutrient availability in Alaskan Tundra" (2016). COURI Symposium Abstracts, Spring 2016, ID= 770

Engineering and Computer Science Abstracts

An Element Activation Approach for Modeling Electron Beam Sintering of Titanium

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Additive Manufacturing (AM) allows for rapid generation of complex parts from computer control. Processes such as Electron Beam Melting (EBM), Direct Metal Laser Sintering (DMLS), Laser Engineering Net Shaping (LENS) and Binder Jetting, employ metals such as aluminum, titanium, and steel. Mechanical properties are innately tied to the sintering mechanics associated with the AM processes.

A study of the local heating and resulting residual stress formation for a model typical of an EBM process is presented. This method employs an element activation/deletion approach to reproduce the sintering densification of the titanium Ti6Al4V powder in the commercial finite element program Abaqus. The model includes include specifying temperature dependent material properties for the titanium alloy Ti6Al4V, and making use of the DFLUX user defined to model the moving path of the heat source (laser). The effect of the heat flux and heat flux path on the resulting residual stresses is considered.

This project is part of a larger effort to develop coupled thermal-mechanical computational models in which we can emulate the AM process and quantify the residual stresses and microstructural formations from powder to fully dense components.

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Recommended Citation:
Beas, Carla ; Chessa, Jack. "An Element Activation Approach for Modeling Electron Beam Sintering of Titanium" (2016). COURI Symposium Abstracts, Spring 2016, ID= 780

Building an IBM Watson-powered mobile application to promote sexual education

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Adolescents and young adults are particularly at-risk of acquiring sexually transmitted diseases or having unplanned pregnancies. This population segment constantly uses mobile technology and the Internet for different purposes (e.g. to find information about sexual health in an anonymous way). As young adults and computer science students, we are aware of the difficulties that our age group faces.

During the Fall 2015 semester, we developed SEXWISE, a Java-based, Android mobile phone application which uses IBM Watson's cognitive computing capabilities to answer questions concerning sexuality. Cognitive computing systems try to mimic the thinking process of humans. IBM Watson is a famous success case, which uses several Artificial Intelligence techniques to "understand" the information contained in a document corpus (e.g. Word, PDF and web page documents) to answer questions.

In order to develop our application, we first trained Watson by asking questions and finding answer extracts from trustworthy, officially-sanctioned and openly-accessible documents concerning sexuality and sexual health. SEXWISE is able to connect to Watson and query the user questions to obtain answers. SEXWISE also queries Google Maps to find health care professionals in the vicinity.

Future plans include extending the document corpus and training question database, and developing a personalized user profile, including age, gender and sexual preference, which allows querying for more specific information.

Recommended Citation:
Gallardo, Paola; Gonzalez, Timothy; Rodriguez, Laura; Royo-Leon, Miguel; Aguirre, Diego; Fuentes, Olac. "Building an IBM Watson-powered mobile application to promote sexual education" (2016). COURI Symposium Abstracts, Spring 2016, ID= 732

Computational fluid mechanics analisis for a volumetric solar receiver

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This research presents a design and model for a concentrated solar power (CSP) volumetric receiver that uses supercritical carbon dioxide as a working fluid, which has a moderate value of critical pressure, substantial chemical stability, relative inertness and sufficient knowledge of its thermodynamic properties, non-toxicity, abundance and low cost. Also a comprehensive analysis of the fluid-structure interaction of the coupled system model along with temperature effects on the system is considered. Furthermore the design incorporates a porous media inside the volumetric receiver which is speculated to increase the thermal efficiency. A novel network based algorithm has been used to model the porous media by performing coupled simulations between a modulus of finite element analysis on the structure of the receiver, computational fluid dynamics to study the flow of the sCO_2, and a heat transfer model in order to study the efficiency of the receiver and reproduce all the physics phenomena behind it. These simulations were performed at 20 MPa and heat flux of 400 MW was applied to the structure, with different materials in order to test the design iteration. The porous media is composed of Nickel Carbide, and the holes in it have a diameter of 10 micrometers. The material selected to build the receiver is Haynes 230, a nickel-chromium-tungsten-molybdenum alloy that combines excellent high temperature strength, outstanding resistance to oxidizing environments up to 1149°C for prolonged exposures, and excellent long-term thermal stability.

Funding Source: COURI

Recommended Citation:
Schiaffino, Arturo; Kumar, Vinod; Chattopadhyay, Ashesh; Kotteda, Krushnarao; Kumar, Vinod. "Computational fluid mechanics analisis for a volumetric solar receiver" (2016). COURI Symposium Abstracts, Spring 2016, ID= 765

Constraint Based Model for Generating t-wise Test Suites

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Technology has become an essential part of our society. We rely so much on software that failure has the potential to be catastrophic. For instance, between 1985 and 1987, Therac-25 was responsible for at least 6 fatalities of cancer patients being wrongly administered massive overdoses of radiation. Such catastrophes could have been avoided via enforcement of thorough testing. However, companies wanting to save money and time can lead to overlook errors. In many cases too, it is just impractical to thoroughly test software, just because the amount of possible configurations is just too large.

Nevertheless practical and thorough-as-possible testing needs to be conducted. Empirical studies have shown that most errors in a software result from the interaction of a limited amount of its parameters. As a matter of fact, the study found for instance that 80% of bugs could be found by solely focusing on two-parameter interactions. This offers an opportunity for quality testing at a potentially much lower cost. However, it opens the door to many challenges in trying to actually cut the testing costs as much as possible (i.e, in generating test suites as small as possible).

In this work, we focused on specific scenarios for having to save testing costs as much as possible. 1/ We looked binary-parameter software only; 2/ we expanded our pool to software whose parameters only take a prime number of values. Our algorithms for generating test suites were tested and showed either optimal or very competitive performance.

Recommended Citation:
Ayub, Cristian; Felix, Gabriel; Mena, Raul; Gonzalez, Elsa; Zamudio, Miguel; Valera, Leobardo; Ceberio, Martine. "Constraint Based Model for Generating t-wise Test Suites" (2016) COURI Symposium Abstracts, Spring 2016, ID=736

Cu- Zeolite as Algaecide

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The objective of this study is to determine the feasibility of using Copper-modified zeolite (Cu-Zeolite) as an algaecide. Zeolites are naturally occurring minerals known as hydrous aluminum silicate of alkali and alkaline earth cations with an open, three-dimensional structure that is used as a cation exchanger and molecular sieve. Chlorine and Copper can be used to inhibit phytoplankton and algae growth but their use in water may pose health risks. The use of chlorine can produce disinfection-by-products (DBPs) such as Thihalomethanes (THMs) that are formed by the mixture of aqueous chlorine with humic substances and soluble compounds secreted from algae. On the other hand, the use of copper may require a precipitation process to remove the excess copper from solution. Since zeolites can be easily removed from water or used in a filtration-type unit, we are performing batch test experiments in which we are analyzing the chlorophyll concentration in water (EPA method 445). Samples of water containing algae grown in a fish tank were tested by analyzing fluorescence levels before and after exposure to copper solutions and Cu-Zeolite. Preliminary results have shown that the Cu-Zeolite can be as effective as a Copper solution to inhibit algae growth. The use of Cu-Zeolite may provide a safer and cost-effective alternative for preventing algae growth in drinking water storage tanks, pools, and ponds. Additional studies are being conducted to ensure that the copper residuals in water resulting from the use of the Cu-Zeolite as algaecide are safe for aquatic life or drinking water.

Recommended Citation:
Garcia, Denise; Santiago, Ivonne. "Cu- Zeolite as Algaecide " (2016). COURI Symposium Abstracts, Spring 2016, ID= 757

Demonstration of chaotic electronic systems diffeomorphism using the Lorenz System

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Chaotic electronic systems are n-dimensional systems that have unsteady but identifiable Lissajous patterns. We set out to show experimentally that when only one of the system variables is observable, diffeomorphism can be used as a way to identify an electronic system. For this purpose we implemented the 3-dimensional Lorenz system using op-amp integrators. By adding a differentiator stage at the output of the system, we are able to observe the derivative of each one of the state variables. Depending on the state variable and derivative pair selected, the Lissajous patterns reveals the unique behavior of the system which allows us to determine if the chaotic system is a Lorenz system. We used MATLAB software in order to observe and compare the results obtained in the implementation. We found that when plotting the x and y state variables versus their derivatives we clearly discern the behavior of the Lorenz System. In contrast, the z state variable plotted versus its derivative does not reveal the existence of the Lorenz System. As a result, we postulate that, in general for other chaotic 3-dimensional systems, pairs of state variables and corresponding time derivatives will exhibit Lissajous patterns that show diffeomorphism. Thus, the addition of a differentiator stage at the output of the electronic system is a practical approach for system characterization.

Recommended Citation:
Ibarra Polanco, Alejandro; Pappu, Chandra; Flores, Benjamin. "Demonstration of chaotic electronic systems diffeomorphism using the Lorenz System" (2016). COURI Symposium Abstracts, Spring 2016, ID=735

Design and Testing of Hybrid Composite Materials for Cryogenic Fuel Tanks

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Cryogenic fuel tanks carry and store cryogenic propellants (oxygen, methane, hydrogen) at subfreezing temperatures in order to generate highly combustible liquids. This tank is exposed to an extremely cold temperature in its interior and to ambient temperature on its external surface creating a large temperature gradient across the wall thickness. Hybrid textile composites with carbon-Kevlar® fabric are explored as means to reduce the thermal gradient effect and enhance the material performance under cryogenic conditions.

Previous studies indicated that carbon-Kevlar® textile composites are suitable materials for cryogenic temperatures (77 K). The pristine mechanical properties of carbon composites changed a maximum of 3-4% after cryogenic exposure, while ≈17% for Kevlar® composites. Computational models of hybrid carbon-Kevlar® composites were subjected to cryogenic temperature for extended periods to study the thermal gradient and optimize the design of layups. Six combinations were selected that resulted in low interface stresses and fewer number of peak stresses through the composite thickness. Subsequently, analysis of cryogenic exposure to one surface of hybrid composites was performed computationally to simulate the composite wall containing the liquid fuel.

Computational and experimental work was conducted to determine the optimum composite wall designs. An ABS plastic insulating holder was designed and 3D printed to hold the specimens such that only one surface is exposed to LN2. Eight composite layups were exposed to LN2 using the holder to study their response to thermal gradient cryogenic exposure. Based on the results obtained computationally and experimentally, optimum hybrid layups of composites for cryogenic exposure were determined.

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Recommended Citation:
Avila, Raudel; Islam, Md; Prabhakar, Pavana. "Design and Testing of Hybrid Composite Materials for Cryogenic Fuel Tanks" (2016). COURI Symposium Abstracts, Spring 2016, ID= 717

Development of high-temperature digital image correlation technique and validation using the stepped isostress method

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The purpose of this study is to develop a digital image correlation (DIC) technique capable of acquiring non-contact strain measurements of Nickle superalloys at temperatures up to 1200°C. At high temperatures, DIC is a challenge because metallic materials glow incandescently in the form of thermal radiation. Thus, a high-temperature DIC technique is required. This study utilizes a split-tube furnace to heat the specimens, which are illuminated with a monochromatic blue LED spotlight. A bandpass filter allows only the monochromatic light to be detected by the CCD sensors of the DIC cameras, thus reducing the observed incandescence. To validate this DIC technique, three kinds of tensile tests are conducted at 600°C on placeholder specimens of 304 Stainless Steel (304SS). The tensile tests are: monotonic tensile tests (MT) at a constant strain rate to determine fundamental tensile properties; creep tests (CT) at a constant load to obtain creep deformation properties; and stepped isostress tests (SSM) at an increasing succession of load levels (62%, 63%, 64%, and 65% the yield strength of 304SS) to obtain creep deformation properties. Direct strain measurements are obtained with a high-temperature extensometer and compared with the non-contact strain measurements obtained with the proposed DIC method. SSM tests are a novel method for metallic materials and it is hypothesized SSM will accelerate the time needed to produce master creep curves. The master creep curves obtained with SSM must first be adjusted and results are compared with master creep curves available from literature to verify the validity of SSM.

Recommended Citation:
Ramirez, Christopher; Stewart, Calvin. "Development of high-temperature digital image correlation technique and validation using the stepped isostress method" (2016). COURI Symposium Abstracts, Spring 2016, ID= 781

Efficient Optimal Recovery Based Spatially-Adaptive Multi-Frame Super-Resolution

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Multi-Frame image restoration is a form of Super-Resolution (SR) which consists of combining multiple Low-Resolution (LR) images in order to reconstruct a single High-Resolution (HR) image. Our current approach to SR based on the framework of optimal recovery is a spatially adaptive scheme whereby the block-by-block processing is modified based on properties of the corresponding local LR image data. The bandwidth parameter is adapted based on the local variance of each corresponding block from all LR images that contribute to the HR image block to be reconstructed. Also, an optimal regularization parameter needs to be chosen for the reconstruction of each HR output block. In order to simplify the computational effort, we chose a single parameter for all blocks based on best fit to the original test image. Simulation results show superiority of the adaptive scheme when blocks are allowed to overlap in the reconstruction process. Our current work is focused on improving this approach based on automated linking of the block variances to the bandwidth parameter, we have incorporated an automated procedure to threshold the distribution of log of the variances into three to five categories of blocks. At this time, we are incorporating the use of gradients and edge maps obtained from the LR images to separate each block into smaller regions defined from the edges. The determination of gradients from the LR images is itself a linear optimal recovery problem, our results are more precisely compared to the determination of gradients using convolution with spatial filtering mask.

Funding Source: COURI-MERITUS program

Recommended Citation:
Ponce, Luis; Cabrera, Sergio. "Efficient Optimal Recovery Based Spatially-Adaptive Multi-Frame Super-Resolution" (2016). COURI Symposium Abstracts, Spring 2016, ID= 795

Investigation of Strategies and Market analysis of the Power TAC Smart Grid

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PowerTAC (Power Trading Agent Competition) is a competition that simulates an energy market where agents act as brokers that buy and sell energy for profits. The agents are responsible for buying energy from renewable and non-renewable resources as well as selling it to the different types of costumers. An agent should be equipped with strategies that will help balance supply and demand in the most effective way in order to make the most profit from several markets. We are exploring strategies which will allow the broker to develop a good quality set of tariffs, individual contracts with customers that can sell and purchase energy, and manage financial and supply/demand imbalances. Clearing price prediction is one of the important parts of the broker's wholesale market strategy because it helps the broker make intelligent decisions while purchasing energy at low cost. In order to come up with strategies for the broker, we used data from the log files to create visuals that will help us see what aspects of the simulation will let the broker predict prices more accurately. So far, we have observed REP tree prediction works better than other prediction methods, such as moving average or linear regression. The goal of this project is to develop a more advanced broker which will win the competition with highest profit. It will be a great advance if intelligent bidding agents can replace humans in future energy markets.

Recommended Citation:
Juarez, Jesus; Chowdhury, Moinul Morshed Porag; Kiekintveld, Christopher. "Investigation of Strategies and Market analysis of the Power TAC Smart Grid" (2016). COURI Symposium Abstracts, Spring 2016, ID= 786

Making a more sustainable energy future: supercritical carbon dioxide power systems

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There exists a need for an efficient, low cost, environmentally safe power supply. Current electric power comes from nonrenewable sources and their greenhouse emissions have great environmental impacts. Supercritical working fluids offer better thermal efficiency and low emissions. This project models a power system using supercritical working fluids O_2, CH_4, and CO_2 in the cycle. It is expected that the cost of electricity can be reduced by 15% using this cycle compared to existing systems. ANSYS Fluent was used to create the supercritical system and optimize the combustion process. A pressure boundary condition was set to be 30 MPa and the Shomate equations were used to model thermodynamic properties of the supercritical working fluids. Combustor and injector designs were made in order to optimize the diameter, mass flow, and shape of the system to be able to control the supercritical fluid behavior maintaining the thermal efficiency desired. The purpose was to design a system where the working fluids enter with the least amount of turbulence and viscosity coefficients. This will aid in creating a more complete combustion with a favorable energy capture from the reaction. The injector inlet geometry and combustion parameters were obtained for this supercritical combustion system. Results show that it is possible to have combustion at high pressure and concentrations of CO_2 up to 90% by volume.

Recommended Citation:
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Passive, wireless temperature sensors based on periodic structures for harsh environment applications

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Wireless passive temperature sensors that can withstand extreme conditions while being durable and precise are fundamental in diverse industries, including the energy conversion systems area, to achieve the maximum efficiency possible. The development of wireless temperature sensors for extreme condition environments was performed using two different approaches: the first was based on the metamaterial principle, while the second one was achieved using a multilayered frequency selective surface structure and the guided mode resonance phenomenon. The response of these sensors was simulated using Ansoft's High Frequency Structural Simulator (HFSS) in a frequency range from 7 to 16 GHZ. After performing the simulations for these structures, the manufacturing process of the sensors was performed using commercially available ceramic and metallic materials. By fabricating a reflective encasing for an alumina ceramic substrate, a frequency selective surface with a 10 by 10 period circular aperture array was manufactured using traditional machining techniques, as well as 3D printing techniques. Meanwhile, the metamaterial sensor sample was fabricated using powder compression methodologies and embedding metal rings in it. In order to characterize the response from the manufactured sensors, a free-space testing setup was developed using Gaussian beam antennas, a Vector Network Analyzer (VNA), and an environmental testing chamber transparent to the electromagnetic waves. The sensor prototypes were tested in the same frequency range as the one simulated, 7 to 16 GHz. Conclusive results for the simulation and experimentation process on the fabricated samples are expected by the time this research effort is presented.

Funding Source: Campus Office of Undergraduate Research Initiatives

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Power Generation Using Magnetohydrodynamics

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Magnetohydrodynamic devices use electrically conducting fluids to generate electricity. This form of energy was first discovered in the 1830s. Since then this device has gained popularity. In this research the design of a supersonic oxy-methane combustor for direct power extraction will be discussed and utilized in a possible commercialization opportunity. This open system direct power extraction combustion chamber consists of a pressure-fed, tangential-swirl fuel and oxidizer delivery system, a cylindrical combustion chamber with converging-diverging De Laval nozzle structure, and a milled cooling channel structure. This combustor will be capable of reaching temperatures as high as 2800K and velocities of >2000 m/s when using a 3.5:1 oxygen to fuel ratio. The technical feasibility of incorporating a small scale combustor capable of generating a thrust which can accelerate any off-the-shelf propellant drone to 25 m/s is designed. In this process the current drone limitations, design requirements, components, and pressure drop calculations are presented in order to contribute to the continuous improvement which this demanding market has undertaken.

Funding Source: Department of Energy

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Sustainable Technology for Removing Arsenic from Water using Natural Zeolite

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The purpose of this project is to develop a sustainable technology that uses Zeolite for removing arsenic from water. Zeolites are naturally occurring minerals known as hydrous aluminum silicate of alkali and alkaline earth cations with an open, three-dimensional structure.

Adsorption studies are being conducted to determine the selectivity of natural and tailored zeolites for Arsenic. A clinoptilolite zeolite from the St. Cloud Mine in Winston, NM was tested. No significant removal of arsenic occurred when the zeolite was used in its natural form. However, adsorption of Arsenic (III and V) was significantly enhanced by replacing naturally occurring inorganic cations by long alkyl quaternary ammonium ions and similar polymers. Appropriate tailoring agent and dose permit the removal of arsenic in its anionic form as arsenate (AsO_4^{-3}) and arsenite (AsO_3). This may result from charge reversal at the surface of the zeolite, suggesting that anion exchange is the responsible mechanism. This study suggests that the efficiency of removal of arsenic depends on the properties of the zeolite (e.g., surface area and External Cation Exchange Capacity), the physical properties of the tailoring agent (e.g., molecular characteristics and Critical Micelle Concentration), and the dosage of the tailoring agent. Efficiency of removal also depends on the solution properties, such as pH and ionic strength.

Our filter will provide an innovative technology with local, regional, and global applications that increases environmental, social, and economic aspects of sustainability worldwide and will help provide safe water in accordance with EPA and WHO standards and guidelines.

Funding Source: NSF

Recommended Citation:
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Thermodynamic analysis of magnesiothermic combustion synthesis of borides

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Borides of zirconium and hafnium (ZrB2 and HfB2) are promising materials for hypersonic flight, atmospheric re-entry, rocket propulsion, and other high-temperature applications. These materials can be fabricated by combustion synthesis, which has advantages such as low energy consumption, high purity of products, and low cost of equipment. However, combustion synthesis of these materials from elements is expensive because of the high costs of zirconium, hafnium, and boron. The present research focuses on the use of inexpensive raw materials such as zirconium oxide, hafnium oxide, boron oxide, magnesium, and sodium chloride. Thermodynamic calculations for combustion of ZrO2-B2O3-Mg and HfO2-B2O3-Mg mixtures with addition of NaCl, MgO, and extra Mg have been performed in order to predict the oxide-to-boride conversion degree. The calculations have demonstrated that a relatively small addition of NaCl, MgO, or extra Mg ensures 100% conversion. Further, it has been shown that NaCl and MgO additives are a better option than extra Mg since they do not generate gas products and hence do not increase pressure in the reaction chamber.

Recommended Citation:
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