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I. Thomas Roerden
II. Lauren Nightingale *
III. Caryl Young
IV. Abigail Weigang
V. David Neivandt

170. - Examining The Role of Palmitoylation In Dictyostelium discoidium
I. Chris Tanner *
II. Robert Gundersen

171. - Examining the Role of Sustainability in the Maine Wine Industry
I. Michaela Murray *
II. Mark Haggerty

172. - Fitness-based optical diagnostic patch for the observation of cardiovascular disease-risk patients
I. Isabelle Grant *
II. Chloe Lilly
III. Alex Danner
IV. Karissa Tilbury

173. - Spatial & Temporal Dynamics of 5-HT2 Receptor Subtypes in JCPyV Infection Using Super-Resolution

Localization Microscopy

I. Kashif Mehmood *
II. Jeanne DuShane
III. Matthew Parent
IV. Samuel Hess
V. Melissa Maginnis

174. - Characterizing a deadly viral infection in the brain by utilizing an innovative and unique approach

I. Francesca Armstrong *
II. Michael Wilczek
III. Colleen Mayberry
IV. Jeanne DuShane
V. Melissa Maginnis

175. - Infinite Length 3D Printing

I. Kevin Chamberland *
II. Bradley Guerrette
III. Jordan Yoder
IV. Wilhelm Friess

176. - How different methods of communication impact undergraduate student's attitudes, knowledge, and beliefs towards white-nose syndrome in little brown bats

I. Kiley Davan *
II. Carly Sponarski

177. - The Fire Bobble: A Vital Sign Monitor to Predict Cardiac Events in Firefighters

I. Tyler Hine *
II. Sean Morris
III. Brad Butler
IV. Andre Khalil

178. - United States and Canadian Film Industry: A Comparison

I. Dominic Guimond *
II. Stefano Tijerina

179. - Design optimization of a structural part using extrusion-based additive manufacturing overprinted on a fiber-reinforced thermoplastic laminate

I. PianPian Chen *
II. Roberto Lopez-Anido

180. - Current and Past History of Depression: Implications for Resting High Frequency Heart Rate Variability

I. Sadie Libby *
II. Danielle Krause
III. Breana Hurley
IV. Rachael Huff
V. Shelby Helwig
VI. Shannon McCoy

181. - Safety assessment of hydroponic lettuce

I. Adwoa Dankwa *
II. Robson Machado
III. Jennifer Perry

182. - How Social Media is Impacting Mental Health in Today's World

I. Emily Ward *
II. Abigail Reese
III. Lilli Wiseman
IV. Taylor Venema
V. Patricia Poirier

183. - Data Queen

I. Sarah Seitz *

II. Jon Ippolito

184. - Application and Properties of Graphene: A Disruptive Technology
    I. Alexander LaRose *
    II. Stefano Tijerina

185. - Physician-Assisted Death: An Analysis of Ethical Considerations
    I. Sarah Somers *
    II. Patricia Miles
    III. Karen Bushey
    IV. Patricia Poirier

186. - Identifying Risk Factors of Parasitic Helminth Infection in the Ruffed Grouse
    I. Julia Cleary *
    II. Pauline Kamath

187. - Do the Benefits of Group Identification Differ for Women of Lower and Higher Socioeconomic Status?
    I. Shelby Helwig
    II. Ashley Farina *
    III. Shannon McCoy

188. - Comparing the Antioxidant Properties of Commercially Available Seaweed Powders
    I. Courtney Brett *
    II. Angela Myracle

189. - RELATIONSHIPS BETWEEN NORTH PACIFIC SEA SURFACE TEMPERATURE AND FRASER RIVER SOCKEYE SALMON (Oncorhynchus nerka) RETURNS
    I. Thomas Phillips *
    II. Thomas Andrew

190. - Planning for uncertainty: The role of educational leadership in rural community vitality
    I. Dominic Gayton *
    II. Owen VanDerAa
    III. Ismael Thadal
    IV. Kathleen Bell
    V. Mindy Crandall
    VI. Catharine Biddle

191. - Women's Centers on Campus
    I. Ashlee Atchinson *
    II. Susan Gardner

192. - Alternative treatment for a chronic disease of small ruminants, Caseous lymphadenitis (CL)
    I. Cassandra Miller *
    II. Anne Lichtenwalner

193. - Temporal Pressure Response in Porous Structures
    I. Michael Orne *
    II. Wilhelm Friess

194. - Examining women's responses to prolonged sexism that increases in clarity over time: A review of preliminary findings
    I. Shelby Helwig
    II. Leah Jennings *
    III. Margaret Gautrau
    IV. Shannon McCoy

195. - Developing an Intra-Anal Insertion Device to Combat Fecal Incontinence
    I. Mark Lambrecht *
    II. Paige Belanger
    III. McKinley Stinson
    IV. Paul Millard

196. - Detection of Loss of Breast Tissue Homeostasis using Fourier Power Spectral Image Analysis of Mammographic Breast Tissue

I. Mark Lambrecht *
II. Andre Khalil

197. - Use of Social Modeling Moderates the Association Between Depressive Symptoms and Co-Rumination

I. Eliot Fearey *
II. Hannah Lawrence
III. Rebecca Schwartz-Mette

198. - Understanding Factors Influencing Broadband Adoption in Maine

I. Briana Littlefield *
II. Megan Bailey

199. - Sex Education: Giving Youth Skills for Lifelong Sexual Health

I. Julia Haberstick *
II. Susan Gardner

200. - Imaging Zebrafish with Duchenne Muscular Dystrophy using Second-Harmonic Generation to Evaluate Myosin Structure

I. Jordan Miner *
II. Karissa Tilbury

201. - Rapid Prototyping to Roll-to-Roll Printing

I. Chris Toothaker *
II. Bailey Corless
III. Amber Boutiette
IV. Caitlin Howell

202. - The Emergent Risks of Food Waste Recovery: Characterizing the Contaminants in MSW Organics from Different Sources

I. Astha Thakali *
II. Jean Macrae

203. - A longitudinal test of the mediating roles of negative problem orientation and perceived stress in predicting changes in depressive symptom severity

I. Natalie Holbrook *
II. Michelle Buffie
III. Douglas Nangle

204. - An Evaluation of the Impacts of the Maine Shrimp Fishery Moratorium

I. Beth Campbell *
II. Hunter Tubbs
III. Stephanie Hurd
IV. Jacquelyn Gill

205. - Phone Use Habits and Microbial Density

I. Ella Glatter *
II. Jennifer Perry

206. - Evaluating Biological and Chemical Characteristics in Kombucha Treatments Enhanced with Maple Products

I. Kilee Nile *
II. Jennifer Perry

207. - Biopsychosocial Factors Contributing to Maine's Unintentional Opioid Overdose Deaths

I. Ashley McAllister *
II. Faith Norton
III. Kelly McCarthy
IV. Cary Millbury
V. Elizabeth Armstrong

208. - Bioinspired Vascularized Polymers for the Delivery of Bioactive Compounds at Surfaces

I. Benjamin Chasse *
II. Kayla Marquis
III. Caitlin Howell

209. - Fighting Flower

I. Anna Soule *
II. Susan Smith

210. - Scale-Up of Biodegradable Golf Balls Comprised of Lobster Shell

I. Rosamond Hickey *
II. David Neivandt

211. - Frame of Mind: #1 In Between Relative & Absolute - #2 Frost Bitten & Flame Burnt - #3 internal/external=hidden/revealed=in>side

I. Anna Soule *
II. Susan Smith

212. - Examining Glacier Instabilities: A Case Study of Turner Glacier

I. Andrew Nolan *
II. William Kochtitzky
III. Karl Kreutz
IV. Robert McNabb
V. Ellyn Enderlin

213. - A Lateral Field Excited Acoustic Wave Sensor for Detecting Cancer Biomarkers

I. Bailee Bartash *
II. Nuri Emanetoglu

214. - Production and Validation of a Fluorescent Ligand Specific to Zebrafish Neutrophils

I. Sadie Novak *
II. Matthew Brichacek

215. - Genetic analysis of fungal toxin candidalysin in pathogenic Candida albicans causing yeast infections

I. Jane Van Der Schaaf *
II. Robert Wheeler

216. - Yttria-Stabilized Zirconia Thin Films on Langasite Substrates for Harsh Environment Gas Sensor Applications

I. Firas Mahyob *
II. Robert Lad

217. - Optical-based methods used to detect phytoplankton community composition in the North Atlantic Ocean

I. Alison Chase *
II. Emmanuel Boss

218. - SLEEVE: Combining medical simulation technology into a low-cost, wearable device for the training of nursing students

I. Austin Steward
II. Anna Webber *
III. Dan Lesko
IV. Caitlin Howell

219. - Using Green Crab to Produce Nutritious Dog Treats

I. Anna Smestad *
II. Angela Myracle

220. - Prevalence, patterns, and potential health impacts of a tick-borne pathogen in Maine moose (Alces alces)

I. Caroline Dickson *
II. James Elliott
III. Lee Kantar
IV. Sandra De Urioste-Stone
V. Anne Lichtenwalner
VI. Pauline Kamath

VI. Pauline Kamath

221. - Genomic and proteomic effects of Red Raspberry (Rubus idaeus) consumption on inflammation in perivascular adipose tissue of the obese Zucker rat, a model of human metabolic syndrome

I. Jasmine Waite *
II. Natalie VandenAkker
III. Dorothy Klimis-Zacas

222. - Tick-borne Disease Exposure Risk in Acadia National Park

I. Sara McBride *
II. Lucy Guarnieri
III. Allison Gardner

223. - Feminism and Political Partisanship

I. Taylor Cray *
II. Susan Gardner

224. - Novel RORβ mutant displays characteristic “high-stepper” gait phenotype and retinal abnormalities.

I. George Murray *
II. Abby Tadenev
III. Robert Burgess

225. - The Components of Rapidly Deployable Structures Made out of Reinforced Thermoplastic Sandwich Panels

I. Adam Letourneau *
II. Roberto Lopez-Anido

226. - Origami-Inspired Design of Rapidly Deployable Structures

I. Anthony Verzoni *
II. Masoud Raisrohani

227. - Disruption of RanGEF Leading to a Decrease in Nuclear Transport Efficiency

I. Dakota Archambault *
II. Andrew Hart
III. William Simke
IV. Joshua Kelley

228. - Synthesis of Cellulose Nanofibril-Silver Nanowire Conductive Films

I. David Flewelling *
II. Muhammad Hossen

229. - The Effects of Activated Galpha on the Localization of Septin and MAP Kinase

I. Andrew Hart *
II. Joshua Kelley

230. - Voice Modification Therapy and the Quality of Life in Transgender Male-to-Female Adolescents

I. Kayla Nason *
II. Cierra Farrington
III. Amanda Peterson
IV. Kassidy Robidoux
V. Paige Lane

231. - Pipeline Development for the Rapid Identification of Chromothriptic Plants Following Genome Elimination

I. Charles-Alexandre Roy *
II. Han Tan

232. - Synthesis and Characterization of Piezoelectric AlN Thin Films Using Plasma-Assisted Electron-Beam Evaporation

I. Morton Greenslit *
II. Robert Lad

233. - Impacts of Invasive Plant Species on Mosquito Larvae Survival

I. Cassandra Steele *
II. Allison Gardner

II. Allison Gardner

234. - Multi-index summer flow regime characterization to inform environmental flow contexts

I. Nuha Abdullah *
II. Shaleen Jain

235. - Warming Eggs: Thermal Stress Response of Mitochondria in Developing Zebrafish Embryos:

I. Brynn Yarbrough *
II. Nishad Jayasundara

236. - Science Communication through Art and Neural Networks with Euglena

I. Brynn Yarbrough *
II. Nishad Jayasundara

237. - Effects of Commercial Nutrient Solutions on Growth of Lemon Basil (Ocimum basilicum var. citriodora ‘Mrs. Burns’)

I. Leala Machesney *
II. Bryan Peterson
III. Stephanie Burnett

238. - The Impact of Student Employment at the Advanced Manufacturing Center on Perceptions on Education and Employment Prospects

I. Mariya Pominova *
II. Megan Bailey

239. - Transmitter Retention Study

I. Jacob Stanton *
II. Erik Blomberg

240. - A framework of past, present, and future cultural responses to water stress in three distinct regions

I. Jennifer Smith-Mayo *
II. Rafa Tasnim
III. Joseph Mohan
IV. Jacquelyn Gill

241. - Body Mass Index as Predictor of Cognitive Decline and Sleep Quality in Aging Participants With or Without Mild Cognitive Impairment

I. Marta Herzog *
II. Ali Abedi
III. Cliff Singer
IV. Thane Fremouw
V. Ariel Bouchard
VI. Chris Gilbert
VII. Taylor Delp
VIII. Ahmed Almghasilah
IX. Katrina Daigle
X. Jessica Aronis
XI. Marie Hayes

242. - Citizens’ Preferences for Coastal Usage

I. Olga Bredikhina *
II. Keith Evans
III. Caroline Noblet

243. - Axial Rod Growth and Age Estimation of the Sea Pen Pennatula aculeata

I. Genevieve Wilson *
II. Richard Langotn
III. Rhian Waller

244. - The Effects of Image Saturation on Multifractal Statistics

I. Jeremy Juybari *
II. Andre Khalil

245. - ASSESSMENT AND RECOMMENDATIONS FOR AN ECOSYSTEM APPROACH TO KELP AQUACULTURE

I. Gretchen Grebe *
II. Carrie Byron

246. - The End of The Three Amigos: Trump’s Impact On The Canadian-Mexican Partnership

I. Ruben Torres *

247. - Synthesizing Amphiphilic Bottlebrush Block Copolymers for Anti-Marine Fouling

I. Hathaithep Senkum *

248. - Creating a sweet spot: How alternative forms of capital are valued by small- and medium-scale Maine maple syrup producers

I. Skye Siladi *
II. Jessica Leahy
III. Sara Velardi
IV. Melissa Ladenheim
V. Kourtney Collum
VI. Julia McGuire
VII. Cynthia Isenhour

249. - EFFECTS OF PARTICLE SIZE ON THE BIO-ACCESSIBILITY OF BIOACTIVE COMPOUNDS OF SUGAR KELP (Saccharina latissima) IN AN IN-VITRO SIMULATED GASTROINTESTINAL TRACT (GIT) MODEL

I. Praveen Sappati *
II. Balunkeswar Nayak

250. - Defining the Dynamics of β-arrestin During JC Polyomavirus Entry of Host Cells

I. Tristan Fong *
II. Colleen Mayberry
III. Kashif Mehmood
IV. Melissa Maginnis

251. - Invading Maine: Spatiotemporal trends of invasive plants and their non-native relatives

I. Kelcie Brown *
II. Seanna Annis

252. - The Archive: A Virtual Catalog of Machine-Learning Art

I. Eliza Bennett *
II. Sofian Audry

253. - Laboratory investigation of soil carbonation: comparison of soil treated with lime and Ground Granulated Blastfurnace Slag (GGBS)

I. SK Belal Hossen *
II. Warda Ashraf
III. Aaron Gallant

254. - All Things Considered: How Recreational Developments Effect Ecological and Social Ecosystem Services

I. Aly East *
II. Nicholas Fisichell
III. Aaron Strong
IV. Katharine Ruskin

255. - The Effect of Public-Place Smoking Ban on Drinking Behavior Among Different Ethnicities in the United States

I. Muntasir Rahman *
II. Angela Daley

256. - A program to construct chondroitin sulfate biopolymer models with biologically-relevant configurations

I. Elizabeth Whitmore *
II. Gabriel Vesenka
III. Hanna Sihler
IV. Olgun Guvench

257. - Gulf of Maine Sea-Surface Temperature During the Past 6,000 Years: Is Modern Warming Anomalous?

257. - Gulf of Maine Sea Surface Temperature During the Past 6,000 Years: Is Modern Warming Anomalous?

I. Jonathan Maurer *
II. Cassandre Stirpe
III. Katherine Allen

258. - Evaluation of Potential Anti-diabetic Effect of Green Crab Hydrolysates Derived by Commercially Available Enzymes

I. Bouhee Kang *
II. Denise Skonberg
III. Angela Myracle

259. - Quantifying tidally driven transport in the Jordan River estuary

I. Gwyneth Roberts *
II. Sean Smith
III. Lauren Ross

260. - Steric stabilization of phycobiliprotein loaded liposome through Polyethylene glycol and cellulose nanocrystals and their impact on gastrointestinal tract.

I. Avinash Singh Patel *
II. Balunkeswar Nayak

261. - Maine’s Forestry and Logging Industry: Forecasting with a Vector Error Correction Model

I. Jonathan Gendron *
II. Andrew Crawley

262. - Influenza A Inactivation Protocols for Studying Neutrophil Migration in Zebrafish

I. Brian Monahan *
II. James Barry
III. Mary Astumian
IV. Brandy-Lee Soos
V. Con Sullivan
VI. Paul Millard
VII. Carol Kim

263. - Theoretical study and design of a catalytic reaction using density functional theory: Acetic acid decarboxylation in the gas phase and on Mg(OH)2 nanosurfaces

I. Duwage Perera *
II. Jayendran Rasaiah

264. - Enhanced Properties of Liquid-Infused Paper for Bacteria Handling

I. Emily LeClair *
II. Caitlin Howell

265. - Risk Factors for Completed Suicides

I. Erica Batson *
II. Dorine Wright
III. Georgia Howland
IV. Andrea Steward
V. Elizabeth Armstrong

266. - Optimal Electrode Parameters and Contouring of Lateral Field Excited AT-Cut Quartz Crystal Microbalances for Improved Implementation in a Sensing System

I. Jequil Hartz *
II. John Vetelino

267. - Additive Metal Manufactured Stirling Engine

I. Quinn Campbell *
II. Michael Filiault
III. Kyle Rooney
IV. Brett Ellis

268. - An Exploratory Study of a Catheter-Based Direct Drug-Delivery System

I. Charles-Alexandre Roy

II. Samantha Steinberg
III. Caitlin Young
IV. Kirstie Belanger *

269. - Converging Traditional and Western Scientific Methods to Highlight Penobscot Sovereignty
I. Nolan Altvater *
II. Bridie McGreavy

270. - The Effects of European Fire Ants on Blacklegged Ticks in Acadia National Park
I. Lucy Guarnieri *
II. Sara McBride
III. Allison Gardner

271. - Alternative treatments for chronic bacterial infection of sheep and goats
I. Sarah Paluso *
II. Ann Bryant
III. Anne Lichtenwalner

272. - Dover-Foxcroft, Lynx Transportation Needs Assessment
I. Garrett Boardway *
II. Emily Berrill
III. Katie Cronin
IV. Souban Doualeh
V. Elizabeth Armstrong

273. - Narrative; Self and the External
I. Thomas Griffith *
II. Susan Smith

274. - Detection of Pesticide in Water by Cellulose Nanofibrils (CNF) Substrate
I. Muhammad Hossen *

275. - Quantifying Physiological Diversity of Wild Blueberries at a Single Site for Precision Agriculture
I. Aldous Hofmann *
II. Yongjiang Zhang

276. - Making science useful to decision-makers in the context of tidal power development
I. Gabriella Marafino *
II. Gayle Zydlewski
III. Teresa Johnson
IV. Jessica Jansujwicz

277. - Engineering a Biodegradable CNF Absorbent Pad for Veterinarian Devices Such as IDEXX SNAP Tests
I. Joshua Hamilton *
II. Muhammad Hossen
III. Michael Mason

278. - Design of a Traverse for Performing Flow Measurements of a Shellfish Nursery Upweller
I. Eric Lindbom *
II. Joshua Viekman
III. Michael Orne
IV. Andrew Goupee

279. - Exploring the dynamic relationship between Candida albicans, Pseudomonas aeruginosa and Fluconazole for improved candidiasis treatment
I. Anna-Maria Dagher *
II. Robert Wheeler

280. - Tessellation
I. Reed Hayden *
II. Susan Smith

281. - Perceptions of Aquaculture in Maine Coastal Communities: Examining Regional Differences and the Impacts of Aquaculture Knowledge

I. Erin Brown
II. Nicholas Alvarez *
III. Caroline Noblet

282. - Characterizing Cellular Uptake of Gold Nanoparticles and the Limitations of Surface Enhanced Raman Spectroscopy in Solutions

I. Charles-Alexandre Roy *

283. - Forming a Research-Practice Partnership to Integrate Computer Science into Middle School Science Instruction: Initial Explorations

I. Mia Callahan *
II. Laura Millay
III. Sara Lindsay

284. - Growing Up Cuban

I. Haley Nelson *
II. Margo Lukens

285. - Synthesis and Application of Cellulose Based Hydrogels for Anti-Biofouling in Marine Environments

I. David Rondeau *
II. William Gramlich

286. - Screening for Borrelia spp. bacterial infections in moose and winter tick populations in Maine

I. Jaycob Bowker *
II. James Elliott
III. Ann Bryant
IV. Pauline Kamath

287. - Dishing Out Creative Research Approaches to Political Women

I. Makenzie Baber *
II. Rachel Snell

288. - The Thermogenics of Bornean Treeshrews

I. Emily Gagne *
II. Danielle Levesque

289. - Development of azobenzene based photoswitches to modulate serotonin receptors

I. Ameya Karapurkar *
II. Michael Kienzler

290. - Potential value-added utilization of wood ash in construction materials

I. Naveen Saladi *
II. Edwin Nagy

291. - The Speciation and Prevalence of Intestinal Parasites in Farmed and Wild Deer in Maine

I. Kyle Alamo *
II. Anne Lichtenwalner

292. - Requiem, a sound installation about extinction

I. Steve Norton *
II. Susan Smith

293. - Modeling Wave Attenuation by Kelp Farms

I. Longhuan Zhu *
II. David Fredriksson
III. Kimberly Huguenard

294. - Hmong Americans and Mainstream Politics in St. Paul, MN

I. Thilee Yost *
II. Amy Fried

295. - Low-Dose Arsenic Exposure Further Impairs Innate Immune System Function in CFTR Morphant Zebrafis

I. Brandy-Lee Soos *
II. Liz Saavedra
III. Carol Kim
IV. Benjamin King

296. - Controlling the Strength of Carbonation Activated Binders Using Amino Acid

I. Mohammad Rakibul Islam Khan *
II. Warda Ashraf

297. - Investigating the Relationship Between Southern Ocean Temperature and Velocity Variability and Iceberg Melting Around Antarctica

I. Emily Miller *
II. Mariama Dryak
III. Thomas Andrew
IV. Ellyn Enderlin

298. - Photoswitching Azobenzene to Bind at Potassium Channels

I. Charlize Castro *
II. Michael Kienzler

299. - Synthesis and use of photoswitchable ligands for CRAC channel inhibition

I. Anwesha Sil *
II. Michael Kienzler

300. - Examining muscle contraction and angular acceleration to detect balance perturbation

I. Nicole McGrath *
II. Daniel Woodhouse
III. Vincent Caccese
IV. Babak Hejrati
V. Marie Hayes
VI. Sonia Naderi
VII. Ali Abedi

301. - Social Media: Is it harming your relationship?

I. Monica Pallin *
II. Claire Sullivan

302. - Unique Roles for Subpopulations of Nociceptive Fibers in Cancer-induced Bone Pain

I. Joshua Havelin *
II. Tamara King

303. - Aronia Berries Three Ways to Utilize in Value Added Products

I. Ashley Reynolds *
II. Amelia Sullivan
III. Angela Myracle

304. - Breaking down Maine’s forest-freshwater connections: in stream litter decomposition under riparian management

I. Kathleen Brown *
II. Mitchell Paisker
III. Ethan Cantin
IV. Hamish Greig

305. - Combinatorial Pathways to Resilience: A New Analysis from New England

I. Elizabeth Spear *
II. Andrew Crawley

306. - Phytoplankton community composition in relation to dimethyl-sulfide (DMS) in the North Atlantic Ocean

I. Faith Hoyle *
II. Lee Karp-Boss

307. - Analyzing residual stand damage under different harvesting methods in the Northern Maine Acadian Forest.

I. Noah Coogan *
II. Anil Kizha

308. - Sensory Innervation in Adipose Tissue

I. Emma Paradie *
II. Cory Johnson
III. Magdalena Blaszkiewicz
IV. Kristy Townsend

309. - Trans Women, Non-Binary Persons, and Motherhood

I. Juliet Williams *

310. - Fort Foster Time Machine

I. Annie Hepburn *
II. Sofian Audry

311. - Emotion Regulation and Adaptive Social Problem-Solving Predict Self-Regulation

I. Michelle Buffie *
II. Lauren Briggs
III. Melodie Godin
IV. Hannah Meidahl
V. Douglas Nangle

312. - Developing a Novel Approach to Estimate Reproductive Success of Black Bears in Maine

I. Griffin Archambault *
II. Bryn Evans
III. Alessio Mortelliti

313. - Developing eDNA sampling as a mechanism for improving marine mammal conservation.

I. Elizabeth Piotrowski *
II. Kristina Cammen

314. - FeedBack

I. Tyler Rollins *
II. Jon Ippolito

315. - Relay-Assisted Wireless Energy Transfer Scheduling with Dual Data-Energy Channel Models

I. Sonia Naderi *
II. Ali Abedi

316. - Shear Connectors for Hybrid Composite FRP-Concrete Bridge Girders

I. Dante Guzzi *
II. William Davids

317. - H4Q LGBT Resource Application

I. Robert Millett *
II. Jon Ippolito

318. - Inpatient Psychiatric Services in Rural Hospitals of the United States and Canada and Mental Health Outcomes between Regions: A Case Study of Maine and New Brunswick

I. Dominic Gayton *
II. Angela Daley

319. - Microscopia: A Museum of Organisms Created with SEM Photogrammetry

I. Ian Donnelly *
II. Sofian Audry

320. - Purchasing Approval System

I. Justin Alcorn *
II. Syed Akhtar

III. Ben Bailey
IV. Kyle Goodale
V. Brian Westhoven
VI. Terry Yoo

321. - Assessing the effectiveness of trail cameras with attractants to detect northeastern mammals
I. Michael Buyaskas *
II. Alessio Mortelliti

322. - Analytical Invertigation of Aquacutlrue Farm Impacts on Esturine Dynamics
I. Zhilong Liu *
II. Lauren Ross
III. Kimberly Huguenard

323. - Inorganic Nature: A Study of Textures in Printmaking
I. Delaney Burns *
II. Andy Mauery

324. - Deforestation, extractive land use, and disease epidemics in Venezuela: an emerging humanitarian crisis
I. Chelsea Fairbank *
II. Ailish Scott
III. Alyssa Marini
IV. Jacquelyn Gill

325. - Multi-sensory Immersive Environment
I. Cullen Shortt *
II. Nimesha Ranasinghe

326. - Towards an improved topographic wetness index for watershed storage characterization
I. Prashanta Bajracharya *
II. Sean Smith
III. Daniel Coker
IV. Shaleen Jain

327. - KLEAR Packaging- Think Outside The Box
I. Haley Campbell *
II. Jon Ippolito

328. - Photoswitchable CRAC Channel Inhibitors
I. Ryan Bray *
II. Michael Kienzler

329. - The Impact of Nurse Residency Programs
I. Michelle Harding *
II. Patricia Poirier

330. - Better Understanding Aquaculture: How Economic Information Impacts Citizen Sentiment
I. Charles Jones *
II. Caroline Noblet

331. - Simulating UAV Flight for Designing an Extended Kalman Filter
I. John Goulet *
II. Samuel Hess
III. Charles Hess

332. - Changing resources in a changing climate: chronicles of livelihood adaptability in the Gulf of Maine
I. Abby Mann *
II. Alessandro Mereghetti
III. Caroline Reed
IV. Suman Acharya
V. Jacquelyn Gill

333. - Extreme precipitation in Maine: What is the role of atmospheric rivers?

I. Adrianne Lovuolo *
II. Shaleen Jain

334. - Geometer’s Planetarium: Implementing Dynamic Alteration of Scale

I. Joseph Haney *
II. Justin Dimmel

335. - GROWING CONCERNS: ASSESSING THE HEALTH AND WELL-BEING OF MAINE’S AGING FARMERS

I. Jennifer Jain *
II. Elizabeth Depoy

336. - Identifying a Candidate Gene for Neuromuscular Disease using a Forward Genetics Approach

I. Paige Martin *
II. Jenn Stauffer
III. Greg Cox

337. - Maine Agriculture Apps

I. Jack Lampinen *
II. Joline Blais

338. - The Relationship between Resilience and Coping on Adverse Health Effects within the LGBTQ Community

I. Sophie Hubbert-Severance *
II. Susan Gardner

339. - Aging Farmers Study

I. Melissa Wone *
II. Margaret Knapp
III. Megan Dow
IV. Elizabeth Depoy

340. - Nonlinear heat conduction theory

I. Benjamin Thompson *
II. Aaron Joy

341. - Anti-Microbial Properties of Cellulose Nanofibrils

I. Abigail Weigang
II. Katherine Kirk *
III. Caitlin Howell

342. - Perceptions and Barriers to the Utlization of Needle Exchange Programs

I. Theresa Murray *
II. Mary Tedescoschneck

343. - Mothering Soldiers: Connections Between 19th Century Motherhood and Civil War Nurses

I. Brianna Ballard *
II. Liam Riordan

344. - Morphosis

I. Nick Dieffenbacher-Krall *
II. Sofian Audry

345. - Bridging the Gap: Community-based Food Scrap Diversion

I. Taylor Patterson *
II. Travis Blackmer

346. - Augmented Coffee Experience

I. Jonathan Roman Bland *
II. Nimesha Ranasinghe

347. - Optical Metabolic Investigation of Lobster Hemocyanin Anti-Cancer Effects Using a Home-Built Two-Photon System

I. Patrick [illegible] *

I. Patrick Breeding *
II. Mitchell Harling
III. Karissa Tilbury

348. - Themes in Political Rhetoric Regarding Reproductive Rights in Maine
I. Hilary Thibodeau *
II. Elizabeth Depoy

349. - Temporal and Spatial Variation of Aquatic Invertebrate Communities Within Riverine Rock Pools in Maine
I. Chase Gagne *
II. Hamish Greig

350. - Ice Cores and Hydroclimate in the St. Elias Mountains of Yukon, Canada
I. Erin McConnell *
II. Karl Kreutz

351. - Tweets, trust & pixie dust: understanding credibility in the age of social media
I. Olivia Reese *
II. Judith Rosenbaum

352. - Refining the James Webb Space Telescope NIRSpec's Post-Pipeline Data Analysis
I. Alex Koch *
II. David Batuski

353. - Clownfish (Amphiprion clarkii) and mitochondrial development with thermal stressors
I. Andrea Ramirez *
II. Bryce Risley
III. Remy Babich
IV. Nishad Jayasundara

354. - Addressing the World Language Teacher Shortage: How Can the Franco-American Centre Support French Programs Under Pressure in Maine?
I. Hadley White *
II. Susan Pinette

355. - A Virtual Reality Based Aid for Studying Medicine
I. Brad Butler *
II. Nick Giudice

356. - Explaining the Resilience of the Balochistan Insurgency
I. Tiffany Tanner *
II. Asif Nawaz

357. - Infection Dynamics of an Acanthocephalan Parasite Profilicollis botulus in the Green Crab Carcinus maenas (L.) on the Coast of Maine
I. Tyler Van Kirk *
II. Ian Bricknell

358. - Social and ecological factors influencing the sustainability of intertidal clam aquaculture
I. Molly Miller *
II. Teresa Johnson

359. - Linear and nonlinear responses to Nor'easters coupled with Sea Level Rise: A tale of two bays
I. Stephen Moore *
II. Huijie Xue

360. - ASSESSING BEHAVIOURAL BIOASSAYS FOR THE COPEPODID STAGE OF PARASITIC SEA LICE
I. Robert Morefield *
II. Seth Tyler
III. Heather Hamlin

361. - Effects of Exercise on Stride Length in Older Adults
I. Jenna Paul *

I. Jenna Paul
II. Jennifer McNulty
III. Christopher Nightingale

362. - Characterization of artificial weed anchorage forces in comparison with selected weed-crop anchorage force profiles.
I. Bradley Smith *
II. Eric Gallandt

363. - There's a meme for that: Understanding the role of memes in daily communication
I. Christian Powell *
II. Judith Rosenbaum

364. - An investigation into the photochemical properties of cyclized-Azobenzene photoswitches.
I. Cody Gigac *
II. Michael Kienzler

365. - Ending the Stigmatization of Sexually Transmitted Infections
I. Briana Murphy *
II. Susan Gardner

366. - Biomass Enabled Three-dimensional Porous Nanostructures for High-performance Supercapacitors
I. Ethan Poland *
II. Min Wang
III. Yingchao Yang

367. - Age-Related Peripheral Neuropathy in the Adipose Organ
I. Jake Willows *
II. Magdalena Blaszkiewicz
III. Morganne Robinson
IV. Cory Johnson
V. Kristy Townsend

368. - Mental Time Machine
I. Aylah Ireland *
II. Susan Smith

369. - Intergenerational Adult Day Services Needs Assessment
I. Leah Kravette *
II. Sandra Butler
III. Lenard Kaye
IV. Dyan Walsh
V. Jennifer Crittenden

370. - Continuous high frequency nitrogen and ammonia monitoring system in Casco Bay, Maine
I. Megan Amico *
II. Kathleen Thornton
III. Kate Liberti
IV. Damian Brady

371. - Implications of Vocalizations on Conservation of Large Carnivores (Ursidae, Canidae, Felidae)
I. Evalyn Machia *
II. Julia McGuire

372. - Neuroplastic Autopoietics, A Life Practice.
I. Joshua Couturier *
II. Susan Smith

373. - Fabrication of anti-oxidant Cellulose Nano-Fibers (CNF) and Kappa-Carrageenan (KC) based polysaccharide films for potential edible packaging applications
I. Suriyaprakaash Lakshmi Balasubramaniam *
II. Balunkeswar Nayak

374. - Synthesize and characterization of biological grade Hydroxyapatite using Hydrothermal method

I. Sahar Roozbahani *

375. - DEVELOPMENT OF AN ELECTRICAL INTERFACE FOR LATERAL FIELD EXCITED SENSOR

I. Thomas Leighton *
II. Nuri Emanetoglu

376. - Holocaust Ghettos Project

I. Jordan Morace *
II. Dakota Gramour
III. Caitlyn Rooms
IV. Hailey Cedor

Abstract ID :
UMSS1926

Attitudes Towards Immigration Following the 2018 Family Separation Crisis: Content Analysis of Tweets in The Washington Post vs Fox News

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 141
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Rebecca Blodgett [1] *
Undergraduate

Author Name : Vincent Eze [2]

Author Name : Ariana Cruwys [3]

Author Name : Sandra Caron [4]

Abstract Description : In May 2018, the Trump administration implemented a “zero-tolerance” policy on immigration, essentially treating asylum seekers as criminals and creating a crisis at the U.S.-Mexico border. Parents and children were separated, causing outrage among the general population. In response, the zero-tolerance policy was rescinded in June, and a federal judge ordered children to be reunited with their parents. This study used content analysis of 395 tweets from June and October articles in the Washington Post and FOX News about the immigration crisis. Tweets were coded in two ways: 1) Pro-immigration or anti-immigration sentiment, and 2) Reasons for opinions on immigration. The analysis revealed that tweets about immigration fell within five categories: Legality, Economic Concerns, Human Rights, Crime, and Morality. Not surprising was the finding that tweets from The Washington Post, a liberal news source, were more pro-immigration than Tweets from FOX News, a conservative news source. However, when looking over time, both news sources showed a decline in pro-immigration Tweets and an increase in anti-immigration tweets between June and October. By October, a majority of Tweets from both news sources were anti-immigration. Results also revealed that commenters were more concerned with whether immigration was “right” or “wrong” than how immigration would concretely affect them. Many comments showed a lack of understanding on immigration issues, including the lack of knowledge of laws, policies and rights for those who seek asylum, and point to the need for education. Implications of the findings and for future research will be discussed.

Abstract ID :
UMSS19130

FitBit Sleep Monitoring and PSQI Measurement

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 150

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Lindsey Lagerstrom [1] *
Undergraduate

Author Name : Taylor McMillan [2]

Author Name : Erika Pacheco [3]
Undergraduate

Author Name : Fayeza Ahmed [4]

Abstract Description : Sleep disturbance is common and has been found to lead to neurocognitive dysfunctions such as attention problems, depression, anxiety, stress and a lack of impulse control[1]. In order to fully investigate these cognitive and emotional domains, clinicians and researchers rely on self-report measures and actigraphy devices to collect sleep data. Further, there is an increase in use of actigraphy devices in the general public, as more people are interested in objectively tracking various health metrics such as activity and sleep. This trend is expected to grow to approximately ninety-nine million being sold this year (2019) [2]. However, self report measures for sleep monitoring remain the most practical and cost-efficient tool to use in clinical practice. The most widely used of these measures is the Pittsburgh Sleep Quality Index (PSQI). The PSQI is also regarded as having the strongest evidence of reliability and validity in practice[3]. The current study aims to directly compare the results of both sleep quality monitoring via FitBit Alta, a popular device used among the general public, and the PSQI self-report scale among undergraduate students. Variables included hours of sleep and number of awakenings across both PSQI and Fitbit. Results are forthcoming, as data collection is still in progress.

Abstract ID :
UMSS19415

Intergenerational Adult Day Services Needs Assessment

Abstract Topic : Social Sciences

Submission Type : Exhibit
Submission# : 106
Graduate

Judge Time Slot : PM2 (2:30 - 3:30)

Author Name : Leah Kravette [1] *
Graduate

Author Name : Sandra Butler [2]

Author Name : Lenard Kaye [3]

Author Name : Dyan Walsh [4]

Author Name : Jennifer Crittenden [5]

Abstract Description : The Intergenerational Adult Day Services (ADS) Needs Assessment Project grew out of a collaboration of stakeholders interested in creating an intergenerational ADS program in the greater Bangor area. The need for this program became evident through focus group research conducted in 2016, in which participants in the Bangor area indicated a need for respite services for caregivers and more intergenerational programs. This exploratory research expands on the 2016 findings to explore the need for adult day services in the greater Bangor area. Quantitative data were collected from 84 caregivers who completed a survey administered by staff at a local area agency on aging. To complement the quantitative data collection, a member of the research team collected qualitative data through semi-structured interviews with ten key informants at ADS programs in Maine as well as key informants who work closely with older adults. Key barriers to ADS noted for caregivers included not knowing such services exist, cost, and being satisfied with current care arrangements. However, 71% of respondents shared that if they did use ADS, it would be to relieve stress, indicating that respite services are needed. Results from key informant interviews illustrated the difficulty of starting and maintaining ADS programs, which can require a significant up front investment. Even when participation in ADS is covered by insurance, reimbursement is often not enough to to cover the costs of running the program. Implications include the need for expanding ADS program access, while balancing the challenges noted regarding starting and sustaining such programs.

Abstract ID :
UMSS1976

#youronlinebaggege - A Socially Engaged, Graduate Art Endeavor

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 700

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Rachel Church [1] *
Graduate

Author Name : Anna Martin [2]
Graduate

Author Name : Arturo Camacho [3]
Graduate

Author Name : Susan Smith [4]

Abstract Description : #youronlinebaggage is a collaborate, socially engaged art project that aims to educate college-aged students in contentious topics around social media. This includes privacy concerns, cyberbullying, and the long-term impact their posts can have on their futures. We will achieve this by engaging students through social media, using the hashtag #youronlinebaggage, as well as the project's website, youronlinebaggage.wordpress.com. The collaborative will engage students across campus through distribution of stickers and with pop-up performances of 50ZL, the collaborative's mobile, remote-controlled, projection unit.

Abstract ID :
UMSS1932

A Content Analysis Television Family Sitcoms 1950-Present: A Comparison to United States Census Data on Family Structure

Abstract Topic : Education

Submission Type : Poster

Submission# : 504

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Jamie Hornsby [1] *
Undergraduate

Author Name : Sandra Caron [2]

Abstract Description : Abstract It is well known that television sitcoms do not always reflect reality (e.g., McLanahan & Percheski, 2008; Pomerantz, 2004), but it is not clear how far such shows are from reality. This study used content analysis to compare the portrayal of families in the most popular television family sitcoms to the United States Census data for families. The study focused on the time period from 1950 to 2010. Nielsen ratings provided information on the top ten family sitcoms and family-centered shows of each decade. A content analysis was conducted of the family structure within the ten most popular shows that aired during each of the seven decades. Two-parent households, divorced couples, and number of children were analyzed, and comparisons were made to the U.S. Census data (2017) for that decade. In our content analysis, we found that two-parent families continue to dominate television sitcoms. In addition, there is a greater diversity of family forms, both in TV and in real life. These findings provide implications for viewers as well as producers of television shows. In terms of television viewers: television impacts how people view society as well as themselves. Families in television sitcoms model family life and have been viewed as important socializing agents, as they offer lessons about what is seen as appropriate family life. In terms of television producers: they need to consider the diversity of families and opportunities to more accurately reflect families.

Abstract ID :
UMSS19275

A framework of past, present, and future cultural responses to water stress in three distinct regions

Abstract Topic : Interdisciplinary

Submission Type : Poster
Submission# : 613
Judge Time Slot : AM2 (11:00 - 12:00)
Graduate

Author Name : Jennifer Smith-Mayo [1] *
Graduate

Author Name : Rafa Tasnim [2]
Graduate

Author Name : Joseph Mohan [3]

Author Name : Jacquelyn Gill [4]

Abstract Description : Changing water supplies have been and continue to be a critical issue causing cultural shifts and forcing human migration across geo-political boundaries. In 2018, the Intergovernmental Panel on Climate Change (IPCC) predicted that water stressors will increase in both frequency and amplitude due to redistribution of the global water supply. Water stress causes human suffering by reducing access to fresh water, decreasing food production, and damaging viability of land. This hardship affects developed regions, but can be devastating in least-developed and developing regions that do not have the resources or infrastructure to implement water-management plans. Here we present three case studies of regions in different stages of development that have had well-documented responses to past water stress and are predicted to undergo dramatic water stress associated with future climate change. The examples provided outline water stress induced in three distinct manners: consciously induced drought in a least-developed region (African Rift Valley); unconsciously induced drought in a developed region (Southwest United States); and unconsciously induced flooding in a developing region (Bangladesh). By approaching this review through an interdisciplinary lens, we aim to bring attention to the potential hardships future climate-induced water stress may have on least-developed and developing regions. The case studies conclude that these regions are at the greatest risk from water stresses and without water management plans may face increased poverty, mass migration, and civil unrest. Proposed solutions are inclusionary intergovernmental meetings to share, plan, and provide water management and renewable energy strategies, financial support, and relocation immigration policies.

Abstract ID :
UMSS19247

A Lateral Field Excited Acoustic Wave Sensor for Detecting Cancer Biomarkers

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 252

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Bailee Bartash [1] *
Undergraduate

Author Name : Nuri Emanetoglu [2]

Abstract Description : Testing for and diagnosing cancer is a notoriously invasive and time-consuming procedure, especially using tissue biopsy. Tissue biopsy also relies on physical indicators, such as tumors, and this makes certain cancers very difficult to diagnose. Successful cancer treatment lies in detecting the cancer as early as possible. The purpose of this research was to investigate the possibility of utilizing the lateral field excited (LFE) device to detect biomarkers using liquid biopsy. Specifically, this research focused on sensing circulating tumor DNA (ctDNA) as an indicator for pancreatic cancer. Pancreatic cancer was the chosen disease because of late clinical presentation making treatment nearly impossible. Currently, Dartmouth College has a leading research group developing a localized surface plasmon resonance (LSPR) sensor for pancreatic cancer that uses gold nanorods with attached peptide nucleic acid (PNA) to attract mutKRAS, the ctDNA of choice. Collaboration is ongoing with Dartmouth researchers to understand the LSPR sensor, it's abilities and limitations, and to produce an LFE sensor that can exceed the LSPR capabilities. Testing has been completed to find the ideal electrode configuration for the LFE sensor platform and two samples were produced and tested with varying sensor surface curvature. Future work includes testing the samples in a system very similar to Dartmouth's, and also modifying the PNA to attach directly to the LFE quartz crystal.

Abstract ID :
UMSS19236

A longitudinal test of the mediating roles of negative problem orientation and perceived stress in predicting changes in depressive symptom severity

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 128

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Natalie Holbrook [1] *
Graduate

Author Name : Michelle Buffie [2]
Graduate

Author Name : Douglas Nangle [3]

Abstract Description : Background: Having a negative problem orientation (NPO; viewing problems as unsolvable) plays a significant mediating role in the impact of stressful life events on depression (D'Zurilla & Nezu, 2010). In the relational/problem-solving model of stress and wellbeing (D'Zurilla & Nezu, 2001), increased stress, higher levels of NPO, and decreased wellbeing are posited to exert transactional influences over time. A true test of the model requires a longitudinal design, yet the majority of existing studies have been cross-sectional. Additionally, despite the proposed transactional nature of the model, most studies only tested NPO as a mediator (Nezu, 2004). It is equally important to test stress as a mediator (Kant et al., 1997). The current study addressed both gaps by using a longitudinal design, and testing the model using both NPO and stress as mediators. Method: Undergraduates ($N = 299$) completed the Social Problem-Solving Inventory-Revised, Perceived Stress Scale, and Center for Epidemiologic Studies Depression-Revised, three times, two weeks apart. Results: Pearson correlations for all measures were positive (p's $< .001$). Two mediational regressions were conducted using PROCESS (Field, 2014) with Time 1 depressive symptoms as a covariate and Time 3 depressive symptoms as the outcome. As hypothesized, perceived stress at Time 2 emerged as a significant mediator in the model with Time 1 NPO ($b = .1085$, CI [.0544, .1693]) as the independent variable, accounting for 7.9% of the variance. Contrary to expectations, Time 2 NPO did not emerge as a significant mediator in the model with Time 1 perceived stress as the independent variable. Conclusion: Support for the relational/problem-solving model was mixed. Stress mediating the NPO/depression relationship is consistent with the stress-generation hypothesis: those prone to depression may behave in ways that contribute to the occurrence of negative life events, which generates more stress and thereby increases risk for depression (Davila et al., 1995). Clarifying the interactive influences of NPO and stress will require more research and a shift away from cross-sectional designs.

Abstract ID :
UMSS19293

A program to construct chondroitin sulfate biopolymer models with biologically-relevant configurations

Abstract Topic : Biomedical Sciences

Submission Type : Exhibit
Submission# : 802
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Elizabeth Whitmore [1] *
Graduate

Author Name : Gabriel Vesenka [2]

Author Name : Hanna Sihler [3]

Author Name : Olgun Guvench [4]

Abstract Description : Chondroitin sulfate (CS) is one of the most abundant proteoglycan carbohydrate biopolymers in the body and may contain hundreds of repeating disaccharide units. Atomic-resolution simulations of large systems are computationally taxing so we aimed to find a more efficient method of modeling biologically-relevant CS polymers. We developed a program that applies conformations from unbiased all-atom explicit-solvent molecular dynamics (MD) simulations of non-sulfated chondroitin 20-mers. Our program was used to construct non-sulfated chondroitin 20-mer models with conformations from MD-generated chondroitin 20-mers. We applied phi/psi dihedral angles of glycosidic linkages from MD-generated ensembles to our program and noticed a subtle difference in end-to-end distance distributions of constructed and MD-generated ensembles suggesting that there are other factors contributing to backbone flexibility. Next, we applied monosaccharide ring dihedrals from the MD-generated ensembles to our program and found that these contribute to end-to-end distance. Bond lengths and angles are also contributing factors and application of these data from MD-generated ensembles is necessary to produce biologically-relevant configurations. Each ring and linkage conformation was treated independently in construction so we checked for interactions between different linkages and rings by incorporating short simulations to minimize the energy of each configuration and examining resulting bond lengths. To validate application of 20-mer conformations to construct polymers of different lengths, we constructed chondroitin 10-mer ensembles and compared to 10-mer simulations. For each polymer length (20-mer and 10-mer), constructed and MD-generated ensembles had matching conformations and end-to-end distances indicating that our program can efficiently construct biologically-relevant CS polymer models of arbitrary length.

Abstract ID :
UMSS19116

A self-fulfilling prophecy in friendships: Rejection sensitivity and hostility as predictors of poor friendship quality

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 127

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Laura Andrews [1] *
Graduate

Author Name : Natalie Holbrook [2]
Graduate

Author Name : Cynthia Erdley [3]

Abstract Description : Rejection sensitive people tend to anxiously expect, readily perceive, and overreact to rejection. This disposition has been associated with maladaptive behavioral responses and poor relationship outcomes. To date, the rejection sensitivity (RS) literature has focused on romantic relationships in young adulthood, leaving much unknown about friendships, a central relationship of this period. The current study examined RS and hostility as predictors of friendship discord and closeness in young adults. We hypothesized that increased RS and hostility would predict reduced closeness and increased discord in friendships. A college sample completed a battery of self-report questionnaires to assess RS, hostility, and friendship quality. Regression analyses indicated that RS and hostility account for 10 and 13% of the variance in friendship closeness and discord. Hostility emerged as the strongest predictor of reduced closeness and increased discord, and RS accounted for a significant amount of additional variance. Findings extend prior research with romantic relationships and indicate that rejection sensitivity and associated behavioral responses predict poorer quality friendships. Rejection sensitive people are characteristically fearful of possible rejection from others and tend to respond to perceived rejection experiences in maladaptive ways (e.g., hostility). These concerns and reactions may serve as a self-fulfilling cycle and inadvertently contribute to their feared outcomes: rejection from friends evidenced by reduced closeness and increased discord. Interventions targeting more adaptive responding may be particularly beneficial for RS individuals to improve close relationships and overall social functioning.

Abstract ID :
UMSS19401

A Virtual Reality Based Aid for Studying Medicine

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 215
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Brad Butler [1] *
Undergraduate

Author Name : Nick Giudice [2]

Abstract Description : The human muscular system is an incredibly complex, multilayered mesh of bundled muscle tissue that works together to move the body. Learning the inner workings of this system can be very difficult through just traditional lecturing and memorization methods that are currently in use. This is due to a large number of individual muscles in the body, which must be understood as working in tandem with one another to generate movement. I have proposed an observational virtual simulation for students studying human anatomy, that will allow users to see the human muscular system performing various movements while also highlighting muscles in tension and compression with distinct colors. This provides a unique perspective for the students that is designed to ease this learning process. A study was performed to test students ability to learn through the virtual simulation compared to traditional methods of learning such as reading texts and analyzing images. Successfully using virtual simulation to ease the learning of complex anatomy and physiology could be applied far beyond just the muscular system. In order to test this idea, participants were tested on their knowledge then they used the proposed method of learning or traditional methods such as textbooks to learn the material then they will be tested again to see if there is a change in their understanding of the material.

Abstract ID :
UMSS19198

Activator Protein CARD9 and Interleukin-23's Involvement in Innate Immunity to Candida albicans infection in Zebrafish

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 841

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Emma Bragdon [1] *
Undergraduate

Author Name : Brian Elsemore [2]
Undergraduate

Author Name : Robert Wheeler [3]

Abstract Description : Candida albicans is a commensal yet opportunistic pathogen. Candida albicans is found in 70% of adults, but can be fatal in immunocompromised individuals. The innate immune system is the first line of defense when foreign bodies enter a system. It recognizes a threat as soon as possible and recruits phagocytes to the threat site. Literature suggests CARD9 and Interleukin 23(IL-23) play crucial roles in the immune response. CARD9 is an activator protein involved in the reception and activation cascade starting from the time of infection to recruitment of immune cells. IL-23 has been found to communicate to naive CD4 T cells causing a heightened immune reaction. A larval zebrafish model is a great way to understand and visualize how pathogens interact with the immune system. This model allows for visualization of the interaction between immune cells and C. albicans in vivo. CRISPR is a genome editing tool that was utilized to remove a target sequence in the gene of interest and can be taken advantage of to effectively remove an entire gene. Breeding CRISPR generated mutant fish will result in a homozygous fish for the mutation, using zebrafish expressing fluorescent immune cells the recruitment and viability of the immune cells can be monitored in real time. To determine the mutation present, the fish were genotyped. We obtained genomic DNA from a small piece of the tail fin; we then performed PCR with gene-specific primers and separated DNA fragments by gel electrophoresis. Using mutant fish expressing fluorescent immune cells in C. albicans infection, the role of CARD9 and IL-23 can be observed and analyzed to draw conclusions on their role in innate immune response.

Abstract ID :
UMSS19304

Additive Metal Manufactured Stirling Engine

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit
Submission# : 218
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Quinn Campbell [1] *
Undergraduate

Author Name : Michael Filiault [2]

Author Name : Kyle Rooney [3]

Author Name : Brett Ellis [4]

Abstract Description : Additive manufacturing of metals (AMM) is an emerging technology capable of producing complex geometries having significant advantages compared to subtractive machining, including up to 95% reduction in number of parts in subassemblies [1], 88% reduced lead times [2], and 40% reduced part weights [1,3]. Although offering significant manufacturing advantages, conventional AMM processes such as Selective Laser Sintering (SLS) and Electron Beam Melting (EBM) are relatively expensive and require extensive safety systems. A recently-developed and -commercialized AMM process, Bound Metal Deposition (BMD), seeks to address these concerns. BMD consists of three steps: (1) extrusion of a metal powder-binder filament to form a green-state part; (2) debinding the majority of the binder from the metal powder to form a brown-state part; and (3) sintering the metal powders to form the solid, sintered part. This research seeks to explore the capabilities and constraints of BMD by designing and manufacturing a functioning beta-type Stirling engine. A functioning Stirling engine converts temperature differences to mechanical work and contains many design challenges for BMD, including sliding interfaces that must seal pressure differentials, heat transfer, differential thermal expansion, and wear surfaces. Results will include design considerations, printer precision and accuracy, post processing requirements, thermo-mechanical characterization, and a financial analysis. Although BMD offers the opportunity for many companies to leverage AMM for economic development, companies are slow to adopt new technology due to uncertainties. This work is significant in that BMD processes are explored and characterized, thus allowing more companies to understand and adopt this exciting technology. Figure 1: Rendered picture of the final design of the Stirling engine

Abstract ID :
UMSS19400

Addressing the World Language Teacher Shortage: How Can the Franco-American Centre Support French Programs Under Pressure in Maine?

Abstract Topic : Education

Submission Type : Exhibit

Submission# : 501

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Hadley White [1] *
Undergraduate

Author Name : Susan Pinette [2]

Abstract Description : This project centers around the world language teaching shortage in Maine public high schools, which is creating critical difficulties in ensuring the resources to meet standards and student educational needs. As a teacher candidate in the French language, this topic is immediately relevant personally and professionally and this was the primary motivation behind investigating the shortage. I conducted personal interviews with currently practicing French teachers from around the state and used the compiled answers to identify supports for the programs to be created in conjunction with the Franco-American Centre at the University of Maine. Participating teachers were asked questions about their perspectives on the statewide shortage, their experiences with meeting state standards under the constraints of their program, and the specific needs of their classroom. The responses largely addressed difficulty finding content and sources relevant to changing standards, planning lessons that would meet the needs of the current student population, and making world language and culture relevant to student interests and aspirations. The resulting resources in development include prepared standards-based lessons and content sources, as well as future efforts to bring speakers to Maine classrooms as a cultural exposure opportunity. As part of the greater impact of the project, I will continue working with the Franco-American Centre to create partnerships with French teachers and evolving the support plan as necessary. For both the academic community and the public, this project works to ensure that Maine students will be given educational equity in culturally and professionally significant skills.

Abstract ID :
UMSS19413

Age-Related Peripheral Neuropathy in the Adipose Organ

Abstract Topic : Biomedical Sciences

Submission Type : Oral
Submission# : 863
Judge Time Slot : AM2 (11:00 - 12:00)
Graduate

Author Name : Jake Willows [1] *
Graduate

Author Name : Magdalena Blaszkiewicz [2]

Author Name : Morganne Robinson [3]

Author Name : Cory Johnson [4]

Author Name : Kristy Townsend [5]

Abstract Description : Peripheral innervation of adipose tissue, both white (energy storing) and brown (energy expending) depots, is crucial for maintaining healthy metabolic function and energy balance. Important processes such as lipid breakdown, production of new adipocytes, thermogenesis, and browning (conversion of white adipocyte to a healthier inducible brown adipocytes) all require regulation via peripheral sympathetic nerves. Without sufficient regulation from the nervous system adipose tissue can become diseased, hypertrophic and inflamed. Peripheral neuropathy (the dying back of nerves) in extremities has been well documented particularly in the diabetic population as well as with aging. We have shown for the first time that age-related peripheral neuropathy extends beneath the skin to the subcutaneous white adipose depots of mice. This decrease of innervation was most pronounced around the vasculature of the adipose depots. Following from these findings, we have further investigated adipose vascular neuropathy in the longevity mouse line HET3 in an attempt to answer the following questions: Do HET3 mice replicate the neuropathic phenotype? Are there sex differences in age-related neuropathy? Are all nerve types affected or just specific subsets? Are more than just vascular associated nerves effected?

Abstract ID :
UMSS19382

Aging Farmers Study

Abstract Topic : Social Sciences

Submission Type : Exhibit
Submission# : 100 **Judge Time Slot :** PM2 (2:30 - 3:30)
Graduate

Author Name : Melissa Wone [1] *
Graduate

Author Name : Margaret Knapp [2]

Author Name : Megan Dow [3]

Author Name : Elizabeth Depoy [4]

Abstract Description : Aging Farmers Study Abstract: Using Rapid Rural Assessment this study examined the assets and needs of aging farmers. The following questions structured this research: 1) How are aging farmers in Maine adapting to age-related embodied changes? 2) What unmet needs do Aging Farmers have and how can Maine Agrability assist them if at all? This study, part of the larger inquiry, reports on the results of case studies of individual farm visits aimed at observing adaptations to aging and interviewing individual farm operators about their careers and work experience as they age and encounter changing economic and political influences. Farmers known to the researchers were recruited for farm visitation. In-depth interviews about how each operator is addressing bodily changes were conducted with each farmer. Observations and descriptions of adaptations were obtained. Visual and thematic analysis of data revealed how farmers were using creative problem solving to address their changing bodies. When relevant, farmers also addressed how they are adapting to the economic and political changes that affect their careers. Acknowledgments & References: Elizabeth Depoy, Ph.D, Stephen Gilson, Ph.D, presenters Margaret Knapp, Megan Dow, Melissa Wone.

Abstract ID :
UMSS19291

All Things Considered: How Recreational Developments Effect Ecological and Social Ecosystem Services

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 366

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Aly East [1] *
Undergraduate

Author Name : Nicholas Fisichell [2]

Author Name : Aaron Strong [3]

Author Name : Katharine Ruskin [4]

Abstract Description : Ecosystem services are an emergent tool that provide a framework for decision making in managing public lands as a socio-ecological system. Broadly, ecosystem services are defined as the benefits that the environment provides to humans for free. Understanding how new developments on public lands impact the full set of market and non-market ecosystem services will allow for strategic growth that preserves ecosystem services such as biodiversity and carbon storage, while optimizing tourism revenue and benefitting local businesses. This study aims to identify how the land acquisition and development by Acadia National Park of 1400 acres of land on the Schoodic Peninsula has affected the portfolio of ecosystem services provided by Acadia National Park. We identified the most important and potentially impacted ecosystem services in this region as biodiversity, carbon storage, recreation and tourism, and local culture. Because baseline data before development data was unavailable, we designed survey methods to hindcast the valuation of ecosystem services before development to estimate change. We detected a compositional shift in the local bird community, but no discernable shift in vegetation biodiversity, a decrease in carbon storage with a potential for future increase with long-term conservation, and potential for increase in economic and recreational opportunity in a historically depressed area. The results of this study provide a knowledge base with which local stakeholders and public land managers in the region can make informed decisions to guide strategic investment in local infrastructure. Acknowledgements: The Center for Undergraduate Research The Margaret Chase Smith Foundation The University of Maine Research Reinvestment Fund for project funding and the Ecology and Environmental Sciences program for administrative support. The Schoodic Institute, especially Abe Miller Rushing, Emma Albee, and Megan Moshier for providing logistical support. Acadia National Park and the National Parks Service for land access and generous project support

Abstract ID :

UMSS19225

Alternative treatment for a chronic disease of small ruminants, Caseous lymphadenitis (CL)

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 345

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Cassandra Miller [1] *

Undergraduate

Author Name : Anne Lichtenwalner [2]

Abstract Description : Caseous lymphadenitis (CL), a disease caused by the bacterium Corynebacterium pseudotuberculosis, causes dry abscesses of the lymph nodes and internal organs of small ruminants. C. pseudotuberculosis is a facultative intracellular parasite, meaning it can live and reproduce inside and outside of host cells making it difficult to eliminate from both ruminants and their environment (Oreiby, 2014). New England's sheep industry was worth approximately $10.2 million during 2017. In 2014, 43% of Maine sheep farms tested positive for CL, with estimated production losses of approximately 20% (Lichtenwalner, 2013). Common treatment practices include draining and cleaning of external abscesses, treatment with antibiotics, surgical removal of abscesses, culling, or injection of formalin into lesions (Washburn et al, 2009). However, these methods are temporary, and few antimicrobials are suitable for food animal use due to new regulations by the Food and Drug Administration (Veterinary Feed Directive, U.S. Food and Drug Administration, 2017). This project tested the effects of alternative, non-antibiotic treatment against C. pseudotuberculosis. Rosemary essential oil (EO) was used in vitroagainst C. pseudotuberculosisin a standard plate assay. It was found that rosemary EO prevented the growth of C. pseudotuberculosis in BHI broth and blood agar. The goal of this project was to provide preliminary data for further investigation of alternative methods to eradicate C. pseudotuberculosisboth from the farm environment and in vivo.

Abstract ID :
UMSS19309

Alternative treatments for chronic bacterial infection of sheep and goats

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 360 **Judge Time Slot :** AM1 (9:30 - 10:30)

Graduate

Author Name : Sarah Paluso [1] *

Graduate

Author Name : Ann Bryant [2]

Author Name : Anne Lichtenwalner [3]

Abstract Description : Caseous lymphadenitis (CL) is a chronic disease of sheep and goats caused by the pathogenic bacterium, Corynebacterium pseudotuberculosis (Cp). The disease is characterized by the formation of "caseous" abscesses which cause significant decreases in wool, meat, and milk production of these animals, costing the worldwide industry millions of dollars each year. Once shed via ruptured abscesses, Cp remains infective in the environment for long periods of time, where it can quickly spread to the rest of the herd. Antibiotics have had limited success in treating CL, due to the difficulty of penetrating the dry, thick-walled abscesses. The purpose of this project is to find an alternative method of treatment and control of CL using components of essential oils with known antimicrobial properties. Essential oils are complex bioactive compounds that have been increasingly explored as sources of antimicrobial activity as the Food and Drug Administration is discouraging use of medically-important antibiotics in food animals. The minimum inhibitory concentrations of nine essential oil components were tested using a standard disk diffusion assay. Five of these components (thymol, carvacrol, trans-cinnamaldehyde, cuminaldehyde, and B-citronellol), successfully inhibited the growth of Cp in vitro and will be tested for cytotoxicity of mammalian cells. Due to the nature of essential oils, tissue penetration may be possible, and environmental treatment (as disinfectants of farm surfaces, such as feeders or shearing equipment) may be easily done. By maintaining healthy flocks and eliminating the need for toxic disinfection methods, this project could have a positive impact on sustainable agriculture.

Abstract ID :
UMSS19123

An Analysis of The National Youth Tobacco Survey from a Native American Perspective: An Indigenous Critique

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 409

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Maliyan Binette [1] *
Undergraduate

Author Name : Mjowen Jowen [2]

Abstract Description : In this study, Native American researchers analyzed the cultural relevance of The National Youth Tobacco Survey in order to design, implement, and evaluate comprehensive tobacco prevention and control programs for Native youth. The purpose of the study was to understand how different populations of Native American researchers perceive the national survey while critically examining both commercial as well as traditional tobacco. Some end goals involved modifying the questionnaire in order to make a more all-encompassing survey that takes into account major Indigenous mores. Additionally, notions on the modern-day perceptions of tobacco use amongst Native American adolescents was gathered through cognitive interviewing via young as well as elder participants. This centered around a desire to avert the development of tobacco-related diseases amongst this ethnic group of people, while simultaneously preserving their ancestral ceremonies. Recommendations for future youth tobacco survey composition were listed in the hopes to institute more effective and culturally competent initiatives to address the diverse needs of Native Americans as a whole.

Abstract ID :
UMSS1986

An Assessment on Nurse Practitioner Burnout Rates

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 406

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Brooke Sheridan [1] *
Graduate

Author Name : Patricia Poirier [2]

Abstract Description : Retaining providers has been an increasing issue in Maine specifically in rural parts of the state. Part of the problem lies in the shortage Maine is facing with primary care providers and with that comes the long hours, over-worked and under-appreciated providers. At a time where fewer people are choosing to work in primary care, the state of Maine is faced with a setback that will result in a dramatic increase in its demand for Nurse Practitioners (NP's). In order to explore further why NP's are facing burnout rates and leaving jobs due to poor satisfaction with work one must look further into the demographics of the area and patient to provider ratios. The stress of burnout for Nurse Practitioners is even more inadequate in rural parts of the state. Nine counties in Maine all have greater than 80% of their population in rural areas. This is concerning for practitioners and patients due to the type, amount and quality of care patients are receiving. A systematic review collected data from CINAHL, EBSCO and NCBI using keywords such as, Nurse Practitioner, burnout, fatigue, Maine, nursing and rural. The literature suggests first to identify local issues, this will give guidance to management on where to go with implementing changes. Common findings other than hiring more providers includes delegating work, relaxation techniques and educating the patients (and public) better. In doing so, this helps decrease the burden on Practitioners and will help improve patient care and decrease chronic diseases.

Abstract ID :
UMSS19237

An Evaluation of the Impacts of the Maine Shrimp Fishery Moratorium

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 326

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Beth Campbell [1] *
Graduate

Author Name : Hunter Tubbs [2]

Author Name : Stephanie Hurd [3]
Graduate

Author Name : Jacquelyn Gill [4]

Abstract Description : In 2011, the Gulf of Maine's northern shrimp (Pandalus borealis) population reached an unprecedented low due to harvesting and climate change. For decades Maine shrimp were a complement to the iconic Maine lobster. In response to the decimated population, the Atlantic States Marine Fisheries Commission, Northern Shrimp Section (including Maine, Massachusetts, and New Hampshire) implemented a moratorium on shrimp harvesting in 2013. While studies have been conducted to assess the failure of the shrimp population to rebound following the moratorium, little attention has been given to the ecological effects outside of this species. Beyond the ecological implications of this decision, there have been limited investigations on the economic and societal impacts in Maine. Commercial fishing industry revenue in Maine declined by $50 million following the moratorium (Maine Department of Marine Resources, 2019), but local fishing communities experienced the most significant impact with the loss of a vital source of income during the shrimp harvesting months. In order to fully evaluate the decision to ban shrimp harvesting in Maine, it is necessary to investigate all resulting consequences. Here we present a preliminary assessment of the implications of the 2013 shrimp harvesting moratorium to date. It is our hope that this report will help advise future management decisions for the shrimp fishery and other fisheries.

Abstract ID :
UMSS19305

An Exploratory Study of a Catheter-Based Direct Drug-Delivery System

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 221

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Charles-Alexandre Roy [1]
Undergraduate

Author Name : Samantha Steinberg [2]

Author Name : Caitlin Young [3]

Author Name : Kirstie Belanger [4] *
Undergraduate

Abstract Description : The vasculature of the circulatory system represents an extensive and established network of vessels that travel throughout the body. The potential of this network for direct drug delivery applications has not been fully realized. This project investigates the viability of using blood vessels as a pathway for providing treatment to obscure areas of the body. Cardiac catheterization has a long-standing precedent in cardiology and in the treatment of many diseases. Currently, catheters are not used to deliver medication outside of blood vessels, and the limitations of current drugs could be overcome through precise delivery to target locations. Drugs are often limited in their effectiveness due to hepatic first-pass filtration. Their administration frequently results in off-target cell damage due to lack of specificity and need for higher dosages to reach effective therapeutic levels. The catheter designed in this project features a curved internal guide for the advancement of a flexible needle to puncture the vessel wall at an angle. Prototype testing involved the use of a dynamometer to obtain forces necessary for puncturing porcine tissue samples. The test results were used to select materials with optimal mechanical properties. An economical scaled 3D-printed prototype of the model was created to determine the feasibility of the mechanical design. Testing of the model was performed in a porcine vein suspended in an agarose gel system. The results of this investigation successfully demonstrate the feasibility of using vasculature to directly deliver drugs within the body.

Abstract ID :
UMSS19191

An Intersectional Analysis of Intervention Methods for Intimate Partner Violence

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 155

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Brianna Belair [1] *
Undergraduate

Author Name : Susan Gardner [2]

Abstract Description : Intimate partner violence (IPV) is a widespread issue across the United States. Using psychotherapy alone is a common practice of intervention and healing for survivors of IPV. However, research suggests that a single method may not be the most effective approach. People of all identities experience intimate partner violence, but many marginalized communities lack access to resources which can prevent them from seeking help, and hinder their recovery. This project will review relevant research about intervention methods used to help survivors of intimate partner violence, and investigates the effectiveness of a more comprehensive method. It is proposed that a combination of psychotherapy, social support, and advocacy, along with the collaboration of community organizations would be not only beneficial, but necessary in helping survivors of intimate partner violence.

Abstract ID :
UMSS19410

An investigation into the photochemical properties of cyclized-Azobenzene photoswitches.

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 374

Judge Time Slot : AM2 (11:00 - 12:00)

Undergraduate

Author Name : Cody Gigac [1] *
Undergraduate

Author Name : Michael Kienzler [2]

Abstract Description : Abstract Molecular photoswitches are playing increasingly central roles in interrogating the functions of chemical systems by allowing for selective conversion between two distinct states [1]. With applications in fields including but not limited to; neurobiology [2], chemical synthesis, and even branching into material science, the potential for novel discovery is expanding and variations of implementations are becoming realizable. Molecular photoswitches allow for precise spatial rearrangement of atoms in time, they are being used to interrogate systems by selectively initializing highly energetic reactions within systems, which otherwise would prove difficult to execute. Azobenzene derivatives specifically have garnered great interest for their well understood photochemical properties and reasonable incorporation into other chemistries. However, where prototypical azo-units have fallen short in performing, cyclized-Azobenzene's are picking up the slack with their distinguished absorption bands and long relaxation rates. Not only are these cyclized motif's an improvement in selectivity and stability, but they have the added benefit of incorporating a degree of ring strain, which is yet another functional property that can be explored and exploited to overcome energetic barriers of reactions. Thus, with slight modifications to a molecular species of interest[2], there may be a means to not only initiate high-energy reactions, but to do so at precise sites within molecules, and thus paving the way for new types of synthetic control. Potential future application includes; tethered biological-receptor-substrate's, a responsive handle for labeled moieties, and potentially even use in novel syntheses of various photo-responsive polymers. References: [1] Siewertsen, Ron, et al. "Highly Efficient Reversible Z−E Photoisomerization of a Bridged Azobenzene with Visible Light through Resolved S1(Nπ*) Absorption Bands." Journal of the American Chemical Society, vol. 131, no. 43, 2009, pp. 15594–15595. [2] Thapaliya, Ek Raj, et al. "Locked-Azobenzene: Testing the Scope of a Unique Photoswitchable Scaffold for Cell Physiology." ACS Chemical Neuroscience, 2019,

Abstract ID :
UMSS19186

Anaerobic Digestion: A Sustainable Alternative for Food Waste Management in Maine

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 242

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Andrew Flynn [1] *
Undergraduate

Author Name : Jean Macrae [2]

Abstract Description : Anaerobic digestion is a waste recovery alternative to incineration and landfilling for food waste. Anaerobic digestion uses anaerobic microbes called methanogens to create methane from complex organic matter, like food waste. The end products, biogas and residual sludge, are both useable products. Biogas can be used to generate electricity and heat for facility buildings. The sludge material is high in nitrogen and phosphorus, which makes it a great fertilizer for agricultural use. The process does have challenges, however. Anaerobic digestion has known inhibitors including common salt (NaCl), which can be found in food and therefore food waste. In my experiment, model anaerobic digesters were set up at different salt concentrations to determine the level required to reduce the amount of methane produced in a 1-day period. At 8g/L concentration of NaCl, we observed a 100% decline in methane production. The goal of this research is to determine "safe" operating ranges of inhibitory substances that operators can use to avoid costly losses of methane. The increased stability of the digesters operating in the safe range will make an already attractive food recovery process more attractive for potential investors in the technology the state of Maine to move away from landfilling and incinerating food waste. In addition, the increased stability of the anaerobic digestion process will create opportunities for Maine to reduce costs associated with landfilling and incinerating food waste, generate clean renewable energy from the digestion process, and reduce negative environmental impacts associated with incinerating and landfilling food waste.

Abstract ID :
UMSS1975

Analysis and Investigation of the Genomic Map of Gordonia terrae Bacteriophage SweatNTears

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 815

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Erika Pacheco [1] *
Undergraduate

Author Name : Alex Barrios [2]

Author Name : Benjamin Gove [3]

Author Name : Jennifer Quezada-Loja [4]

Author Name : Sally Molloy [5]

Abstract Description : Bacteriophage are the viruses that infect bacteria and are the most abundant biological entity on Earth. There are 5,633 phage sequences in GenBank and one third of these were isolated from a single bacterial species, Mycobacterium smegmatis. In contrast, there are only 142 phages isolated using Gordonia species[1]. In using alternative bacterial species for phage isolation, we can, we can increase the understanding of genomic mosaicism in phage. SweatNTears is a novel lytic phage that forms small, clear plaques with turbid halos on a lawn of G. terrae. It has Siphoviridae particle morphology, belongs to cluster CT, and has a broad host range which infects the host bacteria Rhodococcus erythropolysis and G. rubripertincta. Its genome is 45,197 nucleotides in length with a low GC content (59.9 %) compared to that of the host, 63%. The genome encodes 69 putative proteins including 2 orphams, genes with no relation to other sequences in the database and lacks tRNAs genes. Therefore, the completion of gene mapping for SweatNTears will give a complete understanding of the biological functions of how this novel bacteriophage operates in addition to aiding in further research of the field of study as a whole.

Abstract ID :
UMSS19364

Analytical Invertigation of Aquacutlrue Farm Impacts on Esturine Dynamics

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral
Submission# : 259
Graduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Zhilong Liu [1] *
Graduate

Author Name : Lauren Ross [2]

Author Name : Kimberly Huguenard [3]

Abstract Description : Recent field observations in the Damariscotta River have suggested that floating oyster farms impose surface friction that results in elevated surface mixing and altered tidal flow. The resulting hydrodynamic impact, including its influence on long-term material transport is important to understand. A three-dimensional analytical model is proposed to understand the general impact of a floating oyster farm on tidal and subtidal flow in an idealized basin of similar size to the Damariscotta River. The model considers a semidiurnal tide, cross-sectional bathymetry with both depth and width decay, as well as surface friction induced by an oyster farm. Both tidal and subtidal flow patterns obtained from this analytical model compare favorably with the field observations. Results indicate that a floating aquaculture farms can reduce the surface current amplitude by about 50% near the farm. While the surface floating farm decelerates velocity near the surface, it accelerates velocity subsurface. Enhanced local advection imposed by the farm actually reverses the subtidal flow structure compared to the case with no farm. The extent to which the subtidal flow reversal influences residence times will be explored in the future. Results from this work imply that farm friction should be implemented in hydrodynamic and biogeochemical models in order to accurately determine the carrying capacity of a system.

Abstract ID :
UMSS19348

Analyzing residual stand damage under different harvesting methods in the Northern Maine Acadian Forest.

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 311

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Noah Coogan [1] *
Undergraduate

Author Name : Anil Kizha [2]
Undergraduate

Abstract Description : One major component of a sustainable timber harvest is the trees left behind after the harvest. Depending on landowner objectives, these residual trees may be intended for future growth in value, wildlife habitat promotion, seed supply, or general aesthetics. With large mechanized harvesting equipment involved, damage can be inflicted on the crown, stem, or roots of the residual trees; and can pose a risk of death from diseases, natural calamities and/or degrade future economic value. The primary objective of this study was to evaluate residual stand damage following a partial timber harvest. Four harvest blocks implementing different silvicultural prescriptions (i.e., overstory removal, two types of crop tree releases, and diameter limit cut) were selected as the treatment. The study site was located on an industrial timberland in northern Maine. Type, frequency, and intensity of the damage were recorded for each treatment during August 2018. Cut-to-Length (CTL) and Whole-tree (WT) harvesting methods were employed for conducting the harvest. The inventory showed that 148 trees were damaged. Damages recorded were 95% stem related, 14% crown related, and 12% root related. Species damaged included sugar maple, red maple, red spruce, American beech, yellow birch, northern white-cedar, and eastern white pine. The CTL method had reduced residual damage compared to more in the WT method. Results were compared with similar analysis from other research in Maine. The study is expected to facilitate landowners and foresters in decision making while planning their harvest. Keywords: Forest operations; Silvicultural prescription; Timber harvesting; Tree injury

Abstract ID :
UMSS19384

Anti-Microbial Properties of Cellulose Nanofibrils

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 224
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Abigail Weigang [1]
Undergraduate

Author Name : Katherine Kirk [2] *
Undergraduate

Author Name : Caitlin Howell [3]
Undergraduate

Abstract Description : In marine applications, the undesirable attachment and accumulation of bacteria, diatoms, algae and invertebrates on submerged structures is known as biofouling. This phenomenon promotes the spread of invasive species and causes increased hydrodynamic drag on ships, resulting in lower speed and higher fuel consumption. Current technologies to combat biofouling include toxic surface coatings or the use of inefficient hull-cleaning processes. In this work, we investigated the anti-microbial properties of cellulose nanofibrils (CNF) as a non-toxic alternative to current anti-biofouling (AF) marine surface coatings which could promote the development of the Sustainable Ecological Aquaculture Network (SEANET). During the process of gathering preliminary data, it was observed that heat-treated CNF (hCNF) would support visible microbial growth while untreated CNF did not. To investigate this phenomenon, a series of experiments were performed in which samples of hCNF and untreated CNF were subjected to various pre-treatments. After 20 hours of air exposure, the number of visible microbial colonies that formed on the surface of each sample were counted and compared. In every experiment, no microbial growth was exhibited by the untreated CNF, while clear microbial growth was observed on hCNF. Although studies are ongoing, these results suggest that CNF may prove useful in the creation of new non-toxic AF materials which can be treated to biodegrade on-demand, helping to solve the problems associated with biofouling in marine as well as other settings.

Abstract ID :
UMSS19217

Application and Properties of Graphene: A Disruptive Technology

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster
Submission# : 248
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Alexander LaRose [1] *
Undergraduate

Author Name : Stefano Tijerina [2]

Abstract Description : Graphene is a singularly unique material. Composed of single sheets of carbon arranged in a hexagonal honeycomb lattice, graphene is essentially a two-dimensional material. Due to its composition and structure, graphene has nearly limitless potential for application in multiple fields. It is the strongest material known to man, with a tensile strength of 130,000,000,000 pacals, compared to structural steel at 400,000,000. Layered graphene sheets will have huge applications in structural engineering, aerospace development, body armor, virtually anything that can benefit from being stronger, lighter, and more flexible. Another property of graphene is its electrical conductivity, which has shown to be at least one hundred times more conductive than copper. The superior performance of graphene as compared to copper and gold, in conjunction with the relatively low cost of carbon, spell the end for many of the historically valuable metals currently mined and fabricated today. In addition to electrical conductivity, graphene has immense thermal conductivity as well. As electronics shrink, heat dissipation becomes a more and more serious issue. The ability of graphene to quickly and efficiently move heat will prove invaluable in the development of micro- and nano-electronics. Perhaps the most exciting aspect of graphene is not in a specific property, but behavior. Graphene has been demonstrated to ripple at room temperature, and researchers at Arkansas State University have found a method to produce electricity from this motion. This could potentially make current forms of energy production obsolete, with bricks of trillions and trillions of graphene sheets capturing solar energy as kinetic motion, and providing limitless clean energy.

Abstract ID :
UMSS19344

Aronia Berries Three Ways to Utilize in Value Added Products

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 379

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Ashley Reynolds [1] *
Undergraduate

Author Name : Amelia Sullivan [2]

Author Name : Angela Myracle [3]

Abstract Description : This project will work to determine ways to utilize aronia berries for consumption. The abstract explains that, allthough, this berry is packed with numerous health benefits, due to it's large amounts of astrigency, it is rarely consumed. This experiment will use the pomace and juice from the aronia berries three different ways; in muffins, smoothies, and fruit leather. This study will aim to analyze how the addition of the aronia berries affect these foods and their final products. The goal is to find the best way to maximize their use and benefits as well as help Maine growers to make a profit.

Abstract ID :
UMSS19187

Arsenic Remediation in Maine Drinking Water

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 246

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Austin Steward [1] *
Undergraduate

Author Name : Caitlin Howell [2]
Undergraduate

Abstract Description : Arsenic (As), a metalloid, is one of the most prominent toxins in Maine drinking water. There are approximately 86,500 Maine citizens exposed to water containing arsenic over the maximum contamination level which can result in adverse effects including nausea, multiple cancers, and a reduction of full scale IQ and executive function. In drinking water, high arsenic content arises both from the natural leaching from bedrock and from the use of chemicals such as pesticides, embalming fluids, and wood preservatives. There are many known arsenic water remediation techniques but finding a method compatible for multiple arsenic isotopes is challenging. In this work, we test the low-energy and low-cost technique of coupling a ferric chloride flocculation pre-treatment with liquid-gated membrane filtration. We find that flocs formed under specific conditions can be filtered out of the water, with further elemental analysis confirming removal of arsenic and the added ferric chloride. We were additionally able to determine the size of the flocs pre-filtration using dynamic light scattering as well as pH changes during pre-treatment steps. These experiments lay the groundwork for continued arsenic remediation of Maine drinking water using low-cost, self-cleaning membrane filtration.

Abstract ID :
UMSS19406

ASSESSING BEHAVIOURAL BIOASSAYS FOR THE COPEPODID STAGE OF PARASITIC SEA LICE

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 363

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Robert Morefield [1] *
Graduate

Author Name : Seth Tyler [2]

Author Name : Heather Hamlin [3]

Abstract Description : The greatest barrier to growth in the salmon aquaculture industry is infestation by parasitic copepods known as sea lice. Sea lice can render fish unmarketable or vulnerable to secondary infections by feeding on the blood, skin, and muscle tissue of their host. In the infective copepodid stage, sea lice must locate and attach to their host. Disruption of this behavior could be achieved by administering compounds to susceptible farmed salmon. Few behavioral bioassays are available to screen potential compounds. This project aims to reassess, develop, and compare behavioral bioassays to ultimately identify environmentally sustainable compounds for the abatement of these pests in salmon aquaculture. In this project, bioassays were developed to measure the efficacy of anti-parasitic compounds in deterring sea lice from their salmon host. These bioassays were developed to target three measurable components of copepodid host search behavior; taxis, kinesis, and attachment. Taxis (general sea lice activity) was quantified using an arena bioassay, kinesis (directionality toward salmon derived cues) was assessed via a Y-tube maze, and attachment (physiological development required for infection) was analyzed using the development of a frontal filament in treatment bins. Reliable and validated behavioral bioassays are needed to assess compounds that could deter sea lice from finding and/or attaching to their host. Comparable bioassays and best practices would benefit researchers as well as industry. Identifying natural compounds that deter and reduce sea lice infestations will dramatically increase salmon aquaculture profitability and environmental sustainability. Acknowledgements: This project was financially sponsored by the Maine Space Grant Consortium and the Center for Undergraduate Research (CUGR).

Abstract ID :
UMSS19192

Assessing Pre-Service Teacher's Understanding of the Profession

Abstract Topic : Education

Submission Type : Poster

Submission# : 502

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Justin Hagedorn [1] *
Graduate

Author Name : Kim Stewart [2]
Graduate

Author Name : Maryellen Mahoney-O'Neil [3]

Abstract Description : In recent years, a third of all teachers leave their job within three years and almost half of all teachers leave within five years (Brill & McCartney, 2008). Current literature points to a variety of reasons that teachers change jobs and leave the profession including: money (Ingersol, 2001), working conditions (Geiger & Pivovarova, 2018), and a lack of connection to the school and the community (Ingersol, 2001). Yet, research focuses almost entirely on full-time teachers reasons for leaving opposed to pre-service teachers understanding of teaching. Teachers begin their teaching careers long before they enter their own classroom through the training they receive on how to reach students and what to expect in the classroom during their college years. Yet, does the college's focus on how to teach and manage a classroom ignore the pre-service teacher's understanding of the teaching profession? The purpose of this introductory study is to see if pre-service teachers have a misunderstanding of the teaching profession that may contribute to the teacher turnover problem. In order to measure results, the researchers compared national and local data to compare with pre-service teacher's answers on a quantitative survey. Initial results from the study indicate a fundamental misunderstanding in the number of hours worked by teachers, applications submitted to find a job, and salary requirements. Recommendations are made to increase the knowledge of pre-service teachers by being intentional with college curriculum and professional development opportunities. References Brill, S., & McCartney, A. (2008). Stopping the revolving door: Increasing teacher retention. Politics & Policy, 36(5), 750-774. Geiger, T., & Pivovarova, P. (2018). The effects of working conditions on teacher retention. Teachers and Teaching, 24(6), 604-625. Ingersoll, R. M. (2001). Teacher turnover and teacher shortages: An organizational analysis. American Educational Research Journal, 38(3), 499–534. Ingersoll, R. (2003). Is there really a teacher shortage?. CPRE Research Reports. Retrieved from https://repository.upenn.edu/cpre_researchreports/37

Abstract ID :
UMSS19363

Assessing the effectiveness of trail cameras with attractants to detect northeastern mammals

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 376

Judge Time Slot : AM2 (11:00 - 12:00)

Undergraduate

Author Name : Michael Buyaskas [1] *
Undergraduate

Author Name : Alessio Mortelliti [2]

Abstract Description : Camera trapping is one of the best research methods for surveying carnivore populations, and non-invasive survey methods are rapidly increasing in popularity. Detection probability is one of the most important parameters in estimating detection probability. The use of attractants with remote cameras has proven to be effective in increasing detection probability, but has been unexplored in North America. Our aim is to determine the efficacy of using attractants at remote camera sites and their ability to increase detection probability at the camera site. We tested a lure, skunk essence (L), and a non-reward bait, beaver (B), and their combination (BL), all were compared to a control (C), absent of attractants. Research was conducted in three areas of northern Maine. Camera images were analyzed in a multi-method occupancy modeling framework to calculate species-specific detection probabilities for each attractant. Our results showed detection probability differed significantly between BL for Fisher, Marten, Coyote, Weasel and Black bear (0.1 ± 0.03 - 0.34 ± 0.04) and C (0.02 ± 0.01 to 0.13 ± 0.04) for the same species. Although rarely, black bears were detected with the greatest probability at the skunk essence attractant (L). Our tested attractants greatly improved detection probability estimates for all species with sufficient data for modeling. Although some species such as black bear exhibited a slight preference for the skunk essence (L), BL was the most effective attractant at a carnivore community level. Researchers should take attractant selection into account when designing studies of mesocarnivores, specifically, they should taylor their attractant selection to the specific species in their study design, conducting pilot studies to determine what that might be, if previous literature is not available.

Abstract ID :
UMSS19281

ASSESSMENT AND RECOMMENDATIONS FOR AN ECOSYSTEM APPROACH TO KELP AQUACULTURE

Abstract Topic : Interdisciplinary

Submission Type : Poster

Submission# : 614

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Gretchen Grebe [1] *
Graduate

Author Name : Carrie Byron [2]

Abstract Description : Marine kelp farming is an increasingly popular practice along temperate coastlines in the western hemisphere but developing in different manner than the seaweed aquaculture across Asia. Comparing the potential environmental and social impacts of this young kelp farming industry against those observed in established aquaculture industries across the world is important to improving the ecological and social sustainability of these farming activities. Here principles and strategies of the Ecological Approach to Aquaculture (EAA), first described and documented by the Food and Agriculture Organization in 2010, are used to assess the human and natural systems supporting kelp aquaculture along the Maine coastline. Maine was an early adopter of kelp aquaculture in the United States producing approximately 50,000 metric tons of farmed kelp annually. A conceptual model of the human and natural relationships supporting kelp aquaculture in Maine was developed. Relevant stakeholders and germane impacts of the practice were identified from a larger list described by the FAO. Guiding EAA principles were used to recommend actions grouped by the overarching themes of ecosystem services, socially just, and integration. Recommendations to improve or protect the ecosystem services within the Maine case study include: defined ecosystem and management boundaries, ecologically considerate engineering, environmental carrying capacity assessment, and the preservation of wild kelp bed health and genetic diversity. Recommendations to ensure that kelp farming improves the well-being of all stakeholders in Maine include horizontal integration and education in Best Management Practices. To ensure that kelp aquaculture is developed in the context of other sectors and goals it is also recommended that and integrated management strategy be developed for wild and farmed kelp.

Abstract ID :
UMSS19139

Assessment of Helical Anchor Bearing Capacity for Offshore Aquaculture Applications

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral

Submission# : 253
Graduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Leon Cortes Garcia [1] *
Graduate

Author Name : Aaron Gallant [2]

Author Name : Melissa Landon [3]

Abstract Description : Aquaculture in Maine is an industry with an important contribution to the state economy. The most common farming products are shellfish, seaweed, and finfish, where usually farmers deploy catenary mooring systems relying on concrete or granite blocks, mushroom anchors, and drag embedment anchors. The expected growth of this sector will result in a greater optimization of the current leased area for production or an eventual move to more active environments with deeper water and unsheltered conditions in the Gulf of Maine. Current anchor technologies are limited by in their installation-decommissioning costs, so more efficient anchoring solutions are required. Helical anchors (HAs) are a lightweight, anchoring technology that is relatively new to aquaculture, with the potential to create a more resilient infrastructure system. HAs are embedded into the soil and develop their holding capacity from self-weight, geometry, and soil resistance, where greater capacity can be achieved with larger installation depths or geometries. HAs are designed for purely vertical loading, however, their use offshore is in addition to vertical for horizontal and inclined loading conditions, and a lack of understanding of their holding capacity for these conditions exists. This research studies the capacity of HAs under lateral and inclined offshore loading conditions using numerical simulations of soil-anchor interaction to optimize design for aquaculture applications. Specifically, an extended numerical-3D finite element parametrical study varying anchors loading angles, geometries, and soil properties (stiffness and strength) is performed, identifying critical variables which domain the full inclined behavior. Results indicate how the horizontal capacity is a dominant variable to control the inclined behavior, and the interception of the horizontal and vertical loading failure criteria leads to an optimum loading inclination angle. With these results, design recommendations are performed oriented to help future farm designers and farmers to use HAs.

Abstract ID :
UMSS19389

Augmented Coffee Experience

Abstract Topic : Interdisciplinary

Submission Type : Exhibit
Submission# : 606
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Jonathan Roman Bland [1] *
Undergraduate

Author Name : Nimesha Ranasinghe [2]

Abstract Description : Coffee is a staple in the daily life of a typical American. Although coffee by itself is typically seen as beneficial if used in moderation, the addition of sugar, cream, and other additives can change this potentially healthy drink into one which helps contribute to the many health issues currently facing our society including diabetes and obesity. As a solution, we propose an augmented reality coffee experience which virtually adds flavor sensations to a plain cup of coffee. Food grade scents (e.g. essential oils) and temperature augmentation techniques will be utilized to simulate an augmented coffee drinking experience. Therefore, our aim of this project is to design and develop a prototype coffee mug with a built-in control module to release different smells and simulate the temperatures of a beverage. Different smells will be stored and released using micro air-pumps while the warmness of a cup of coffee will be simulated using Peltier heating elements mounted on the mug.

Abstract ID :
UMSS1994

Avian blood parasite prevalence and diversity in wild birds residing on the Witter Farm

Abstract Topic : Natural Sciences

Submission Type : Exhibit
Submission# : 307
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Shannon O'Grady [1] *
Undergraduate

Author Name : Oliva Choi [2]
Graduate

Author Name : Pauline Kamath [3]

Abstract Description : An important ecological question is how different environments can influence infectious disease dynamics. In particular, anthropogenic factors, such as land use, may play a role in altering nesting and foraging habitats of wild birds, thereby affecting transmission and individual susceptibility to pathogens. In this study, we will explore the relationship between land use and pathogen dynamics, by comparing avian blood parasite prevalence (percent of individuals infected in a population) and species diversity in two different habitat types: on and off farm. This study targets two focal species, rock pigeons (Columba livia) and house sparrows (Passer domesticus), with a target sample size of 50 birds per species from the University of Maine's J. Franklin Witter Farm and 50 per species from off-farm habitats in the Orono area. Birds are captured using mist nets and walk-in traps. Blood is collected from birds to test for Haemoproteus, Leucocytozoon, and Plasmodium species. Microscopy (examination of blood smears) and molecular techniques (DNA extraction, PCR, sequencing) will be used for parasite identification. The parasite species richness, parasite intensity per host, and the prevalence of each type of parasite will be compared between the two sites. Thus far, we have collected 72 and 3 samples from pigeons and sparrows, respectively. As sampling is ongoing, results are not currently available, however, we expect the prevalence of parasites will differ between the two habitats, but parasite diversity will be similar. Acknowledgements: This project was supported by the USDA-National Institute of Food and Agriculture Hatch Project No. ME021908, the NSF-Ecology and Evolution of Infectious Diseases grant #1617982, and the J. Franklin Witter Undergraduate Research Endowment Fund. We thank Alexander Fish and his team of volunteers for helping with trapping and the Kamath Lab for assistance with the lab work and feedback.

Abstract ID :
UMSS1956

Avian microbiome composition and diversity in wild birds on the Witter Farm Madison Bangs1, Olivia Choi 1,2, Pauline Kamath1 1 School of Food and Agriculture, 2Ecology and Environmental Sciences, College of Natural Sciences, Forestry, and Agriculture, College of Natural Sciences, Forestry, and Agriculture, University of Maine

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 304 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Madison Bangs [1] *
Undergraduate

Author Name : Oliva Choi [2]
Graduate

Author Name : Pauline Kamath [3]

Abstract Description : The microbial community on and within an animal host is of vital importance to its health, due to its role in digestion, energy regulation and metabolism, growth, and immune defense. Despite this, it has been largely understudied in wild avian species. The objective of this study is to contribute to filling the information gap of how wild avian microbiomes are affected by a farm habitat. My hypothesis is that the microbiome of birds residing in a farm habitat, in association with domestic farm animals, will show a microbiome composition signal that corresponds to interactions with domestic farm animals. This signal would correspond to the prevalence of bacteria species that are commonly associated with farm environments. To address this hypothesis, we collected cloacal samples from two focal species: 72 rock pigeons (Columba livia) and 3 house sparrows (Passer domesticus) on the University of Maine J. Franklin Witter farm. This work is ongoing, and DNA will be extracted from cloacal swabs, the cloacal microbiome will be characterized by 16S rRNA sequencing, and sequence data analyzed for microbial community diversity and composition. We expect the results of this study to provide insight into the role of agricultural environments in shaping the wild avian microbiome as well as to characterize previously undescribed microbiomes. Also, it will set the foundation for future studies focused on whether antibiotics used in agriculture may affect wild bird populations. Acknowledgements: This research was funded by a Center for Undergraduate Research 2018-19 Faculty Fellow Research Assistantship, the USDA-National Institute of Food and Agriculture Hatch Project No. ME021908, and the NSF-Ecology and Evolution of Infectious Diseases grant #1617982. We also thank Alexander Fish and his team of volunteers for helping to trap and sample birds.

Abstract ID :
UMSS19278

Axial Rod Growth and Age Estimation of the Sea Pen Pennatula aculeata

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 350

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Genevieve Wilson [1] *
Undergraduate

Author Name : Richard Langotn [2]

Author Name : Rhian Waller [3]

Abstract Description : This project focuses on the age structure of sea pens, particularly Pennatula aculeata, a benthic cnidarian sea pen species found primarily in cold, deep-water environments. Sea pens have a skeletal structure known as the axial rod, that exhibits growth rings in cross sections. In this study, the exoskeleton was cross-sectioned and examined for growth rings in order to estimate age. Using an isometric saw to cut the axis of each individual sea pen, samples were observed for growth bands in order to make estimates on the annual growth of Pennatula aculeata. It was found that the linear regression was not a strong representative of a relationship between growth bands and sea pen length. Axial rod growth and age estimation of the sea pen can help us to assess sea pen populations, which make up a large biomass of mega faunal communities in the deep sea. Sea pen populations have also been recognized as nurseries for fish larvae, in particular the commercially important redfish (Sebastes spp.). Sea pens are typically caught as bycatch in commercial fishing efforts. An increase in anthropogenic activity has caused a global decline in numerous commercial fish populations. It is important for appropriate assessments to be made for fisheries management. This study aims to validate a direct method of aging for this species of sea pen Pennatula aculeata.

Abstract ID :
UMSS1919

Backpack Programs: How Maine Elementary Schools Are Tackling Childhood Hunger

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 139 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Julianna Acheson [1] *
Undergraduate

Author Name : Julia Van Steenberge [2]

Author Name : Dean Rando [3]

Author Name : Ashlee Atchinson [4]
Undergraduate

Author Name : Sandra Caron [5]

Abstract Description : According to the Good Shephard Food Bank (2017) one in five children in Maine experience childhood hunger. Schools play an important role in combatting childhood hunger though free and reduced breakfast and lunch programs. However, little is known about another program known as the Backpack program, involving sending a backpack of food home on the weekend with children who are at risk (Fram & Frongillo, 2018). The purpose of our study was to learn more about Backpack programs in Maine. Specifically, we were interested in learning how many elementary schools offer such a program, when they started their program, how many elementary school children are served, and how the program is supported. A survey was emailed to 127 elementary school guidance counselors in Maine. Each guidance counselor represented one school. The email contained a link to a survey to find out if their school offers a Backpack Program and if so, what it entails. A total of 73 surveys were returned for a response rate of 57%. Findings revealed important information about the little known program. For example, many elementary schools in Maine provide a Backpack Program. Most began such a program in the past six years. There is a wide range in the number of children served by a school, with many schools sending 20-40 children home with backpacks on weekends. Most schools obtain their food from their local food pantry. Implications and suggestions for further research are discussed.

Abstract ID :
UMSS19117

Barriers to Hospital Food Waste: An Exploratory Study

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 423 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Jennifer Goulding [1] *
Undergraduate

Author Name : Deborah Saber [2]

Abstract Description : Food waste is an ever-growing problem in this country and hospitals are large producers of food waste. Food is something that is beneficial to everyone on the planet, but when wasted, it creates added methane gas production which contributes to the greenhouse gas effect. There is a paucity in the literature concerning industry specific food waste disposal processes. Because of this, the literature review of this study analyzed food waste patterns of food related industries (grocery, restaurants, household), as well as consider the present solutions we have and how they could potentially influence hospital food waste. A 24-question survey was distributed to nutrition departments in Maine hospitals to learn about their food disposal, reuse, environmental sustainability efforts. The data will be analyzed and subsequently provide more comprehensive knowledge of food the waste landscape within the healthcare industry. A better understanding can focus efforts to food waste reduction, circular economy support, and environmental sustainability.

Abstract ID :
UMSS19372

Better Understanding Aquaculture: How Economic Information Impacts Citizen Sentiment

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 112 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Charles Jones [1] *
Undergraduate

Author Name : Caroline Noblet [2]

Abstract Description : Despite its history in Maine and popularity in other parts of the world, aquaculture is still a growing industry with considerable potential in the United States. Expanding industries face many challenges, one of these is consumer perspective of said industry. Consumer sentiment and perspective can be a strong boon to an industry, or a hindrance (Kilkenny, Nalbarte, Besser). The perspective of aquaculture has largely been focused on environmental aspects and economic factors to a lesser extent. With the success of international fisheries, the economic prospects of aquaculture within the United States are growing. Informing consumers of this economic potential can provide the lift a developing industry needs to expand beyond its current limits and change citizen sentiment towards the industry. This is known as the framing effect, a well studied phenomenon of how changing the information provided to an individual or changing the way a choice is presented can affect their ultimate decisions (Kahneman, Tversky 1979). I want to examine how providing consumers with economic information regarding aquaculture affects their perspective of the industry. I will use data collected from a statewide survey conducted by the Economics Department of the University of Maine. The questions in this survey ask the respondent their opinions and experiences with aquaculture and its future in Maine. These surveys come in two forms, one providing aquaculture economic information to respondents, and another without. Preliminary results have shown a difference between the responses of both groups indicating the effect providing economic information can have on consumers.

Abstract ID :
UMSS19242

Bioinspired Vascularized Polymers for the Delivery of Bioactive Compounds at Surfaces

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 850

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Benjamin Chasse [1] *
Undergraduate

Author Name : Kayla Marquis [2]
Graduate

Author Name : Caitlin Howell [3]
Undergraduate

Abstract Description : Similar to how the veins in a leaf deliver nutrients throughout a plant, channels can be added to a material to temporally and spatially control the delivery of bioactive compounds to a surface. The purpose of the research is to derive predictive modeling variables via experimental designs to produce highly precise and optimizable bioactive compound delivery systems for a broad range of applications. To test the effectiveness and predictability of the system, we have developed predictive models of the transport of bioactive compounds from channels to a biofilm on the surface of a polymer using Solidworks and COMSOL. The system is defined by its geometry, the diffusion coefficients of the bioactive compounds, and both the minimum inhibitory concentration and critical time of the bacteria being tested. Using these models, we can predict the inhibition zone sizes and locations, and then the results are validated using experimental data. A dose response curve was used to predict the formation of a more complex pattern, which in this case was an “M”, with a target inhibition zone of 2.53 mm. The experimental inhibition zone had an average of 2.70 mm with a standard deviation of 0.32 mm, showing that the method is reliable. This method may prove useful in studying of the healing or toxic effects of various chemicals on organisms, the antifouling applications used for a ship’s hull to prevent the attachment of sea creatures, the isolation of desired genes from a culture, or the separation of bacteria in bacterial multi-cultures.

Abstract ID :
UMSS19412

Biomass Enabled Three-dimensional Porous Nanostructures for High-performance Supercapacitors

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral

Submission# : 260

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Ethan Poland [1] *
Undergraduate

Author Name : Min Wang [2]

Author Name : Yingchao Yang [3]

Abstract Description : Department of Mechanical Engineering, University of Maine Abstract The goal of this research is to find a process capable of transforming selected biomass, such as eggplant, into a porous three-dimensional (3D) carbon nanostructure. This nanostructure is achieved through a combination of acid treatments, freeze-drying, and carbonization. The most important of these processes is the freeze-drying, which allows the porous structure of the biomass to remain undamaged when being carbonized, allowing it to retain a very large amount of surface area, one of the larger factors that determines the capacitance of the material. A fabricated electrode using such carbon nanostructure would have a high capacitance benefiting from large surface area owned by the natural structure of biomass. Advancement in this field would allow for large scale use of biomass and fabrication of supercapacitors with longer lasting and cheaper electrodes.

Abstract ID :
UMSS19240

Biopsychosocial Factors Contributing to Maine's Unintentional Opioid Overdose Deaths

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 136

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Ashley McAllister [1] *
Graduate

Author Name : Faith Norton [2]

Author Name : Kelly McCarthy [3]

Author Name : Cary Millbury [4]

Author Name : Elizabeth Armstrong [5]

Abstract Description : Background: Opioids are a current public health crisis (Lipato & Terplan, 2018). The Center for Disease Control (CDC) reports Maine has increased 35.4% in overdose deaths between 2015 and 2016 (CDC, 2017). The opioid crisis is fueled by overprescription, misuse, and addiction involving both prescribed and non-prescribed opioids (Lipato & Terplan, 2018). The Biopsychosocial Model is a framework that looks at a person as a whole by considering all life domains, including biological, psychological, and social factors. The intent of this research is to further determine the needs of substance using populations by identifying commonalities among opioid overdose decedents. Hypothesis: We hypothesize biological factors like physical health and polysubstance abuse, psychological factors like mental health diagnoses, and social factors such as employment status, educational attainment, and relationship status interact to heighten the risk for opioid overdose deaths in Maine. Methods: This project uses data from the CDC's National Violent Death Reporting System and State Unintentional Drug Overdose Reporting System, which includes all unintentional opioid overdoses resulting in death in the state of Maine between July 1, 2016 and December 31, 2018 (500+ decedents). Anticipated Results: We expect to find that males with a history of polysubstance use, mental health issues, and/or chronic pain are more likely than others to die from an opioid overdose. Findings will inform practice related to overdose prevention and substance abuse treatment. Acknowledgement and References: This research was conducted in collaboration with the Margaret Chase Smith Policy Center and the University of Maine School of Social Work. Centers for Disease Control and Prevention. (2017). Drug overdose death data (2017).https://www.cdc.gov/drugoverdose/data/statedeaths.html Lipato, T., & Terplan, M. (2018). Risk factors for opioid overdose. Current Treatment Options in Psychiatry, 5(3), 323-333.

Abstract ID :
UMSS19276

Body Mass Index as Predictor of Cognitive Decline and Sleep Quality in Aging Participants With or Without Mild Cognitive Impairment

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 864

Judge Time Slot : AM2 (11:00 - 12:00)

Undergraduate

Author Name : Marta Herzog [1] *
Undergraduate

Author Name : Ali Abedi [2]

Author Name : Cliff Singer [3]

Author Name : Thane Fremouw [4]

Author Name : Ariel Bouchard [5]

Author Name : Chris Gilbert [6]

Author Name : Taylor Delp [7]

Author Name : Ahmed Almghasilah [8]

Author Name : Katrina Daigle [9]

Author Name : Jessica Aronis [10]
Graduate

Author Name : Marie Hayes [11]

Abstract Description : Introduction. Obesity, measured by body mass index (BMI), may be a protective factor for cognitive decline in late life, specifically for developing neurodegenerative diseases such as Alzheimer's Disease (AD) and its prodrome, mild cognitive impairment (MCI) [1]. However, obesity has also been found to accelerate progression from MCI to dementia [2]. Obesity may also serve as a risk factor for impaired sleep, particularly short sleep duration and poor sleep quality, which may further increase risk for AD [3, 4]. In this ongoing study, I hypothesized that BMI mediates the relationship between cognitive decline and sleep quality in aging individuals with and without MCI. Methods. Independently living older adults, age 65-85 (M= 72.76, SD=6.56), were recruited from the community and a geriatric psychiatric clinic. Self-report sleep questionnaires (e.g. Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS)) were used to identify subjective sleep quality, sleep duration, daytime sleepiness and sleep efficiency. A neurocognitive assessment battery was administered at one-month follow up. Preliminary Results. BMI was significantly correlated with daytime sleepiness ($p < 0.05$) and number of sleep disturbances ($p < 0.05$). A trend toward significance was observed between BMI and sleep duration ($p=0.060$). Regression analysis was used to investigate the hypothesis that BMI mediates the relationship between sleep quality and cognitive decline. Results show no significant relationship in any path of this model. However, results indicate that sex may be a significant predictor of

BMI ($B=0.79$, $SE=0.33$, $p < 0.05$), and BMI a significant predictor of daytime sleepiness ($B=0.3790$, $SE=0.1749$, $p=0.05$). Sex was not found to be a significant predictor of daytime sleepiness in this model.

Abstract ID :
UMSS19345

Breaking down Maine's forest-freshwater connections: in stream litter decomposition under riparian management

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 380

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Kathleen Brown [1] *
Undergraduate

Author Name : Mitchell Paisker [2]
Undergraduate

Author Name : Ethan Cantin [3]
Undergraduate

Author Name : Hamish Greig [4]

Abstract Description : Our study assessed the long-term ecological effects of riparian management practices on forested headwater streams throughout western Maine in order to provide information that managers can use to balance economic gains from forest harvest while safeguarding freshwater resources. As an undergraduate research collaborator, I contributed to the field acquisition, processing and initial analysis of data from fourteen remote streams beginning in June 2018. An objective of this study is to quantify the impact that riparian buffer designs (clearcut harvest with 0m, 11m, or 24m buffers, a partial harvest without a buffer, and an unharvested control) have on resource exchange between terrestrial and aquatic ecosystems. To do so, I developed a study to measure the breakdown of terrestrial litter in streams to understand how terrestrial carbon is cycled through the aquatic food web. I placed mesh bags (leaf packs) containing known amounts of organic matter (red maple leaves) into the water for 4-8 weeks to observe the rate at which mass is lost through decomposition. Additionally, leaf packs were sorted for insects to document patterns in diversity and abundance of detritivores among streams and link these communities to detritus breakdown. Initial results suggest that leaf pack insect assemblages and litter breakdown rates varied with riparian harvest type, but background environmental conditions such as stream water temperature were also important. By taking this leaf pack approach, we hope to inform best management practices that optimize the forest-freshwater connections that are vital for the state's iconic forest product industry.

Abstract ID :
UMSS19388

Bridging the Gap: Community-based Food Scrap Diversion

Abstract Topic : Interdisciplinary

Submission Type : Exhibit

Submission# : 603
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Taylor Patterson [1] *
Undergraduate

Author Name : Travis Blackmer [2]

Abstract Description : Food waste is a momentous issue in Maine, taking up more space in our household garbage than any other material. This waste will ultimately end up in a landfill or incinerator, where all of its nutrients will be lost. Composting can be used as an effective materials management practice, to recover nutrients and promote a more circular food system. Maine's rural geography is a barrier in implementing food-scrap diversion programs throughout the state. Community-based composting programs pose a potential solution to overcoming waste management challenges in rural areas. By composting food waste locally, these programs benefit all members of a community by providing organic waste management, creating local jobs, conserving landfill space, and circulating capital throughout the local economy. The purpose of this research project is to bridge the gap between a community and food scrap diversion through a composting program, in this case working with a local dairy farm and an enthusiastic couple looking to establish food scrap diversion in their hometown. Over the past year we helped assist in the start-up of this operation by providing educational resources on composting, conducting outreach into the community, creating a business plan, and obtaining grant money from the Maine DEP. Through this collaboration, the program is able to provide services for households, businesses, schools, and municipalities in Mid Coast Maine. The intent of this research project is to serve as an example for areas or individuals who are interested in diverting organics.

Abstract ID :
UMSS1921

Capacity Assessment of Older T-Beam Bridges Using Field Load Testing and Nonlinear Proxy Finite-Element Analysis

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 227
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Andrew Schanck [1] *
Graduate

Author Name : William Davids [2]

Abstract Description : Conventional engineering analysis often predicts that older, reinforced concrete T-beam bridges are under strength, despite carrying modern traffic loads without obvious damage. Three T-beam bridges were instrumented and field load tested using heavy trucks to better assess their load-carrying capacity. The test results showed that two of these bridges have greater capacity than predicted by conventional engineering analysis. However, the field test results could not predict the capacity of the third bridge due to its non-uniform geometry. To circumvent the often expensive process of field testing and assess the effect of non-uniform geometry, a novel, nonlinear proxy finite element analysis (PFEA) technique was developed allowing for computationally efficient prediction of bridge response up to failure while accounting for the ductility and load redistribution present in the actual structures. PFEA uses a genetic algorithm to optimize constitutive and geometric parameters assigned to a shell-element discretization of each girder that possesses moment-curvature response equivalent to that of the solid reinforced concrete T-beam sections. The resulting elastic and elastic-plastic shell-element discretization is straightforward to implement in a three-dimensional model of a complete bridge using commercial finite element software. Using PFEA, the three field-tested bridges were analyzed, and the capacities of all three bridges were predicted to be greater than those calculated by either conventional analysis or field testing. PFEA is shown to accurately predict the real bridges' longitudinal and transverse load responses while also being able to assess bridges with non-uniform geometry. Acknowledgements: This research was funded by the Maine Department of Transportation.

Abstract ID :
UMSS1957

Catalytic Carbon-Carbon Bond Coupling for Upgrading Biomass-Derived Organic Molecules

Abstract Topic : Physical Sciences

Submission Type : Poster

Submission# : 906

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Elnaz Jamalzade [1] *
Graduate

Author Name : Thomas Schwartz [2]

Abstract Description : Biomass has received considerable attention as a suitable feedstock to replace crude oil for producing energy and value-added compounds. Our primary research goal is to produce value-added bioproducts from Maine's woody biomass resources. Carboxylic acids obtained from fermentation processes of lignocellulosic biomass are suitable for further oligomerization using heterogeneous chemical catalysis. The target end product is a mixture of C20 -C30 molecules that are analogous to existing synthetic lubricants. In this project, we developed a novel lubricant synthesis platform using low-cost conversion technologies and we have successfully synthesized a wide range of C7-C19 molecules at more than 90% conversion of a model C8 ester feed. We evaluated the activity of Pd/CeZrOx, which we found to be highly stable under reaction conditions and based on our latest results more than 90% of the product were C11 or above, and the major product had 11 carbons with 60% selectivity. Currently, we are using bulk methods (e.g., XRD) to determine the atomic-scale structure and composition of the catalyst and surface analysis techniques (e.g. FTIR, BET, and TPD) to evaluate the chemical characteristics of the catalyst surface. Measuring the reactivity and selectivity of this catalyst in conjunction with kinetic modeling will allow us to elucidate the fundamental surface chemistry associated with the oligomerization of esters (as the product of esterification of carboxylic acids provided by fermentation) to yield biolubricants. This information will ultimately be used for rational catalyst design, with the end goal being a catalyst optimized for biolubricant production. Acknowledgment This research is funded by the U.S. Department of Agriculture (USDA). Grant No. 2018-67010-27905.

Abstract ID :
UMSS1985

Catalytic hydrogenation of L-Histidine using a polymer-containing Cu/γ-Alumina catalyst

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 240

Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Matthew Webber [1] *
Undergraduate

Author Name : Thomas Schwartz [2]

Abstract Description : L-Histidinol is an important chemical in anticancer research. It has been shown to improve the efficacy of several anticancer drugs by improving their selectivity toward malignant cells. L-histidine conversion to L-histidinol was completed using a 5% Cu/γ-Alumina catalyst both with and without the presence of phosphoric acid. The catalyst was prepared using incipient wetness impregnation and the pores of the catalyst were filled with crosslinked polyacrylic acid to improve the catalytic properties. Both polymer enhanced and non-polymerized catalysts are to be analyzed with respect to their ability to hydrogenate the amino acid. Liquid-phase proton and carbon-13 NMR will test whether the polymerized catalyst is superior at converting the amino acid to its corresponding amino alcohol, and whether presence of the acid improves conversion.

Abstract ID :
UMSS19150

Cellulose Nanofibril Thin Films as Viewing Windows for Packaging Materials

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 244

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Isabelle Grant [1] *
Undergraduate

Author Name : Nicklaus Carter [2]
Graduate

Author Name : David Neivandt [3]

Abstract Description : In 2015, according to the Environmental Protection Agency (EPA), containers and packages contributed to 29 million tons of landfilled materials; over one third of these materials were nonbiodegradable plastics. Therefore, there is an immediate need to develop materials that are readily biodegradable. The goal of the current project is to develop a thin-film material which will act as a replacement for plastics such as polyethylene terephthalate (PET), high-density polyethylene (HDPE), low-density polyethylene (LDPE), polyvinyl chloride (PVC), polystyrene (PS) and polypropylene (PP) which are being used in various packaging windows such as pasta boxes and envelopes. Plastic viewing windows for packaging require excellent barrier properties whilst retaining translucency such that consumers can visualize the product knowing it will remain fresh and dry. Plastics that are currently used are neither degradable nor recyclable resulting in their accumulation in landfills. To mediate the problem, a novel packaging material, cellulose nanofibrils (CNF), will be employed. Results of thin films made with CNF have shown potential to have good barrier properties and are easily manipulated to increase their translucent characteristics.

Abstract ID :
UMSS19158

Cellulose Nanofibril Thin Films with Immobilized Food-grade Oil for Food Packaging Products

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster
Submission# : 237
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Shayla Rose Kleisinger [1] *
Undergraduate

Author Name : Caitlin Howell [2]
Undergraduate

Author Name : Balunkeswar Nayak [3]

Abstract Description : Food waste management is a significant problem faced by the state of Maine, as most surplus food-products are incinerated or landfilled. A critical contributing factor to the large amounts of food-waste generated is the pathogenic bacterial contamination and/or spoilage of food before it can be purchased and consumed. With pulp and paper already having significant infrastructure in Maine, there is opportunity to utilize cellulose-based products as a new approach to addressing food packaging, along with creating new business avenues for an at-risk industry. This research highlights the use of cellulose nanofibrils (CNF), a wood-based product, as an alternative to non-biodegradable plastic food packaging. The incorporation of a physically-immobilized layer of food-grade oil will allow for the creation of an anti-adhesive barrier that discourages bacterial adhesion, while remaining food-safe. The usage of food-grade/safe products gives potential for this material to be integrated into compost, therefore becoming a solution for the increase in non-biodegradable plastic products that are only partially re-integrated into the environment. This dual-layer material has the ability to decrease water adherence, which shows great promise in decreasing contaminant penetration. A lowered level of outside contaminants interacting with food products will lead to an increase in shelf-life and an overall reduction of food-waste. The Process Development Center (PDC) at the University of Maine is already capable of producing materials such as CNF; demonstrating that with the addition of equipment to pre-existing paper-mills, the issues of maintaining Maine industry and food-waste can simultaneously be addressed.

Abstract ID :
UMSS19374

Changing resources in a changing climate: chronicles of livelihood adaptability in the Gulf of Maine

Abstract Topic : Interdisciplinary

Submission Type : Oral
Submission# : 600
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Abby Mann [1] *
Graduate

Author Name : Alessandro Mereghetti [2]
Graduate

Author Name : Caroline Reed [3]

Author Name : Suman Acharya [4]

Author Name : Jacquelyn Gill [5]

Abstract Description : The Gulf of Maine (GOM) is a large, productive ocean basin that is interlinked with the livelihoods of diverse communities and distinct cultures. Unprecedented rates of warming caused by climate change are expected to have severe repercussions for the economic stability of rural fishing communities in Maine. Since the onset of the Holocene (approximately 12,000 BP), human populations living on the GOM coast have adapted to changing marine resources multiple times. The archaeological and historic record of the region holds valuable evidence regarding past resource shifts as a result of anthropogenic and climatic stressors and subsequent human adaptations. Understanding past population trends in marine resources from prehistoric time to the present is key to addressing future challenges for human populations living along the shores of the GOM today and in the future. In this review, we will examine three sites over a latitudinal gradient in the GOM: (1) Holmes Point West, Machias Bay; (2) Turner Farm, Penobscot Bay; and (3) Seabrook Marsh, located near Jeffrey's Ledge. We will then compare these records with past changes in climate and availability of marine populations, with focus on important species for the livelihood of rural populations, including Atlantic cod (Gadus morhua), American lobster (Homarus americanus) and Atlantic herring (Clupea harengus). The adaptation strategies that have proven effective in the past will be analyzed for their ecological sustainability. We will then take into account expected climate change scenarios to draw comparisons with the past and suggest sustainable adaptation strategies for the present and future inhabitants of the GOM.

Abstract ID :
UMSS1978

Characterization and Genomic Analysis of Novel Bacteriophage Whack

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 834 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Ezekiel Robinson[1] *
Undergraduate

Author Name : Matthew Cox[2]

Author Name : Eva Nazim[3]

Author Name : Jack Beaulieu[4]

Author Name : Sally Molloy[5]

Abstract Description : Bacteriophage (phage) are highly diverse viruses that infect bacterial hosts in order to replicate and produce progeny. Phage are the most populous biological entities on the planet with an estimated 1031 particles world wide. By isolating and characterizing new bacteriophage, we increase opportunities to develop medical and industrial applications. Of the 15,050 isolated phage, genomes have been sequenced for only 15 % (Russell et al., BMC Bioinformatics 33(5):784–786., 2017). A mere 55 of these have been isolated using Rhodococcus species. The singleton Rhodococcus erythropolis phage Whack is a novel, Siphoviridae bacteriophage with a icosahedral head 80 nm in diameter and a tail length of 280 nm. Gene locations and functions were called based on Glimmer and Genemark automated annotations in conjunction with data from multiple sources found on PECAAN (Besemer et al., Nucleic Acids Res., 33:W451-W454, 2005;Cresawn S.G. et al., BMC Bioinformatics., 12:1, 2011;Delcher et al., Nucleic Acids Res., 27(23):4366-4641, 1999). The Whack genome is 49,660 nucleotides long encoding 77 putative genes. Thirty-three of these genes are orphams, genes not found in any other known genome. Host range testing revealed the ability of Whack to lyse but not infect Gordonia terrae. In studying Whack through wet lab and bioinformatics techniques, we have developed strong foundations in research and data analysis as undergraduates.

Abstract ID :
UMSS19408

Characterization of artificial weed anchorage forces in comparison with selected weed-crop anchorage force profiles.

Abstract Topic : Interdisciplinary

Submission Type : Exhibit
Submission# : 602
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Bradley Smith [1] *
Undergraduate

Author Name : Eric Gallandt [2]

Abstract Description : Thus far, the research that I have conducted has primarily focused on the delelopment of of artificial weeds (weeds synthisized from non-living material) that acurately reflect the anchorage force profiles of slected species of weed and crop. This has been done by creating artifial weeds, and planting then in a sand medium at a particular moisture level, and using a high precision motorized force gauge to pull the artifial weeds out of the soil. As this is done, measurments of the anchorage forces over time are recorded, and a profile of the anchorage force for that particuilar artifical weed is produced. These achorage force profiles are compared to that of real weeds to determine how accurately and precicely the artifical weeds relect the mechanical anchorage force properties of real weeds. With artificial weeds that acurately represent the mecanical properties of real weeds in terms of mecahnical cultivation, experiments can be done at a much faster pace to test different means of mecachnaical cultivation. This will allow for easier, effective, and efficient testing to different types of mechanical cultivation efficacies (i.e. the amount of weeds that are eliminated, and the amount of crops that are damanged in the process) with the end goals of providing organic farmers with a guide for choosing a mechanical cultivation system appropriate for there particular weed pest problem.

Abstract ID :
UMSS19194

Characterization of Boi1 and Boi2 Proteins in Yeast Cell Signaling

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 819

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Niklas Hase [1] *
Undergraduate

Author Name : Andrew Hart [2]
Graduate

Author Name : William Simke [3]

Author Name : Joshua Kelley [4]

Abstract Description : Characterization of Boi1 and Boi2 Proteins in Yeast Cell Signaling Hase, Niklas, Hart, Andrew, Simke, William, Kelley, Joshua The University of Maine College of Natural Sciences, Forestry, and Agriculture Yeast sense pheromone in the environment and grow toward its source. In order to sense this pheromone, yeast utilize a G protein-coupled receptor (GPCR) mediated pathway. As yeast sense pheromone, they grow in the directions of pheromone. Two yeast proteins in the GPRC pathway integral to cell growth are Boi1 and Boi2. Past studies have suggested that these two proteins are functionally redundant, performing the same role in polarizing the growing cell front. However, preliminary data indicates that Boi1 and Boi2 localize to distinct points along the forming cell front as it grows towards its pheromone. We hypothesize that Boi1 and Boi2 have distinct functions in polarization of the forming yeast cell front, and are not functionally redundant. Yeast proteins Boi1 and Boi2 were tagged with fluorescent molecular markers, and then observed in the presence of pheromone to distinguish their localization. It was found that the yeast proteins Boi1 and Boi2 localize to different points along the growing cell, with a spatial difference of 0.183 μm on the cell front. Furthermore, Bio1 and Bio2 were observed in a microfluidic pheromone gradient and found to localize to different points along the the growing edge of the cell, indicating that they act at different places. This differential location of action of Bio1 and Bio2 suggest a distinct function for each protein.

Abstract ID :
UMSS1973

Characterization of Novel Gordonia Phage: Sidious

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 833

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Jack Burnell [1] *

Undergraduate

Author Name : Hanna Griffin [2]

Author Name : Hope Dorr [3]

Author Name : Nathaniel Jordan [4]

Author Name : Sally Molloy [5]

Abstract Description : Bacteriophage (phage), viruses that infect bacteria, have a highly vast and genetically diverse population. While phage isolated from the genus Gordonia are more diverse than phage from Mycobacteria, they are less characterized and thus give us broader insight on how these viruses infect bacteria. A phage isolated from Gordonia terrae, called Sidious, was sequenced using Illumina high-throughput sequencing. Sidious was analyzed and characterized to determine the start and function of each putative gene using the databases and programs: DNAMaster, PhagesDB, Phamerator, and PECAAN. It is a Siphoviridae phage with an 80 nm diameter icosahedral head and 480-nm tail. Sidious is a temperate phage and forms 1-mm turbid plaques on a lawn of G. terrae. The temperate lifestyle of Sidious is supported by the presence of an integrase and a repressor in its genome. Sidious was assigned to cluster CZ based on high sequence identity with other CZ phage, Yeezy and BaxterFox (CZ3) but with enough unique sequence to warrant assignment to a new subcluster CZ7. The genome is 51,789 base pairs in length, has a GC content of 66.6%, and encodes 84 putative genes. Twelve of the genes are orphams, genes that lack homologs in the database, including a toxin-antitoxin system, RexAB, which has yet to be described in CZ phage. Further research will focus on novel genes of the CZ cluster, including the RexAB-like gene as well as regulatory sequences in Sidious.

Abstract ID :
UMSS19205

Characterizing a deadly viral infection in the brain by utilizing an innovative and unique approach

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 828

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Francesca Armstrong [1] *
Undergraduate

Author Name : Michael Wilczek [2]
Graduate

Author Name : Colleen Mayberry [3]
Graduate

Author Name : Jeanne DuShane [4]
Graduate

Author Name : Melissa Maginnis [5]

Abstract Description : Viral infections in the brain are often fatal and have a poor prognosis. JC polyomavirus (JCPyV), a human-specific virus that infects the majority of the adult population, resides in the kidneys but can disseminate to the central nervous system and cause a deadly and incurable disease known as progressive multifocal leukoencephalopathy (PML). Individuals that are immunosuppressed are at risk for development of PML; a terminal, demyelinating syndrome characterized by viral destruction of brain cells, astrocytes and oligodendrocytes. Our current understanding of JCPyV infection and pathogenesis is derived from cell culture studies utilizing a mixed brain cell line specifically designed to support JCPyV known as SVG-A cells. However, due to its immortalized characteristics, these cells may not accurately portray infection in the host. Current research suggests that astrocytes are an important cell type infected by JCPyV in the host. Therefore, we have established primary normal human astrocytes (NHAs) as a model for JCPyV infectivity. Using biochemical and molecular biology approaches, we have determined that JCPyV uses the same entry mechanism in NHAs as compared to SVG-A cells, but may utilize other downstream signaling pathways in an infected cell. These findings suggest that research on JCPyV infectivity can be recapitulated in NHAs. Further research will examine the signaling pathways required by JCPyV to establish infection in NHAs, illuminating possible roles in disease pathogenesis.

Abstract ID :
UMSS19320

Characterizing Cellular Uptake of Gold Nanoparticles and the Limitations of Surface Enhanced Raman Spectroscopy in Solutions

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 212

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Charles-Alexandre Roy [1] *
Undergraduate

Abstract Description : Gold nanoparticles (GNPs) have been an attractive candidate for facilitating research aimed at better understanding and treating diseases of aging, such as cancer. These diseases often arise from the accumulation and propagation of genetic errors in cell lineages over time, and therefore require continuous collection of biochemical data for improved characterization. A class of GNPs known as gold nanostars has been shown to outcompete fluorophores in certain contexts and is theorized as being a useful tool for tracking genetic and biochemical changes in cells over time. Unlike fluorescent molecules, GNPs are not prone to photobleaching and can be excited at any wavelength in any medium. Nanoparticle systems are also expected to play an important role in the era of personalized medicine. Because gold NPs have been used as imaging probes and as vectors for drug delivery, they are ideal for addressing the heterogeneity inherent in many diseases of aging. They have been advanced as a promising theranostic agent for providing patient-specific feedback regarding the efficacy of a given therapy. This project used darkfield microscopy and image analysis to estimate differential particle uptake in mouse osteoblast cells. This knowledge can be used in future work for better controlling nanoparticle dosage and expected signals. Further theoretical work is also presented explaining why the Surface Enhanced Raman Spectroscopy (SERS) signal enhancements generated by GNPs in solution are not as dramatic as might be expected given the upper limits of SERS often cited in the literature.

Abstract ID :
UMSS1948

Characterizing the impact of Mycobacterial prophage by curing M. chelonae of McProf through overexpression of the excise gene

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 825

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Jaycee Cushman [1] *
Undergraduate

Author Name : Sally Molloy [2]

Abstract Description : Characterizing the impact of Mycobacterial prophage by curing M. chelonae of McProf through overexpression of the excise gene Cushman, J.1, Smith, S.1, Freeman, E.1, McCallister, S.1, Hutchison, K.1, Molloy, S.1 Department of Molecular and Biomedical Sciences, College of Natural Sciences, Forestry, and Agriculture, University of Maine jaycee.cushman@maine.edu Mycobacterium tuberculosis is the leading cause of mortality among all infectious agents to date. It is responsible for 1.3 million deaths per year, and is the leading cause of death among HIV-positive individuals. Effective treatment for Tuberculosis remains elusive as the number of multidrug-resistant M. tuberculosis strains are ever increasing. All pathogenic strains of the M. tuberculosis complex carry prophage that are hypothesized to play a role in host fitness, although without an obvious virulence factor. In M. chelonae, a pathogen related to M. tuberculosis, we have demonstrated drastic changes in bacterial gene expression in the presence of prophage BPs. M. chelonae also carries a naturally occuring prophage, McProf, that has not previously been characterized, nor has its impact on bacterial gene expression been determined. The McProf genome appears complete and encodes 99 genes. RNA-sequencing analysis of M. chelonae indicated expression of 16 McProf genes. Three membrane proteins were identified that could prevent bacteriophage superinfection. To further study the role of McProf in bacterial gene expression and fitness, the McProf genome needs to be cured from M. chelonae. We have cloned the McProf xis gene and are overexpressing it in M. chelonae to isolate cells in which the prophage genome has been excised. By studying the interactions between naturally occurring prophage and mycobacteria, we increase our understanding of how prophage impact bacterial fitness and virulence and can potentially identify new targets for treatment.

Abstract ID :
UMSS19137

Childhood Obesity Interventions

Abstract Topic : Allied Health

Submission Type : Poster
Submission# : 426 **Judge Time Slot :** AM1 (9:30 - 10:30)
Undergraduate

Author Name : Rachel Emerich [1] *
Undergraduate

Author Name : Abigail DeHaas [2]
Undergraduate

Author Name : Kayla Harrington [3]

Author Name : Patricia Poirier [4]

Abstract Description : Obesity has become an ever-growing issue in America affecting the most recent generations of children and adolescents. The treatment and prevention of obesity in young adults can improve health outcomes and prevent the future burden of disease. Numerous research studies were reviewed that supported physical activity, nutrition, or a combination of the two in preventing and treating obesity in school-aged children. Vissers, Hens, Hansen, and Taeymans (2016) found through their meta-analysis research that a combination of nutrition and exercise interventions resulted in a significant decrease in body mass index (BMI) for overweight children. Therefore, it is important for nurses to promote both diet and exercise in order for children to experience an optimal level of health leading to healthy adult lives.

Abstract ID :
UMSS19277

Citizens’ Preferences for Coastal Usage

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 327

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Olga Bredikhina [1] *
Graduate

Author Name : Keith Evans [2]

Author Name : Caroline Noblet [3]

Abstract Description : Over the past few decades, the U.S. coastline has been rapidly transforming. Much of this change is due to growth in marine aquaculture and wild-capture fisheries production, development of recreational and conservation areas and expansion of coastal infrastructure, coupled with increasing coastal populations. With 40% of Americans living in counties directly on the shoreline, effective coastal management and planning require the understanding of public preferences for, and acceptance of different types of coastal usage. This paper uses an online choice experiment of Maine coastal residents to examine citizens’ preferences for alternate forms of coastal development related to food production, e.g., aquaculture and commercial harvest. Our online experiment simulates a coastal home purchase decision by asking participants to choose from a set of alternate housing options located within proximity to one of the following coastal features: aquaculture, coastal fishing and undeveloped coastal areas. In our choice experiment, all housing options have identical housing characteristics but are located near different coastal features and are associated with different monthly mortgage payments. This allows isolating the economic impact that proximity to different types of coastal infrastructure has on respondents’ willingness to pay for residential property in coastal areas. The results of our study may be valuable for industry stakeholders and policy-makers that work to promote sustainable coastal management practices and balance the interests of different groups of population.

Abstract ID :
UMSS1997

Climate Change and Diverse Challenges Facing Maine's Maple Industry: Areas for Potential Future Research

Abstract Topic : Interdisciplinary

Submission Type : Poster
Submission# : 616
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Patrick Hurley [1] *
Undergraduate

Author Name : Sal Magnano [2]

Author Name : Juliette Shean [3]

Author Name : Sara Velardi [4]

Abstract Description : The state of Maine, like the rest of the planet, is experiencing the harsh cultural, economic, and environmental impacts of climate change. A change in Maine's climate is causing a decrease in winter snowpack and shortening the average tapping season, both posing serious threats to Maine maple production (Matthews & Iverson, 2017). Since maple syrup holds serious economic and cultural significance in Maine, it is important to also consider the environmental and biological impacts climate change is expected to have on maple production. Drawing from material and experiences in an Honors Tutorial: Reflections on Cultural Aspects of Maine Agriculture, this poster will address three aspects of maple production in need of future study with the advent of climate change: the cultural meanings tied to maple in Maine; relevant political and regulatory issues around maple production; and lastly, the challenges that a warming climate poses to maple producers. This poster will present a current synopsis of the maple industry in Maine related to these three areas of study with potential research questions and corresponding methods for future research. This type of information could benefit not only maple producers, but also the general public and university researchers by identifying important areas of research in the maple industry and providing brief methodologies as to how we can approach these issues.

Abstract ID :
UMSS19399

Clownfish (Amphiprion clarkii) and mitochondrial development with thermal stressors

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 381 **Judge Time Slot :** AM2 (11:00 - 12:00)

Undergraduate

Author Name : Andrea Ramirez [1] *
Undergraduate

Author Name : Bryce Risley [2]

Author Name : Remy Babich [3]

Author Name : Nishad Jayasundara [4]

Abstract Description : Due to rising oceanic temperatures there is an inherent trend of organisms being forced to either adapt or resign to extinction. Despite significant advances in research focusing on identifying “winners” and “losers” of ocean warming, little is known about developmental susceptibility of organisms to changes in their environmental temperature. To this end, our research is focused on thermal plasticity of mitochondria, the energy powerhouse of the cell, during development. For these studies, we examine tropical reef fish Amphiprion clarkii, also commonly known as clownfish. They serve as an important model organism to elucidate susceptibility of reef fish to changing ocean temperatures. As the first phase of our study, we have developed a clownfish aquaculture system to complete their life-cycle in captivity. Subsequently, our research focused on developing a methodology to examine ontogenetic shifts in mitochondrial phenotype of clownfish embryos during development. Based on a high throughput assay using XFe extracellular flux analyzer, and coupled with the use of different pharmacological inhibitors, we characterized developmental mitochondrial phenotype of clownfish embryos. We are currently examining plasticity of this phenotype under different thermal regimes and the later-life bioenergetic consequences of early-life exposure to thermal stress.

Abstract ID :
UMSS1953

Co-learning Sustainability Science & Policy: An interdisciplinary approach to food waste reduction

Abstract Topic : Interdisciplinary

Submission Type : Oral

Submission# : 621

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Brieanne Berry [1] *
Graduate

Author Name : Skyler Horton [2]
Undergraduate

Author Name : Hannah Nadeau [3]
Undergraduate

Author Name : Shayla Rose Kleisinger [4]
Undergraduate

Author Name : Taylor Patterson [5]
Undergraduate

Author Name : Andrew Flynn [6]
Undergraduate

Author Name : Cynthia Isenhour [7]

Abstract Description : Food waste is a complex issue that is situated at the intersection of multiple academic disciplines. For several years the Materials Management Research Group, an interdisciplinary team based out of the University of Maine's Senator George J. Mitchell Center for Sustainability Solutions, has sought to connect research to practice on food waste issues in Maine. With a goal of increasing student engagement at all levels, and with support from multiple funders, in 2018 the Research Group established a program to train a team of undergraduates in interdisciplinary research centered around issues of food waste. This team of five students represents a broad range of academic disciplines, with the goal of conducting research to build a more circular food system in Maine. We present a case study of our first team of scholars, sharing some of the obstacles we faced in training students in interdisciplinary, solutions-oriented research. We also share the impact this program has had on our students, along with implications for other contexts and opportunities for collaboration across the state of Maine. We found that although interdisciplinary work is complex and often slow-moving, it presents important opportunities for undergraduate and graduate student collaboration, as well as contributions to real-world problem solving.

Abstract ID :
UMSS1999

Co-Rumination Predicts Non-Suicidal Self-Injury in Late Adolescence

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 124

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Emily Scarpulla [1] *
Graduate

Author Name : Melissa Jankowski [2]
Graduate

Author Name : Cynthia Erdley [3]

Abstract Description : Co-rumination refers to discussing problems with another person in a repetitive, symptom-focused manner and has been shown to be a prevalent social behavior in adolescents (Rose, 2007). Research (e.g., Giletta et al., 2013) has shown that there is a relationship between peer influence and nonsuicidal self-injury (NSSI), but it seems to be more complex than simply modeling of behavior. Although several studies have examined the multifaceted role peer relationships have on NSSI, limited research has specifically investigated the relationship between co-rumination and NSSI in late adolescents. The strong tendency for group identification in late adolescence, paired with the problem-focused nature of co-rumination, may increase the likelihood of engaging in NSSI. The current study seeks to examine the relationship between co-rumination and NSSI. A total of 150 participants are being recruited and will complete self-report measures of suicidality (Self-Injurious Thoughts and Behaviors Interview; Nock, Holmberg, Photos, & Michel, 2007) and co-rumination (Co-Rumination Questionnaire; Rose, 2002). Preliminary data ($N = 64$; M age = 18.7 years; 53.8% male) indicate that co-rumination is related to thoughts of NSSI ($r = .31$, $p = .013$) and reported engagement in NSSI ($r = .255$, $p = .021$). Next, co-rumination was examined as a predictor of NSSI behavior using a regression analysis ($\Delta R2 = .065$, $F(1, 62) = 4.307$, $p = .042$). Results showed that co-rumination significantly predicted NSSI. Our findings contribute to research on co-rumination and suggest that problem-focused socializing may predict nonsuicidal self-injury in late adolescents.

Abstract ID :
UMSS1935

Cochlear Implants and Vestibular Dysfunction

Abstract Topic : Natural Sciences

Submission Type : Poster
Submission# : 330
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Emma Jandreau [1] *
Undergraduate

Author Name : Willow Beccia [2]

Author Name : Emily Brackett [3]

Author Name : Jordan Belanger [4]

Author Name : Isabel Alesse [5]

Author Name : Paige Lane [6]

Abstract Description : Cochlear Implants and Vestibular Dysfunction Isabel Alesse, Willow Beccia, Jordan Belanger, Emily Brackett, Emma Jandreau University of Maine In the United States alone 41,000 adults and 26,000 children have cochlear implants to aid in their communication, according to The National Institute of Health (2018). Cochlear implants are prevalent in other countries such as Australia and Egypt, along with many others. The inner ear contains three semicircular canals that are filled with fluid which help the body to maintain balance. When the cochlea functions improperly, people have a higher probability of being eligible for cochlear implants. Balance is required for daily functions such as walking and standing, as well as more intense coordinated activities such as dance and other sports. Vestibular deficit theory states that damage to the cochlea results in damage to the semicircular canals, which can be extended to include surgery of the implantation of a cochlear implant (Ebrahimi 2016). This research review aims to explore the connection between vestibular dysfunction and implantation of the artificial cochlea, as well as how the time of intervention and severity of imbalance affect the result of therapy provided.

Abstract ID :
UMSS19346

Combinatorial Pathways to Resilience: A New Analysis from New England

Abstract Topic : Social Sciences

Submission Type : Exhibit
Submission# : 108
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Elizabeth Spear [1] *
Undergraduate

Author Name : Andrew Crawley [2]

Abstract Description : The economic downturn of 2007/2008 was one of the largest financial shocks to hit the global economy and its aftermath was still evident years later in some US states. The heterogeneity between states in terms of responsiveness to the shock has prompted much research within economics. The term resiliency has become a buzz word amongst regional development practitioners and scholars clambering to understand what characteristics make an area better able to deal with economic shocks. In this paper, we attempt to quantify the regional characteristics that could contribute to resiliency through a county level analysis of New England. The study utilizes a multi-procedural approach, first implementing the sensitivity index of Faggian et al. (2018), then using fuzzy set qualitative comparative analyses (FSQCA) to identify the combinatorial predictors of resiliency. Driving this analysis is a set of relative industrial measures that were calculated prior to the recession. This gives us the ability to estimate whether the presence of certain industries contributed to the resiliency, or otherwise, of a region. The research has found significant variation in the level of resilience across New England, with Rhode Island being the least and Vermont being the most effected by the US recession. The paper gives new insights into the possible explanation for these discrepancies by drawing out the social and physical characteristics present at a county level.

Abstract ID :
UMSS19107

Comparative Rhetorical Analysis of Anti-Choice and Pro-Choice Social Movements

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 147 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Meghan Frisard [1] *
Undergraduate

Author Name : Susan Gardner [2]

Abstract Description : One of the constant challenges for supporters of abortion access is competing with the ways in which the anti-choice movement uses language to appeal to the general public. This project compares the language and rhetoric of pro-life and pro-choice organizations and clinics in our home state of Maine and one of the most anti-choice states in the country, Arizona. Data sources include publicly available information from the websites and social media pages of these organizations. Analysis will compare the ways in which these organizations make rhetorical choices to achieve their stated goals.The hypothesis is that successful anti-choice campaigns in Maine, a state much more protective of abortion rights than Arizona, will have to employ far more emotionally charged rhetoric to gain support from residents because support of their campaigns is much more controversial. The ways in which movements use this type of rhetoric can then be compared to the ways in which successful pro-choice campaigns in each state have used rhetoric to mobilize support and achieve a goal. Results from this project can be used to inform abortion access advocates about how to successfully use language and media in their activism; particularly in states with varying levels of hostility towards abortion rights.

Abstract ID :
UMSS19221

Comparing the Antioxidant Properties of Commercially Available Seaweed Powders

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 346

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Courtney Brett [1] *
Undergraduate

Author Name : Angela Myracle [2]

Abstract Description : The antioxidant capacity of seaweed varies by color and species. Antioxidants have been linked to decreasing oxidative stress, which is crucial in disease treatment and prevention. The overall goal of this research is to compare the total phenolic content (TPC) and radical scavenging capacity of four seaweed samples obtained in the North Atlantic. The samples include three brown seaweeds (Alaria esculenta, Laminaria digitata, Ascophyllum nodosum) and one green seaweed (Ulva Lactuca). Seaweed samples will be extracted through accelerated solvent extraction (ASE) using high pressure and lower temperatures. The specific temperature being used in this research is 40 °C. Total phenolic content and radical scavenging capacity will be measured by established assays. The hypothesis and expected outcomes of this study are that brown seaweed will contain higher total phenolic content and radical scavenging capacity than that of green seaweed. This study will add to the existing research regarding seaweed and its antioxidant content. The results can provide consumers and producers with viable information regarding the nutritional information of these products.

Abstract ID :
UMSS19152

Conflict Resolution: Training & Tactics

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 142

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Eliana Martel [1] *
Undergraduate

Author Name : Claire Sullivan [2]

Abstract Description : Eliana Martel Conflict Resolution: Training and Tactics Faculty Mentor: Claire Sullivan Department: Communication & Journalism This literature review explores the content and results of formal conflict resolution training in relation to common conflict resolution tactics, by utilizing peer reviewed qualitative and quantitative research dating back to 2010. Due to the diverse and universal nature of conflict, investigating formal conflict resolution education and common tactics uncovers several ways to ease the process of encountering and resolving day-to-day conflict. The studies examined in this literature review focus on: (1) formal conflict resolution training and their documented results and (2) personal conflict resolution tactics from various contexts. This research has been collected from the Communication Mass Media Search Complete database, it includes published quantitative and qualitative peer reviewed studies. This literature review seeks to aid in understanding the impact of formal conflict resolution training, and guide those who have not received training by fully describing and analyzing researched techniques. The poster presentation will include: (1) the most significant data regarding formal conflict resolution training results and (2) conflict resolution tactics divided by the context for which they are most suitable.

Abstract ID :
UMSS19416

Continuous high frequency nitrogen and ammonia monitoring system in Casco Bay, Maine

Abstract Topic : Natural Sciences

Submission Type : Exhibit
Submission# : 303
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Megan Amico [1] *
Undergraduate

Author Name : Kathleen Thornton [2]

Author Name : Kate Liberti [3]
Graduate

Author Name : Damian Brady [4]

Abstract Description : A large majority of the people of Maine live in the Casco Bay watershed. People living in high density coastal areas tend to lead to increases non-point and point sources of nutrients. Excess nutrients, especially nitrogen, in marine waterways can often lead to eutrophication and hypoxia. If eutrophication causes hypoxia, it can diminish valuable marine resources such as lobsters and oysters by suffocating the organisms beneath the surface. To understand the water quality of Casco Bay, we developed a novel real-time mobile ammonium and nitrate analyzing system to monitor nutrient concentration in Casco Bay. The objective was to determine potential sources of nitrogen. We took real-time samples while underway on the Friends of Casco Bay's Bay Keeper in the summer of 2018. We found that there were significant amounts of ammonia near the South Portland wastewater treatment plant but relatively low ammonia near the outfall of the Portland wastewater treatment plant. Our data may be used to educate the community on their local water quality as well as aid in the decision making process for creating nitrogen management infrastructure. The relatively smaller observed ammonia concentration at the East End Wastewater Treatment facility corresponds to an upgrade in the nitrification-denitrification processing the plant recently underwent. The ability to monitor ammonia while underway in real-time has the potential to change the way we manage nutrients and link sources to in water concentrations.

Acknowledgements: Thank you to Damian Brady PhD., Kathleen Thornton, Kate Coupland-Liberti, Friends of Casco Bay and SEANet for the continuous support and resources to make this project possible. This activity is supported by National Science Foundation award #IIA-1355457 to Maine EPSCoR at the University of Maine.

Abstract ID :
UMSS19153

Control of Surface-Adherent Bacteria for Prolonged Space Travel

Abstract Topic : Biomedical Sciences

Submission Type : Oral
Submission# : 859 **Judge Time Slot :** AM2 (11:00 - 12:00)
Graduate

Author Name : Kayla Marquis [1] *
Graduate

Author Name : Benjamin Chasse [2]
Undergraduate

Author Name : Caitlin Howell [3]
Undergraduate

Abstract Description : With the imminent consequences of global warming and a continually rising global population, Earth's natural resources are dwindling and the sustainability of life on Earth as we know it has become threatened. With the rapid development of technology for space travel the prospect of Lunar and Martian missions grows more promising by day; however, the health risks associated with prolonged travel and limited accessibility to healthcare presents a major challenge. Due to the close proximity of individuals traveling in space and the continual recycling of resources, bacterial biofilms are constantly forming in confined space environments where they can contribute to the degradation of the polymers and metals of the space vehicles as well as potentially threaten human health. We have developed a simple solution to the continual biofilm formation in the confined environments of space by adapting a newly developed technology, self-replenishing vascularized polymer systems, to commonly bio-fouled surfaces. Self-replenishing vascular systems possess unique surface properties which have been shown to reduce the adhesion of fouling organisms without toxic chemicals. The reduction in adhesion of these organisms increases the ease with which fouling organisms can be physically removed from the surface with mechanical methods such as wiping. We have further adapted this system to identify antibiotic resistance within the space vehicle cabin. We anticipate that this technology will help increase human safety and the longevity of space hardware for prolonged space missions.

Abstract ID :
UMSS19336

Controlling the Strength of Carbonation Activated Binders Using Amino Acid

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral

Submission# : 256 **Judge Time Slot :** PM1 (1:00 -2:00)
Graduate

Author Name : Mohammad Rakibul Islam Khan [1] *
Graduate

Author Name : Warda Ashraf [2]

Abstract Description : Carbonation activated binder is an alternative cementitious system with significantly low carbon footprint compared to those of traditional portland cement. This study wollastonite as the raw binder. Wollastonite reacts with CO2 and form Ca-modified silica gel and CaCO3 which will give strength in carbonated matrix. The CaCO3 formed from this reaction can have different polymorph including aragonite, calcite, vaterite and amorphous. As the primary binding phase, the exact polymorph of CaCO3 controls the final strength of carbonation activated binder. The goal of this study was to control the polymorph of CaCO3 using amino acid (AA) and thus, to obtain a better control on the strength of carbonation activated binder system. Three types of Amino acid i.e. hydrophobic L-valine, less polar uncharged L-serine, positively charged L-arginine has been used in this research. Based on the thermogravimetric analysis, it was observed that all three Amino acid (AA) are responsible for reducing degree of carbonation (DOC). Fourier transformed infrared (FTIR) spectroscopy and three-point bending test were performed to analyze the CaCO3 morphologies present and the strength of the carbonated Wollastonite system. Among these three Amino acids, L-Arginine showed higher amount of Amorphous CaCO3 formation which eventually lead to a higher flexural strength of the carbonate materials.

Abstract ID :
UMSS19306

Converging Traditional and Western Scientific Methods to Highlight Penobscot Sovereignty

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 110

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Nolan Altvater [1] *
Undergraduate

Author Name : Bridie McGreavy [2]
Graduate

Abstract Description : The waters of the Penobscot River are a vital element of life and identity to the Penobscot Nation, who have called this watershed home for more than 10,000 years and now share this land with others. Over time, changes in water use have impacted the culture and survival of the Penobscot People. For example, they are exposed to water contaminants through cultural practices and consumption of fish. In response, my collaborators and I use this poster to advance decolonizing research (Smith, 2012), writing (Asher, 2009), and media techniques (Haas, 2007) to highlight tribal sovereignty. We describe how we have become part of the Penobscots' story, in particular focusing on how the Nation's Water Resources program uses Western science to protect their river. As an intern in the Wabanaki Youth in Science (WaYS) program at the University of Maine, participating in long-term efforts to restore this river has shaped me as a native researcher. For example, in-depth interviews with tribal members (n=6) led to research dialogues with elders and family members that helped me explore new ways to share research. This included collecting photos and videos (n=812) on water sampling trips with Penobscot Nation staff over multiple field seasons, an ongoing form of reciprocation that is building a media database to support their program. This work has also shaped my understanding of how Western science is being applied to promote the sustainability of natural resources and Wabanaki sovereignty.

Abstract ID :
UMSS1937

Course Evaluation System

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster
Submission# : 238
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Stanley Small [1] *
Undergraduate

Author Name : Jovon Craig [2]

Author Name : Robert Judkins [3]

Author Name : Samuel Elliott [4]

Author Name : Yuanqi Guo [5]

Author Name : Terry Yoo [6]

Abstract Description : Four members of the computer science capstone class are designing an electronic teaching evaluation system at the direction of Dr. Harlan Onsrud, a professor and prior director of the School of Computing and Information Sciences. Teaching evaluations have long been done by hand, and new efforts to process evaluations electronically are often expensive and inflexible. Without a simple and efficient system, fewer responses will be received and instructors will miss valuable feedback. Simplicity and security are two of the most important requirements. Our team chose this project because we can see a direct and immediate use of the project from which we can receive valuable feedback. As students, we are invested in our education and wish to improve one of the most important systems in a teaching institution. Insturctors create evaluations, then they are automatically distributed to students.

Abstract ID :
UMSS19284

Creating a sweet spot: How alternative forms of capital are valued by small- and medium-scale Maine maple syrup producers

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 153
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Skye Siladi [1] *
Undergraduate

Author Name : Jessica Leahy [2]

Author Name : Sara Velardi [3]

Author Name : Melissa Ladenheim [4]

Author Name : Kourtney Collum [5]

Author Name : Julia McGuire [6]

Author Name : Cynthia Isenhour [7]

Abstract Description : Why do people farm? The answers are increasingly unclear given the heightened pressure of agricultural consolidation on small family farms. When profit margins are thin or even non-existent it is necessary to look at how other factors influence this group of people – particularly the social and cultural ties within and amongst communities that inspire people to remain in a profession which may not be as financially lucrative as it once was. This poster explores conceptualizations of social, cultural, and natural wealth as rationales for continuing in agricultural work by focusing on maple syrup producers in Maine. At the small and medium-scale, maple syrup production cannot provide substantial income and yet people continue to participate in a time- and labor-intensive activity with marginal returns. We argue that maple sugaring makes an interesting case study through which to explore the various reasons that people take part in small-scale agricultural work with minimal financial benefits. Drawing on 10 semi-structured interviews with both multigenerational and first-generation maple syrup producers we utilize the community capitals framework to explore the reasons these producers have chosen to continue or begin maple syrup production. Focusing on how social capital, cultural capital, natural capital, and human capital have impacted their decisions, we argue that monetary consideration may not be a primary decision-making factor. Our research points to a whole array of motivations which suggest that their returns are linked to human relationship and connections to culture and place.

References [1] C. Flora, J. Flora, S. Gasteyer, “Rural communities: legacy + change”, Westview Press, 2016. [2] C. Hinrichs, “Sideline and lifeline: the cultural economy of maple syrup production”, Rural Sociology, 1998.

Abstract ID :
UMSS19213

Current and Past History of Depression: Implications for Resting High Frequency Heart Rate Variability

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 151 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Sadie Libby [1] *
Undergraduate

Author Name : Danielle Krause [2]

Author Name : Breana Hurley [3]

Author Name : Rachael Huff [4]

Author Name : Shelby Helwig [5]

Author Name : Shannon McCoy [6]
Undergraduate

Abstract Description : Depression may put individuals at risk for cardiovascular disease. Low resting high frequency heart rate variability (HF-HRV) is associated with increased risk of a cardiovascular event, and individuals with clinical depression tend to have lower resting HF-HRV than individuals who are not depressed. Yet many questions remain. Does a past history of depression, or severity of depression, negatively impact later cardiovascular functioning when one is not depressed? Are these associations evident in relatively healthy young adults, or at relatively mild levels of depression? In a sample of young adults we examined the predictive role of current depressive symptoms and severity of past depression on resting HF-HRV. Participants completed the Beck Depression Inventory (BDI) to assess current depressive symptoms and the Patient Health Questionnaire (PHQ – reworded to assess “a time when you were most sad”) to assess severity of past depression. Upon arrival to the lab (2 months later), participants completed a measure assessing a broad spectrum of positive and negative current mood states. Following application of impedance cardiography and electrocardiogram sensors, resting HF-HRV was recorded for 10 minutes. Consistent with predictions and prior research, the higher a participant’s current depression (BDI) the poorer their cardiovascular functioning (lower resting HF-HRV). In this sample of young adults, we did not observe cardiovascular vulnerability among individuals who were not currently depressed regardless of past severity of depression. In addition, the more negative participant’s current mood, the lower their resting HF-HRV. Results of the current study further our understanding of the roles of current depression, past severity of depression and current negative mood in cardiovascular functioning. In our sample of relatively healthy young adults, individuals with current depression, and those with more negative mood, evidenced lower resting HF-HRV.

Abstract ID :
UMSS19216

Data Queen

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 707 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Sarah Seitz [1] *
Undergraduate

Author Name : Jon Ippolito [2]

Abstract Description : "Numbers are boring. People are interesting." - Hans Rosling. For my project, Data Queen, I created data sonification music based on the experiences of women. 2018 was considered the Year of the Woman, the first since Anita Hill stood in front of the Senate Judiciary Committee in 1991. As a woman, I feel that there is still much to do in the future to pave a way for the next generation of smart, powerful women and Data Queen is my contribution. I surveyed over 300 women on various topics of interpersonal relationships and am using the data I've collected to tell a story through the music it produces. Every number and statistic recorded in my surveys, which asks questions like, "Do you feel like you struggle to make female friends?" and "Are you asexual?", have been aggregated and translated into a musical composition. Data sonification is the use of non-speech audio to convey information or perceptualize data. In Data Queen, it is the data itself that drives the composition, not the other way around. In this way, the audience can hear the data instead of just seeing it, which allows for a curated experience. Although data sonification isn't as conventional as bar graphs and pie charts, that's where the magic lies - hearing data makes it easier to recognize patterns and trends that may be missed visually. Listening to music is intuitive, any person of any age can listen to music and recognize patterns - it doesn't have to be taught.

Abstract ID :
UMSS19286

Defining the Dynamics of β-arrestin During JC Polyomavirus Entry of Host Cells

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 849

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Tristan Fong [1] *
Undergraduate

Author Name : Colleen Mayberry [2]
Graduate

Author Name : Kashif Mehmood [3]
Graduate

Author Name : Melissa Maginnis [4]

Abstract Description : Defining the Dynamics of β-arrestin During JC Polyomavirus Entry of Host Cells Fong, TM1, Mayberry, CL1, Mehmood, K1, Maginnis, MS1 1Department of Molecular and Biomedical Sciences, University of Maine, Orono, ME JC polyomavirus (JCPyV) is a non-enveloped double-stranded DNA virus that persists in the majority of the adult population as an asymptomatic infection of the kidneys. Cases of severe immunosuppression can lead to JCPyV migration to the central nervous system (CNS), resulting in progressive multifocal leukoencephalopathy (PML), a fatal disease with no effective existing treatments. To infect host cells, JCPyV must interact with receptor proteins and other macromolecules. Entry requires the 5-hydroxytryptamine (5-HT)2 receptors, a subtype of serotonin receptors, that are expressed on CNS and kidney cells. It was recently shown that JCPyV internalization also requires the endocytic proteins, β-arrestin, which is proposed to interact with 5-HT2Rs. The objective this research is to define whether β-arrestin is recruited to the 5-HT2 receptors to mediate JCPyV infection. More specifically, a known β-arrestin-binding motif comprised of a conserved tripeptide sequence of Ala-Ser-Lys (ASK) will be assessed for its contribution to JCPyV infectivity and entry. To determine this, dynamics of β-arrestin during JCPyV entry will be compared between wild-type 5-HT2Rs and those with mutated ASK motifs. This will be accomplished utilizing two microscopy techniques, Transfluor microscopy and fluorescence photoactivation localization microscopy (FPALM), which will allow visualization of β-arrestin redistribution within host cells and association with 5-HT2Rs during JCPyV entry, respectively. Results from this study would improve our understanding of JCPyV entry and could potentially lead to the discovery of a new drug target for antiviral therapy.

Abstract ID :
UMSS19366

Deforestation, extractive land use, and disease epidemics in Venezuela: an emerging humanitarian crisis

Abstract Topic : Interdisciplinary

Submission Type : Poster
Submission# : 615
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Chelsea Fairbank [1] *
Graduate

Author Name : Ailish Scott [2]

Author Name : Alyssa Marini [3]

Author Name : Jacquelyn Gill [4]

Abstract Description : Venezuela is currently experiencing a confluence of social, political, and environmental issues which have resulted in its current humanitarian crisis. Contemporary contingencies of economic decline, increased land alterations for economic extraction activities, a decline in mosquito-control activities, and political authoritarianism preventing accurate medical reporting and care have combined to produce increases in vector borne disease infections throughout Venezuelan populations. Workers in both logging and in mining positions are creating habitats for larval breeding, causing a high risk of contact with mosquitoes carrying diseases like Malaria, Dengue, Venezuelan Equine Encephalitis (VEE), West Nile virus (WNV), Zika and Chikungunya. Studies have shown that changes in land use and deforestation affect disease vectors and alter disease patterns by increasing the risk of exposure and increasing the habitats available for mosquito reproduction. Concurrently, political instability and the decline of basic social infrastructures places the risk of infectious diseases into a broader regional scope, through current high rates of emigration, with the potential to put adjacent countries at-risk through spillover. These issues are often considered separately, here we will look at how these interactions have contributed to the humanitarian crisis Venezuela is in today. This submission seeks to connect the political, environmental, and social spheres which impact the health and safety of the Venezuelan populace. Identifying linkages and feedbacks between the physical, biological, and social systems being expressed currently in Venezuela can advance understandings around anthropogenic increases in vector borne diseases while adding to academic literature seeking to prevent and manage future risk in social, political, and environmentally related scenarios.

Abstract ID :
UMSS1969

Design and Testing of a Wind Tunnel Gust Generator

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster
Submission# : 229
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Aaron French [1] *
Graduate

Author Name : Wilhelm Friess [2]

Abstract Description : Wind tunnel testing is an important process for evaluating aerodynamic effects on model experiments. However, most wind tunnels are not initially equipped with the means to simulate more realistic aerodynamic conditions that one would see in the natural environment, such as wind gusts and turbulence. The wind tunnel in Crosby Laboratory at the University of Maine is such a case, and to remedy this problem a wind tunnel gust generator design is proposed. The design of this gust generator is to simulate significant gusting conditions with high peak differences that vary sinusoidally down the wind tunnel test section. The device operates by means of two parallel airfoil gust vanes that oscillate as the wind passes, causing a reverse in the bound circulation around the airfoil with every reverse in the oscillation direction. This corresponds to a reverse in the wake circulation behind the airfoil, producing a sinusoidal variation in wind velocity. This device was built, installed, and tested for different wind velocities, gusting frequencies, airfoil oscillating angles of attack, and positions in the wind tunnel. The results at the point of interest show that there is a trend of sinusoidal gusts with velocity differences of up to 4 m/s on average. This research was funded through a University of Maine Teaching Assistantship for the 2017-2018 Academic Year.

Abstract ID :
UMSS19200

Design of a clinical patient-monitoring system for use in Stokes basket field rescue operations

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 214

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Thomas Roerden [1]
Undergraduate

Author Name : Lauren Nightingale [2] *
Undergraduate

Author Name : Caryl Young [3]

Author Name : Abigail Weigang [4]
Undergraduate

Author Name : David Neivandt [5]

Abstract Description : In field rescue operations, Stokes baskets are commonly used by search-and-rescue (SAR) teams to transport the patient from their location to an awaiting emergency vehicle at the nearest access point. The rescue process typically takes several hours, as SAR teams must carry the Stokes basket long distances across rugged terrain and may be subjected to extreme weather conditions. SAR teams are currently unable to monitor patients during field rescue due to a lack of medical technologies which fulfill both the durability requirements and weight constraints of these missions. In this project, we propose the design of a patient-monitoring system which is lightweight, waterproof, and sufficiently robust for use in field rescue operations. The RescueNest patient monitoring system will allow for continuous acquisition of several patient vital signs (heart rate, blood oxygenation, core temperature, and blood pressure) while the patient is strapped securely into a Stokes basket. The product unit will mount directly onto the frame of the basket, where vital signs will be displayed on an LCD screen and synced to a mobile application for long-range transmission via SMS text messaging. Additionally, all patient data will be stored onto an SD card for use by medical professionals once the patient has arrived at a treatment facility. In general, this system will allow for improved patient outcomes in Stokes basket field rescue operations.

Abstract ID :
UMSS19316

Design of a Traverse for Performing Flow Measurements of a Shellfish Nursery Upweller

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 220
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Eric Lindbom [1] *
Undergraduate

Author Name : Joshua Viekman [2]

Author Name : Michael Orne [3]
Undergraduate

Author Name : Andrew Goupee [4]

Abstract Description : Shellfish aquaculture is rapidly growing in the State of Maine with harvest values of approximately $6 million as of 2016. Currently, rearing of juvenile shellfish is undertaken by using a simplistic device, called an upweller, which passes seawater containing ambient phytoplankton through a layer of juvenile shellfish in order to feed the animals. Prior work has shown that flow rates, flow distribution and phytoplankton content have a strong impact on the productivity of the shellfish nursery. The development of upwellers which exhibit these ideal flow characteristics will lead to improved early-stage growth, and ultimately, greater economic viability of oyster farming operations in the State. To aid in the design and testing of advanced upweller technologies, an upweller test stand has been fabricated in UMaine's Crosby Laboratory which permits the simulation of flow through upwellers of varying configuration. In this work, the design and implementation of a traverse system for accurately locating a hot film anemometer used for measuring water flow velocities and turbulence levels is discussed. The traverse allows for flow measurements throughout the upweller interior for volumes up to 1.2 m width, 1.8 m in length and 1.2 m in depth. In addition to the traverse, the design and fabrication of a device for calibration of the hot film anemometer in water is also presented as is the manufacture of 3D printed oysters used for simulating the impact of oyster beds on upweller flows.

Abstract ID :
UMSS19212

Design optimization of a structural part using extrusion-based additive manufacturing overprinted on a fiber-reinforced thermoplastic laminate

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 202
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : PianPian Chen [1] *
Graduate

Author Name : Roberto Lopez-Anido [2]

Abstract Description : Leveling jacks for ISO containers experience harsh treatment, and the baseplate, which is used to distribute loads to the ground, needs to be replaced frequently. Extrusion-based additive manufacturing (AM) is a 3D printing technology that builds objects by layering thermoplastics. The advantages of using AM for replacement parts include convenient field deployment without stockpiling, ease of fabrication, and material recyclability. The objective of this research is to optimize the design of a baseplate using AM overprinting on a continuous fiber-reinforced thermoplastic (CFRTP) composite laminate. The resulting part presents new challenges for developing a strong and durable interface between AM and CFRTP composite laminate. A copolyester with 20% discontinuous carbon fiber (DCF) reinforcement was selected because it’s an amorphous engineering thermoplastic that is environmentally stable, with low odor, and amenable for AM. E-glass fiber reinforced PETG was selected for CFRTP because is compatible with the AM material. An ironing method was investigated for bonding the 3D printing DCF copolyester on the E-glass reinforced PETG laminate to develop strong interfaces. An in-plane laminate shear test, in accordance with ASTM D3846, was conducted to characterize the shear strength of the interface. Topological and composite laminate optimization are applied through a finite element analysis to design the baseplate using the AM and CFRTP materials. This research will contribute to develop a process for extrusion-based AM overprinting on a CFRTP composite laminate for structural applications and a methodology for optimizing the design of the resulting hybrid part. This material is based upon work supported by the US Army Combat Capabilities Development Command Solider Center (CCDC-SC) under Contract No. W15QKN-13-9-0001 and W911QY-18-C-0101. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the CCDC-SC. Approved for Public Release – CCDC-SC PAO #: U19-1012.

Abstract ID :
UMSS19169

Designing a Platform for Early Diagnosis of Peripheral Neuropathy

Abstract Topic : Biomedical Sciences

Submission Type : Poster
Submission# : 851
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Erin Merchant [1] *
Undergraduate

Author Name : Kristy Townsend [2]

Abstract Description : The growing obesity pandemic has caused diabetes to become one of the world's leading health concerns. Diabetic individuals often suffer from peripheral neuropathy, which is nerve death that typically starts at the extremities and moves skin inward to deeper tissues. This nerve death causes painful symptoms including tingling, stinging, numbness, and others. Current methods to diagnose peripheral neuropathy by measuring nerve function are invasive and painful since they target large axons of the legs; however, by the time the neuropathy reaches the diagnosable axons, it is often too late for intervention. Although no cures for neuropathy are established, aside from analgesics for pain, there are options for mitigating worsening of the disease if diagnosed early enough (for example, glucose control for diabetic neuropathy). There is a critical need for early detection and diagnosis of peripheral neuropathy as obesity and diabetes continue to plague the world. Microneedle fabrication is a growing research area, especially in transdermal drug delivery due to their minimal invasive, pain-free application. The objective of this project is to design a platform using electrically conductive microneedles for early detection of peripheral neuropathy. Using these needles, neurophysiology can be employed to record electrical signal just below the skin to determine the integrity of the nerves to track neuropathy progression. Thus far, prototypes of the device have been tested on mice to establish protocols and understand the hardware and software, with the goal of eventually developing a useable prototype for a longitudinal study of diseased mice and human clinical studies.

Abstract ID :
UMSS19229

Detection of Loss of Breast Tissue Homeostasis using Fourier Power Spectral Image Analysis of Mammographic Breast Tissue

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 250
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Mark Lambrecht [1] *
Undergraduate

Author Name : Andre Khalil [2]

Abstract Description : One in eight women and one in a thousand men will be diagnosed with breast cancer within their lifetime. Despite an aggressive emphasis on screening mammography, there has been no change in initial mestastic breast cancer diagnosis. Screening mammography is ineffective and biased towards a reactive diagnosis when cancer is already present. We seek to develop a predictive algorithm that is sensitive to currently undetectable alterations of the microenvironment that precede tumorigenesis. The relationship between breast tumor proliferation and the structural integrity of the tumors' microenvironment can be characterized by surrounding non-tumor tissue.1 Marin et al. investigated the breast tissue microenvironment and breast bilateral asymmetry of mammograms to quantify tissue disruption via the Hurst exponent (H), using a wavelet-based approach called the 2D Wavelet Transform Modulus Maxima (WTMM) method. Results suggested objective discrimination of tumor-associated disrupted breast tissue associated with uncorrelated (H~½) density fluctuations.1 This computational method has the potential to perform pre-detection assessments of when and where tumorigenesis may occur. This study will explore a supplemental computational method - Fourier Power Spectral Analysis – to determine whether discriminatory power (similar to the WTMM approach) can be achieved with a faster, less complicated method. The employment of predictive diagnostics, such as Fourier Power Spectral Analysis, empowers both patient and clinician to collaboratively assess all ramifications of the disease and select optimal therapeutics.

Abstract ID :
UMSS19312

Detection of Pesticide in Water by Cellulose Nanofibrils (CNF) Substrate

Abstract Topic : Physical Sciences

Submission Type : Oral

Submission# : 913

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Muhammad Hossen [1] *
Graduate

Abstract Description : Highly porous aerogels made from cellulose nanofibrils (CNF) are promising candidates for applications in aqueous environments. One of the biggest challenges of high porosity CNF aerogels applications is their propensity to break down rapidly in aqueous environments. Here we explore a method to overcome this deficiency by incorporating methacrylate functionalized carboxymethyl cellulose (MetCMC) into the CNF system followed by UV irradiation leading to crosslinking of the methacrylate groups of MetCMC. The resultant polymer composite matrix successfully maintains a robust 3D structure, without collapsing, even when rewetted and stored in water. Incorporation of silver nanoparticles to the composite does not affect the wet stable property of the materials. Silver nanoparticles incorporated CNF-MetCMC substrate is capable of concentrating organic pollutants such as pesticides onto its surface by hydrophobic interaction. Using this novel substrate, parts per trillion (ppt) detection & quantification of pesticides has been possible. Acknowledgement: This work was supported by NSF SEP Award number 1230908 from NSF CBET Division; University of Maine Research Reinvestment Fund (RRF) References [1] C. Haigler, Biosynthesis and biodegradation of cellulose, CRC Press, USA, 1990. [2] O. Nechyporchuk, M.N. Belgacem, J. Bras, Production of cellulose nanofibrils: A review of recent advances, Ind. Crops Prod. 93 (2016) 2–25. doi:10.1016/j.indcrop.2016.02.016.

Abstract ID :
UMSS19145

Determination of Potential Biopolymer Substitutes for Intaglio Etching Constituents Based on Rheological and Adhesive Properties.

Abstract Topic : Physical Sciences

Submission Type : Poster
Submission# : 909
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Gabrielle Bock [1] *
Undergraduate

Author Name : William Gramlich [2]

Abstract Description : Intaglio etching is an artistic process in which the commercial etching grounds have significant health and environmental impacts. Potentially non-toxic grounds exist, but not much is known about their composition or physical properties that lead to desirable printmaking qualities. To better understand these materials and develop new ones, the composition of the Orono Ground, developed by Professor Susan Groce at the University of Maine, and other commercial grounds were studied through chemical and physical characterization techniques to determine if there is a non-toxic alternative. Knowledge of the physical properties of the grounds was obtained through adhesion tests, rheology, and analysis of the drying process. Biopolymers such as xanthan gum, kappa carrageenan, and pectin were analyzed as a replacement to constituents of the Orono Ground. These biopolymers are added to thicken or gelatinize food and are generally recognized to be safe. Carrageenan is a hydrocolloid extract found in seaweed, xanthan gum is produced by the anaerobic fermentation of aerobic bacteria and pectin is a polysaccharide found in fruits. The biopolymer with the most similar rheological characteristics to the Orono Ground was tested for its adhesive properties. Acknowledgments: This research was funded by the Center for Undergraduate Research 2018-19 Academic Year Fellowship.

Abstract ID :
UMSS19126

Determining Key Residues of the LytR Domain in the Streptococcal CpsA Protein

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 842

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Mohammad Hashmi [1] *
Undergraduate

Author Name : Melody Neely [2]

Abstract Description : Streptococcus agalactiae or Group B Streptococcus (GBS), is a Gram-positive commensal bacterium that is harmless in healthy adults, yet causes systemic diseases in neonates, the elderly, and immunocompromised individuals. Neonates are at risk of GBS infection in utero or during delivery due to the colonization of the organism in the vaginal canal of between 15-30% of adult females. GBS can cause severe neonatal sepsis and meningitis, as well as chorioamnionitis, which can cause premature birth and stillbirth. GBS infection is greatly facilitated by the presence of a bacterial capsule; a protective, polysaccharide matrix surrounding the cell that plays a key role in the pathogen's ability to evade host immune responses. Antibiotics are effective in reducing the chances of neonatal infection by GBS, however, they also increase the likelihood of the organism developing antibiotic resistance. An approach to manipulate GBS and reduce its functionality would be beneficial to counter the potential of antibiotic resistance developments, while avoiding the cytotoxic effects that antibiotics can impose on the host. The GBS CpsA protein, a putative transcriptional regulator of the capsule locus within the GBS genome, plays a significant role in capsule production. Without CpsA, GBS displays reduced capsule production, and thus, reduced virulence. In this study, we are targeting specific amino acids in an extracellular domain of CpsA that is proposed to be responsible for ligation of capsule to the cell wall of GBS. This work will provide insight into which amino acids are the key residues required for the function of CpsA.

Abstract ID :
UMSS19118

Determining Potential Protein Interaction Between Streptococcal CpsA and MurA2

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 845

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Allison Watson [1] *
Undergraduate

Author Name : Melody Neely [2]

Abstract Description : Group B Streptococcus (GBS) is commensal bacterium colonizing the gastrointestinal and genitourinary tracts of healthy adults. However, GBS is also an opportunistic pathogen, which can cause systemic disease in immunocompromised individuals and is the leading cause of death in neonates from bacterial infections. GBS demonstrates virulence through a polysaccharide capsule, which allows the pathogen to evade host defenses. The GBS CpsA protein plays an important role in capsule production. Less well understood is the role of CpsA in cell wall maintenance and integrity. Previous data demonstrated that mutations in the extracellular LytR domain of the CpsA protein in GBS resulted in reduced capsule production and alterations in cell morphology after cell division. These changes in cell morphology suggest that the CpsA protein may play a role in cell wall regulation as well as capsule expression, potentially linking the cell wall to the capsule. The objective of this research is to determine if Streptococcal CpsA and MurA2 (which is involved in peptidoglycan biosynthesis) interact at the protein level to better understand the relationship between capsule and cell wall regulation. This will be accomplished through co-immunoprecipitation assays with differentially tagged CpsA and MurA2 proteins. Results from this analysis will provide new information on the multi-functional CpsA protein and its various roles in GBS virulence.

Abstract ID :
UMSS1942

Determining the impact of prophage BPs viral gene expression on bacterial host Mycobacterium chelonae gene expression

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 813

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Emma Freeman [1] *
Undergraduate

Author Name : Sally Molloy [2]

Abstract Description : Mycobacterium tuberculosis is the leading cause of death by an infectious disease. In 2017, 10 million people developed tuberculosis and 558,000 of these cases were resistant to antibiotics. All members of the M. tuberculosis complex carry prophage, viruses that infect bacteria and integrate themselves into the host genome through a process called lysogeny. The non-pathogenic vaccine strain for tuberculosis lacks the prophage, which suggests a prophage role in virulence. Because the prophage do not encode obvious virulence genes, we hypothesized that prophage impact bacterial virulence by altering bacterial gene expression. By studying gene expression patterns in Mycobacterium chelonae, a close relative of M. tuberculosis, in the presence and absence of prophage BPs, we determined prophage impact mycobacterial gene expression. Through RNAseq analysis of M. chelonae cells with or without prophage, we detected changes in expression of 7.74% of M. chelonae genes, including genes involved in antibiotic resistance. During lysogenic infection of M. chelonae the most highly expressed genes in BPs were the repressor (gp33) and a putative mobile element (gp58). To determine if viral gene products drive changes in gene expression, we will construct strains of M. chelonae that express either gp33 or gp58 and measure changes in gene expression and antibiotic resistance.

Abstract ID :
UMSS1989

Determining the key residues for capsule production in the GBS CpsA protein

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 837

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Anna Struba [1] *
Undergraduate

Author Name : Melody Neely [2]

Abstract Description : Streptococcus agalactiae (GBS) is a common bacterium found commensally in the vaginal mucosa of healthy adults. GBS also causes severe systemic infection in neonates, often leading to meningitis, which can cause lifelong health consequences including impaired hearing and seizures. Infection of newborns can arise before birth through ascending infection, during birth, or from contact with other colonized individuals. Ascending infection, in which the bacteria travel directly to the fetus from the vaginal mucosa, is especially concerning as it can lead to loss of pregnancy or premature birth. The most common method of neonatal GBS disease prevention is antibiotic prophylaxis during delivery. However, this method doesn't address the risk of ascending infection, and additionally antibiotic use can disrupt newborn immune development and contribute to antibiotic resistance. A promising alternative target for GBS virulence attenuation is capsular polysaccharide, which protects the bacteria from human immune factors and is necessary for GBS to cause systemic infection. Capsule production is regulated by CpsA, a multifunctional protein which activates capsule operon transcription. CpsA which lacks the LytR domain attenuates capsule production in WT GBS. In this study, a CpsA mutant was created with two amino acid substitutions occurring in a region of the LytR domain which is directly implicated in attachment of capsular polysaccharides to the bacterial cell wall. The effects of these changes were analyzed using several techniques to determine if they result in a mutant phenotype, suggesting their importance for enzymatic addition of capsule to the cell wall.

Abstract ID :
UMSS1939

Determining the Role of Prophage, Cuke, Gene Expression in Mycobacterium smegmatis

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 814

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Sarah McCallister [1] *
Undergraduate

Author Name : Sally Molloy [2]

Abstract Description : Mycobacteriophage (phage) are viruses that infect mycobacteria, including non-pathogenic Mycobacterium smegmatis and pathogenic M. tuberculosis, the leading cause of Tuberculosis. Nearly all pathogenic species of Mycobacterium contain prophage (viral genomes that are integrated into the host genome), including M. tuberculosis. The role of prophage in bacterial fitness and virulence is not yet understood, however, understanding how phage establish a prophage state (lysogeny) and how they impact bacterial virulence could lead to the development of new treatments. Cuke is a cluster AC phage and forms lysogens in M. smegmatis; however, it is not understood how Cuke integrates into the genome and maintains lysogeny as there are no obvious integrase and immunity repressor genes. To determine where the Cuke genome integrates into the host genome, we sequenced lysogen genomes. To determine which Cuke genes are expressed during lysogeny, we performed RNAseq analysis of RNA isolated from Cuke lysogens of M. smegmatis. Four prophage genes are expressed during lysogeny, including putative integrase proteins, gp65 and 66 and two highly expressed genes gp75 and gp78. This project aims to determine if putative integrase proteins gp65 and 66 have integrase activity and if either of the highly expressed genes, gp75 and gp78, act as the immunity repressor.

Abstract ID :
UMSS19353

Developing a Novel Approach to Estimate Reproductive Success of Black Bears in Maine

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 305

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Griffin Archambault [1] *
Undergraduate

Author Name : Bryn Evans [2]

Author Name : Alessio Mortelliti [3]

Abstract Description : The black bear (Ursus americanus) is an important species native to Maine which provides recreational, sentimental, and ecological value to the region, yet to date we do not have a protocol to assess black bear reproductive success over the entire state. This is a major issue, as reproductive success has strong effects on population demographics, and thus, is critical for management and conservation efforts. The objective of this study is to develop a cost-effective protocol for estimating black bear reproductive success across Maine, which will consist of 1) an estimate of the areas with the highest chances of occupancy by bear mothers with cubs, and 2) an estimate of the number of transects required to detect a mother bear with cubs in a given area. We hypothesized 1) that logging will affect reproductive success, and 2) that there will be a latitudinal gradient in reproductive success. Data was collected using Bushnell Trophy Cam E2 Trail Cameras set up in 170 separate sampling sites, which consisted of 3 separate cameras spaced 100 meters apart in a straight transect. Sites were stationed across the state in diverse forested areas. Variables recorded were reproductive state (age and presence/ absence of cubs) and sex (if known). Data will be analyzed by fitting newly developed multi-state occupancy models, which are effective tools for understanding carnivore populations. In the first year, 98 camera sites detected bears, 11.9% of cameras detected reproductive females, and litters ranged from 1-3 cubs with an average of 1.97 cubs per litter.

Abstract ID :
UMSS19228

Developing an Intra-Anal Insertion Device to Combat Fecal Incontinence

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 216

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Mark Lambrecht [1] *
Undergraduate

Author Name : Paige Belanger [2]

Author Name : McKinley Stinson [3]

Author Name : Paul Millard [4]

Abstract Description : Fecal incontinence (FI) is defined as the involuntary loss of liquid or solid stool. It is a debilitating disorder that impacts individuals physically and emotionally. By some estimates, this disorder impacts up to 8.3% of the population, and this number increases with age, becoming as high as 50% in institutions such as nursing homes and assisted living.1 The pathophysiology associated with FI is a result of myriad factors that result in weakened musculature, tissue degradation, and/or lack of anorectal sensation. Existing solutions are limited, ineffective, and generally compromise the patient's dignity. The aim of this study is to develop a cheap, disposable, and adaptable intra-anal insertion device to prevent leakage associated with FI. Device considerations are defined by three objectives: 1) occlusion of flow at the anorectal junction; 2) prevention of the defecation sensation; 3) and compression of the anal canal to mimic a functioning external anal sphincter. Development of a functional prototype was performed by integrating an iterative design process with relevant literature. Additionally, a functional anorectal model was created to characterize device feasibility in vitro and determine the parameters necessary to effectively obstruct flow. The novel technology is an opportunity to target this silent affliction and improve the quality of life in an underrecognized population.

Abstract ID :
UMSS19354

Developing eDNA sampling as a mechanism for improving marine mammal conservation.

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 312 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Elizabeth Piotrowski [1] *
Undergraduate

Author Name : Kristina Cammen [2]

Abstract Description : Environmental DNA (eDNA) is free floating DNA left behind by an organism as it travels through an environment. eDNA sampling methods can reduce the logistical, ethical, and financial difficulties inherent in current approaches that obtain DNA from tissue samples. In this study, we tested the hypotheses that eDNA isolated from water samples in controlled (e.g., rehabilitation centers) and uncontrolled (e.g., river and ocean field sites) environments can be used to detect seal and dolphin presence and characterize genetic diversity among individuals. We developed protocols to extract seal DNA from water samples and demonstrated their success across multiple seal species in samples collected in controlled environments. Success was evaluated by amplifying and sequencing a fragment of the mitochondrial control region with sequence variation diagnostic of species. We further tested our ability to distinguish multiple individuals in a mixed sample, using both field-mixed and lab-mixed samples. With lab-mixed samples, we evaluated thresholds at which sequences from multiple individuals can be detected. Finally, we tested our new methods in two field settings: at harbor seal haul-out sites along the Penobscot River and in a pod of Atlantic white-sided dolphins offshore in the GOM. These field tests revealed new challenges with non-specific amplification of eDNA from other species and limited sensitivity to characterize diversity in large mixed samples. The initial information achieved through this study is critical to further development of eDNA sampling that holds great promise for improving our understanding of marine mammal populations and the broader ecosystem health of the Gulf of Maine. Acknowledgements This research was funded by the Center for Undergraduate Research Faculty Fellows Program, funding from the Office of the Vice President for Research, and supported by Marine Mammals of Maine, Mystic Aquarium and the National Marine Life Center.

Abstract ID :
UMSS19178

Development and Utilization of Silica-Cellulose Nano Composites in Portland Cement Systems

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 231

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Kavya Shirisha Kamasamudram [1] *
Graduate

Author Name : Warda Ashraf [2]

Abstract Description : Cellulose nano-fibrils (CNF) are typically less than 0.2 mm in length and 50 nm in width that can be extracted from plants and trees. Having a high aspect ratio, elastic modulus, strength and reactive surface for functionalization, CNFs are considered as promising nanomaterials for improving the chemo-mechanical properties of cementitious matrixes. Nonetheless, poor stability of CNFs in high pH pore solution of portland cement is a concern that can reduce the compressive strength of hydrated matrixes. To overcome this issue, the goal of this study is to develop hybrid silica-cellulose nanocomposites and to investigate the effects of these materials in the Portland cement systems in terms of rheology, cement hydration and mechanical performance. Sol-gel process (base) was adapted for depositing of silica nanoparticles on CNF. The underlying hypothesis is that these silica nanoparticles will form additional C-S-H layers on CNFs during the cement hydration. This new C-S-H will improve the interfacial bonding between CNF and hydrated matrix, protect the CNF from harsh pore solution as well as increase the strength of the cement matrix. The synthesis medium consisted of tetraethyl orthosilicate (TEOS) as the precursor, sodium hydroxide as base catalyst . The average sizes of the silica nanoparticles were 50 nm obtained through TEM imaging. 0.3% by weight of these silica-cellulose nanocomposites (w/c =0.35) improved the compressive strength (90 days) of cement paste up to 12% compared with pure CNF. Increase in cement hydration is achieved through nucleation effect using silica-cellulose nanocomposites.

Abstract ID :
UMSS19176

Development of a High-throughput Screen for Analysis of JC Polyomavirus Infection

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 808

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Mason Crocker [1] *
Graduate

Author Name : Jeanne DuShane [2]
Graduate

Author Name : Melissa Maginnis [3]

Abstract Description : JC polyomavirus (JCPyV), a human- specific virus, persists in up to 80% of the population as a dormant infection of the kidney. In severely immunocompromised individuals, the virus can migrate to the central nervous system and cause a fatal disease, progressive multifocal leukoencephalopathy (PML). PML occurs most frequently in those patients suffering from severe immunosuppression caused by HIV or those undergoing immunomodulatory therapies. Additionally, recent studies have demonstrated that long-term space travel in zero gravity environments leads to dysregulation of the human immune system and reactivation of viral infections. Thus viruses with the propensity to reactivate, causing serious illness, under such conditions demand attention. Microscopy-based techniques have been traditionally used to quantify JCPyV infectivity in vitro. However, these techniques present obstacles to timely and impartial determination of infectivity under experimental conditions. These limitations render these techniques unsuitable for high-throughput applications. A new method for analyzing in vitro JCPyV infectivity, the In-cell Western (ICWTM) assay, provides a solution to reduce these limitations through use of an automated imaging system capable of rapid, consistent, and impartial determinations of viral infectivity in cell culture. The adaptation of the ICW assay for use in the study of JCPyV will allow for a reliable method for quantifying JCPyV infectivity, significantly enhancing the rate of discovery, and allowing for high-throughput screening. Ultimately, this high-throughput platform will enable the screening of potential antiviral therapeutics for JCPyV and other viruses activated during immunosuppression.

Abstract ID :
UMSS1917

Development of a Hybrid Thermoplastic Composite and Concrete Deck System

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 225
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Benjamin Smith [1] *
Graduate

Author Name : William Davids [2]

Abstract Description : Reinforced concrete is a widely used structural system in conventional construction. It is used to create beams, columns, slabs, walls, bridge decks, dams, and many other structures. Concrete is a relatively inexpensive material that is much stronger in compression than in tension. This leads to the need to combine concrete with other materials to make an efficient hybrid structure. In conventional construction, steel reinforcing bars (rebar) are often used to carry the tension in the structure, as they are widely available and their design is well understood. There are some situations where rebar is not effective such as highly corrosive environments. A continuous fiber reinforced thermoplastic (CFRTP) panel could be used as non-corrosive tension reinforcement in concrete structures to replace steel rebar. Two alternatives are being investigated to add flexural stiffness to the CFRTP panels: corrugations and stiffeners. The corrugations and stiffeners increase the flexural stiffness of the panel, which allows it to function as stay-in-place formwork. CFRTP panels were designed as a rapidly deployable, low-weight, low-logistics structural support system. For this research, E-glass fiber-reinforced thermoplastic polyethylene terephthalate glycol (PETg) has been selected for its good mechanical and hygro-thermal properties and relatively low cost compared to other thermoplastic composites. Hybrid CFRTP-concrete beams were designed to meet the requirements for a bridge deck with stay-in-place formwork given in the AASHTO LRFD Bridge Design Specifications. The corrugated hybrid beams were tested and reached at least 170% of the required design loading prior to failure. The stiffened hybrid beams are currently being manufactured.

Abstract ID :
UMSS19421

DEVELOPMENT OF AN ELECTRICAL INTERFACE FOR LATERAL FIELD EXCITED SENSOR

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 208
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Thomas Leighton [1] *
Graduate

Author Name : Nuri Emanetoglu [2]

Abstract Description : A Lateral Field Excited (LFE) is a proposed alternative configuration for Quartz Crystal Mircobalance (QCM) devices. The LFE sensor, as with other sensors, requires the sensor to be integrated into an electrical interface in order to be effectively used. After characterizing the LFE sensor to determine an optimum electrode configuration and surface curvature, several electrical interfaces were investigated and developed. The Pierce, Miller, and Colpitts oscillator configurations were tested and proven to not be compatible with the LFE devices. These configurations were found to not work due to the high internal resistance of the LFE and the high parallel to motional capacitance ratio. In an attempt to compensate for the parallel capacitance seen by the LFE and therefore reduce Cr, the Balanced Bridge Oscillator was tested with the sensor. However, this configuration also failed to be compatible with the LFE sensor again due to the high internal resistance of the device. Where tracking the resonant frequency of the LFE with oscillator configurations has proven difficult, an alternative characterization technique was used. The Phase-Mass characterization technique excites the LFE sensor with a stable external frequency source and the mass load induced phase-shift of the sensor. The research on this method is in progress.

Abstract ID :
UMSS19328

Development of azobenzene based photoswitches to modulate serotonin receptors

Abstract Topic : Physical Sciences

Submission Type : Oral

Submission# : 911

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Ameya Karapurkar [1] *
Graduate

Author Name : Michael Kienzler [2]

Abstract Description : Serotonin or 5-hydroxytryptamine (5HT) is a monoamine neurotransmitter which is used as a signaling molecule in the body to carry out a diverse set of bodily functions.1 There are 18 types of serotonin receptors present in the body; 5 of which are ion channels, the remaining are G-protein coupled receptors (GPCRs); and they are known to play a role in functions like anxiety, mood, memory, addiction, appetite, digestion, sleep, vasoconstriction.2 Research in the identification of functions of individual receptors and development of target specific drugs for each receptor is a topic of active research, but similarities between the binding sites of these receptors makes it difficult. Even the few selective drugs that have been developed tend to cause severe side effects since the serotonin receptors are expressed all across the body.3 We plan on resolving these issues with the help of photopharmacology.4 We are working on developing azobenzene based photoswitches with serotonin at one end that can help us achieve spatiotemporal control of 5HT receptors. These photoswitches can be isomerized between their cis and trans conformations to activate and deactivate the ligand. We are working on synthesis of two types of photoswitches, ones that are freely diffuses and others that are tethered to the receptor by means of cysteine-maleimide linkage.5 They each have serotonin attached on one end which can bind to the active site of the receptor whereas varying chain lengths and tethering groups will be used to achieve selective control of each receptor. References 1. The Serotonin Receptors; Roth, B. L., Ed.; Humana Press: Totowa, NJ, 2006. 2. Berger, M.; Gray, J. A.; Roth, B. L. Annual Review of Medicine. 2009, 60, 355–366. 3. Tfelt-Hansen, D. P.; Vries, P. D.; Saxena, P. R. Drugs. 2000, 60, 1259–1287. 4. Velema, W. A.; Szymanski, W.; Feringa, B. L. J. Am. Chem. Soc. 2014, 136, 2178-2191. 5. Wildling L.; Rankl C. et al. Journal of Biological Chemistry. 2012, 287, 105-113.

Abstract ID :
UMSS1944

Discovery of Novel Long Non-Coding RNAs during Zebrafish Caudal Fin Regeneration

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 822

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Emily Robinson [1] *
Undergraduate

Author Name : Benjamin King [2]

Abstract Description : Humans have limited regenerative capacity as many tissues cannot regenerate following injury. Modern medicine uses tissue transplantation, but need outweighs supply. Developing therapies to promote and enhance regenerative capacity may be a solution. Danio rerio, the zebrafish, is a powerful vertebrate model for tissue regeneration as they can completely regenerate tissues and organs following injury or amputation, with the caudal fin being a model for appendage regeneration. Regeneration requires formation of a highly proliferative tissue, the blastema, early in regeneration that persists during outgrowth. Appendage regeneration also requires positional memory; the ability of regenerating cells to use spatial information to regenerate only lost tissues and alter regeneration speed depending on injury location. What genes encode positional memory remains largely unknown. Our goal was to discover novel noncoding genes that regulate positional memory by analysing a RNA sequencing data set where the expression of genes were measured at 0, 2, 4 and 14 days post injury at three amputation planes. We examined genes with a significant interaction between the factors of time (days post injury) and amputation plane. Among the differentially expressed noncoding genes, we specifically focused on long noncoding RNAs (lncRNAs) as they participate in gene regulation. LncRNAs can regulate genes by several mechanisms, but specific functions for lncRNAs are understudied, and many are unidentified.

Abstract ID :
UMSS19326

Dishing Out Creative Research Approaches to Political Women

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 113 **Judge Time Slot :** AM2 (11:00 - 12:00)

Undergraduate

Author Name : Makenzie Baber [1] *
Undergraduate

Author Name : Rachel Snell [2]

Abstract Description : Recipes are a record of a woman’s life. For Margaret Chase Smith she successfully balanced political ambition and femininity because of her connection to food, which for her was liberating. However, Hillary Clinton proved how food could be constricting when she campaigned for her husband in the 1992 Presidential Election and had many controversies which stemmed from the clashing ideas of feminism and women’s civic engagement. Both Smith and Clinton defied the odds but were also faced food controversies focusing on the issue of femininity in their eras. For women who managed to harness gendered expectations, their femininity, at least related to food, evolved into a competitive advantage. The role of food in the performance of gender and the ways Smith and Clinton ran afoul of or used these expectations to their advantage, reveals the evolution of women in politics during the second half of the twentieth century as well as the persistence of expectations of women’s activities around food. For women who managed to harness gendered expectations, their femininity, at least related to food, evolved into a competitive advantage.

Abstract ID :
UMSS19261

Disruption of RanGEF Leading to a Decrease in Nuclear Transport Efficiency

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 820

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Dakota Archambault [1] *
Undergraduate

Author Name : Andrew Hart [2]
Graduate

Author Name : William Simke [3]

Author Name : Joshua Kelley [4]

Abstract Description : Nuclear transport is the mechanism in which molecules enter and exit the nucleus of a cell. This process is regulated by Ran which is a G protein that controls transport of molecules through the nuclear pore complex. The RanGEF is needed for nuclear transport to occur as it activates Ran allowing for molecules to enter the nucleus. Activation of Ran also leads to accumulation in the nucleus, thus forming a Ran gradient. There is mounting evidence that RanGEF function is dependent upon interaction with heterochromatin in the nucleus, including work from our lab showing that deletion of a histone methyltransferase results in disruption of the Ran gradient. The RanGEF in yeast, Prp20 is homologous to the human GEF, RCC1. A useful tool in the study of RanGEF biology has been the mutant cell line tsBN2, which has a temperature sensitive RanGEF. Upon shifting to the nonpermissive temperature, the Ran gradient collapses and nuclear transport efficiency decreases. A previously discovered mutant in the Prp20 gene, srm1-1, also shows temperature sensitivity, but has not been characterized for its effects on nuclear transport and maintenance of the Ran gradient. We are sequencing the mutant gene to identify the specific mutation responsible, and examining the effects of this temperature sensitive allele on the maintenance of the Ran gradient in yeast.

Abstract ID :
UMSS19174

Distribution of Shell Boring Polychaetes at aquaculture sites along the Northeast coast of the US

Abstract Topic : Natural Sciences

Submission Type : Poster
Submission# : 342
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Samantha Silverbrand [1] *
Undergraduate

Author Name : Paul Rawson [2]

Author Name : Sara Lindsay [3]

Abstract Description : Coastal shellfish aquaculture has expanded substantially in recent years in Maine and New England as traditional wild fishery stocks have declined. As shellfish aquaculture has expanded, producers have become more concerned about marine worm pests (i.e., polychaetes) that infest cultured bivalves. In particular, worms from the genus Polydora(also known as “polydorids”) burrow into oyster and scallop shells where they feed and deposit mud. Bivalves cover over the muddy burrows creating blisters that can decrease their market value and hinder growth. Farmers and researchers have identified methods to control infestations of P. websteri, one common species of shell boring worm. However, recent surveys have identified the presence of additional species of shell boring polychaetes among aquaculture sites in New England. Whether the same control measures will work for all species will depend on the ecology, reproductive biology and distribution of these new species. The goal of my project is to determine the distribution of different shell boring polychaetes at bivalve aquaculture sites in northern New England. I used light and scanning electron to identify polychaete worms sampled from the shells of bivalves from twelve shellfish farms across the region. Using molecular biological tools, I have confirmed the identity of these species, including P. onagawaensis, a newly introduced species that previously had only been observed on shellfish farms in Japan. As part of my project, I am investigating how the movement of shellfish hosts facilitated the introduction of this species to Maine waters.

Abstract ID :
UMSS19220

Do the Benefits of Group Identification Differ for Women of Lower and Higher Socioeconomic Status?

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 158

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Shelby Helwig [1]

Author Name : Ashley Farina [2] *
Undergraduate

Author Name : Shannon McCoy [3]
Undergraduate

Abstract Description : In the face of perceived sexism, group identification may provide an important buffer for the self-esteem of women (Rejection Identification Model, RIM; Branscombe et al., 2002). Collective action (commitment to working for equity of women in society) and social support (emotional support from women) are two potential benefits of higher group identification after perceiving personal or group discrimination. We test whether social support and collective action explain why group identification is beneficial for women's well-being after perceiving sexism and ask if the benefits of group identification on a woman's well-being hold in light of intersectional identities. We test how subjective socioeconomic status (SES) may moderate the RIM and, in particular, how SES may moderate the mechanisms (i.e., social support and collective action) through which group identification benefits women's self-esteem (N = 422). Consistent with hypotheses, we find that group identification positively benefited self-esteem indirectly through social support and collective action; however, this effect only occurred for women of higher subjective SES. For women of lower subjective SES, perceived discrimination was positively associated with group identification which was positively associated with feelings of social support and collective action; however, neither mechanism significantly predicted self-esteem. These data suggest identifying with the group is beneficial for women of lower SES; however, the mechanisms that help them cope may be different than women of higher SES. Implications of intersectional identities for coping with sexism, and, the representation of lower SES women in political/women's movements are discussed.

Abstract ID :
UMSS1970

Does delayed umbilical cord clamping lead to short term and long term benefits in the hemodynamic status of the newborn?

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 422

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Lilly DeLisle [1] *
Undergraduate

Author Name : Lydia Murray [2]

Author Name : Darissa Rodas [3]

Author Name : Megan Dunroe [4]

Author Name : Patricia Poirier [5]

Abstract Description : The umbilical cord is the life-sustaining, critical connection between the fetus and the mother's placenta. Although early cord clamping has been thought to be standard practice in the past, it is not an evidence-based practice. Delayed cord clamping (DCC) is the action of postponing the ligation of the umbilical cord until 2-3 minutes following delivery. Similarly, umbilical cord milking, or the grasping of the umbilical cord whilst pushing towards the newborn to promote blood flow, exists as an additional intervention in DCC. Method: A review of the literature was conducted to examine the evidence supporting the hemodynamic benefits of DCC in the newborn. Outcome: The literature review supports that DCC improves hematocrit levels, results in greater vascular stability, provides positive outcomes of hemoglobin levels and decreases the need for packed cell transfusions in newborns with anemia (Ultee, Deure, Swart, Lasham & Baar, 2008).

Abstract ID :
UMSS1952

Does follow up home health care reduce emergency room visits and hospital readmissions in patients six months after being discharged from an inpatient stay compared to standard discharge instruction?

Abstract Topic : Allied Health

Submission Type : Poster
Submission# : 417
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Danielle LaPointe [1] *
Undergraduate

Author Name : Hannah Welborn [2]

Author Name : Ivy Wallace [3]

Author Name : Abigail Doyle [4]

Author Name : Valerie Herbert [5]

Abstract Description : Background: Readmission to the hospital following discharge can lead to increased health care costs and decreased patient quality of life. Home health care provides one-on-one care for patients in their homes. Each patient has an individualized plan of care in hopes of reducing the risk of hospital readmission (Landers et al., 2016). Methods: We evaluated 10 research studies found through online databases which detailed studies that compared hospital readmission and emergency room visit rates when follow-up home health care is given when compared to patients who receive standard discharge instruction without nursing follow-up. Outcomes: Each study found that patients who receive home health care after discharge from the hospital, regardless of diagnosis, had a lesser chance of being readmitted to the hospital for the same issue. This suggests that hospitals should implement a more inclusive home health partnership for patients to receive follow-up appointments in their own home to increase understanding of their diagnosis, how to adhere to their treatment plan, and continuing assessment of their health status in order to decrease hospital readmission rates and emergency room visits

References Landers, S., Madigan, E., Leff, B., Rosati, R., McCann, B., Hornbake, R., . . . Breese, E. (2016). The future of home health care: A strategic framework for optimizing value. Home Health Care Management & Practice , 262-278.

Abstract ID :
UMSS19310

Dover-Foxcroft, Lynx Transportation Needs Assessment

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 134
Graduate

Judge Time Slot : PM2 (2:30 - 3:30)

Author Name : Garrett Boardway [1] *
Graduate

Author Name : Emily Berrill [2]

Author Name : Katie Cronin [3]

Author Name : Souban Doualeh [4]

Author Name : Elizabeth Armstrong [5]

Abstract Description : As the aging population in Maine grows, so do risk factors associated with inadequate or inaccessible transportation, which include isolation, depression, health problems, and other issues (Arcury et al., 2005). These challenges are particularly pronounced for older adults in rural communities like Dover-Foxcroft. The goal of this study is to better understand the transportation needs and preferences of older adults in Dover-Foxcroft and, specifically, their receptivity to flexible transportation options available through Lynx Transportation Services. To identify unmet transportation needs and resident preferences among several alternative options, we used a self-administered survey. A total of 660 surveys were distributed through nine organizations in the Dover-Foxcroft area in March 2019. We expect our findings will corroborate patterns in the existing literature and yield new insights into preferred transportation options in rural communities. Through identifying needs and preferences of older adults living in Dover-Foxcroft, study results will enhance Lynx Transportation Services' ability to ensure their programs are accessible to and desired by the older adults in the community. Specifically, findings may support the establishment of a flex route in order to alleviate transportation barriers faced by older adults. Increasing transportation accessibility will help older adults in Dover-Foxcroft access necessary medical and social service resources, thus promoting their overall well-being. Arcury, T. A., Gesler, W. M., Preisser, J. S., Sherman, J., Spencer, J., & Perin, J. (2005). The effects of geography and spatial behavior on health care utilization among the residents of a rural region. Health services research, 40(1), 135-156.

Abstract ID :
UMSS1930

Effect of Simulation in Nursing Education on Senior BSN Students' Self-Confidence Level and Preparedness for Practice

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 405

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Kaitlin Robinson [1] *

Graduate

Author Name : Patricia Poirier [2]

Abstract Description : Effect of Simulation in Nursing Education on Senior BSN Students' Self-Confidence Level and Preparedness for Practice Abstract Kaitlin Robinson University of Maine Orono Introduction: It is not uncommon for student nurses, approaching graduation, to feel unprepared for their role ahead in the practice setting. Simulation in nursing education increases the likelihood that student nurses preparing to graduate feel self-confident and prepared in their ability to manage and provide safe, high quality patient care (Woods et al., 2015). Aim: The proposed study will aim to determine the effects of simulation lab on students' perception of preparedness and self-confidence level about entering the practice setting in comparison to their feelings of preparedness and self-confidence level at the start of the semester. Methods: A quasi-experimental design was utilized to determine the impact of simulation intervention in nursing students in NUR 456 and how it effects their self-confidence level and preparedness for practice. The instrument used to collect the data in this study include the Casey- Fink Readiness for Practice Survey. Results: Results show and increased level of self-confidence among students and higher perception of preparedness level about entering the practice setting as compared to the start of the semester. Keywords: simulation, nursing education, self-confidence, preparedness for practice References Woods, C., West, C., Mills, J., Park, T., Southern, J., & Usher, K. (2015). Undergraduate student nurses' self-reported preparedness for practice. Collegian, 22(4), 359-368. doi:10.1016/j/colegn.2014.05.2003

Abstract ID :
UMSS19271

Effects of Commercial Nutrient Solutions on Growth of Lemon Basil (Ocimum basilicum var. citriodora 'Mrs. Burns')

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 336

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Leala Machesney [1] *
Undergraduate

Author Name : Bryan Peterson [2]

Author Name : Stephanie Burnett [3]

Abstract Description : Hydroponic production of plants is a multi-billion-dollar industry that allows for year-round production of crops in temperate climates. Plants in hydroponic systems receive water and nutrients from a chamber of solution in which roots are suspended. However, the components of many commercially available nutrient solutions are unlisted, so it is difficult to anticipate their effectiveness. In contrast, the recipe for Hoagland solution, a standard fertilizer solution for research in hydroponics, provides a wide variety of plants with the necessary nutrients. The growth of lemon basil (Ocimum basilicum var. citriodora 'Mrs. Burns') was evaluated in deep water culture hydroponic systems with fertility supplied by Hoagland solution or one of three commercial nutrient solutions: Advanced Nutrients, General Hydroponics Flora, or Remo. Solutions were prepared to a concentration of 113 ppm nitrogen, while the concentration of other macronutrients and micronutrients varied. Hydroponic chambers were emptied and supplied with new distilled water and nutrients every 14 days. Plant height, plant width, solution electroconductivity (an estimate of fertilizer concentration), and pH were measured weekly. When plants reached marketable size, a SPAD meter was used to estimate leaf color, which correlates to foliar nitrogen concentration. Plant root and shoot dry weights were also measured. Plants grown in Flora and Remo solutions had the greatest dry weights, SPAD measure, and height and width, while Hoagland solution produced the smallest plants. Future foliar nutrient analysis will determine how nutrient solutions impacted basil growth.

Abstract ID :
UMSS19407

Effects of Exercise on Stride Length in Older Adults

Abstract Topic : Allied Health

Submission Type : Exhibit

Submission# : 403

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Jenna Paul [1] *
Undergraduate

Author Name : Jennifer McNulty [2]

Author Name : Christopher Nightingale [3]

Abstract Description : As senior citizens age, balance decreases and gait adaptations lead to shortened and less consistent stride length. These gait alterations are hypothesized to serve as a strategy to reduce fall risk. This may contribute to decreased balance and an increased risk of falls. Fear or falls reduces senior citizen's confidence in physical activities and lead to voluntary isolation from activities of daily living. We can measure senior citizen's level of self-efficacy using the Activities-specific Balance Confidence scale (ABC). The OptoGait system can be used to measure spatiotemporal parameters of gait including stride length. OptoGait has been found to be a reliable and valid tool for assessing balance and fall risk in senior citizens. The purpose of this project is to investigate the relationship between stride length (a commonly used balance marker) and self-efficacy of senior citizens regarding physical activity and to see if correlations exist between the two types of variables, in the hopes of evaluating self-efficacy as a fall risk predictor.

Abstract ID :
UMSS19285

EFFECTS OF PARTICLE SIZE ON THE BIO-ACCESSIBILITY OF BIOACTIVE COMPOUNDS OF SUGAR KELP (Saccharina latissima) IN AN IN-VITRO SIMULATED GASTROINTESTINAL TRACT (GIT) MODEL

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 329

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Praveen Sappati [1] *
Graduate

Author Name : Balunkeswar Nayak [2]

Abstract Description : Seaweeds, such as sugar kelp, are rich source of vitamins, minerals, antioxidants, omega-3 fatty acids and especially the medicinal bioactive active compounds in the form of dietary fibers (alginates, carrageenan, fucoidan, laminarin) and secondary polyphenolic metabolites (fucoxanthin, phlorotannins). The chemical composition and nutritional content of seaweeds depends mostly on species, geography, location, season, water temperature, salinity and light intensity. The active metabolites found in seaweed have been documented for exhibiting the various biological activities such as anticancer, antitumor, antiviral, anti-inflammatory and anti-angiogenic effects. Obesity is increasing worldwide at an alarming rate and it is estimated that by 2030 with 58% of global population will become obese. Many studies have found that the consumption of high dietary fibers of seaweed could also help in the prevention of obesity related disorders and metabolic syndrome. The objective of this research is to study the effect of different particle size on the bio-accessibility of bioactive phytochemicals tested under the gastrointestinal tract (GIT) condition. Fresh sugar kelp was procured from the local Maine seaweed farmer and is freeze dried. Dried sample was sifted at different particle size level range from >250 μm, 250-500 μm, 0.5-1 mm and >1 mm, respectively. After passing the dried samples through the different GIT (saliva and gastric) phase, the samples were centrifuged. The collected supernatant and pellet were tested for proximate content, antioxidant and phenolic activity. These studies will help in understanding the digestion of sugar kelp and the absorption of bioactive compounds in human digestive system. Acknowledgment This activity is supported by National Science Foundation award #IIA-1355457 to Maine EPSCoR at the University of Maine. References [1] Versantvoort, C.H.M., Oomen, A.G., Van de Kamp, E., Rompelberg, C.J.M. & Sips, A.J.A.M. 2005, "Applicability of an in vitro digestion model in assessing the bioaccessibility of mycotoxins from food", Food and Chemical Toxicology, vol. 43, no. 1, pp. 31-40.

Abstract ID :
UMSS19129

Effects of pre-freezing blanching procedures on the physicochemical properties of frozen seaweed (sugar kelp)

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 320

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Samuel Akomea-Frempong [1] *
Graduate

Author Name : Jennifer Perry [2]

Author Name : Denise Skonberg [3]

Abstract Description : Seaweeds including sugar kelp (Laminaria saccharina) are highly seasonal and perishable because of high moisture content, limiting their shelf life. Freezing can be employed to extend the shelf-life. Blanching prior to freezing may prevent enzymatic activity that could affect quality during storage. The aim of the study was to develop an optimal pre-freezing blanching procedure for sugar kelp and to evaluate the effects of frozen storage on product quality. The impact of the product form (whole blade, shredded slaw), blanching method (direct immersion, vacuum packed), blanching temperature (80 or 100°C) and blanching time (5, 30 s) on kelp quality were evaluated. Samples were processed in triplicate, frozen at -20°C, and evaluated immediately and after 1 and 6 months for driploss, instrumental color, texture (force, N), aerobic plate counts, psychrotrophs and fungi. One-way and multi-way ANOVA ($p < 0.05$) were performed to evaluate effects of the treatment variables. Direct immersion blanching, higher blanching temperature and longer blanching time increased brightness and greenness values. Apart from whole blade having firmer texture than slaw, other treatments had no significant effect on the texture. As storage time increased from day 1 to month 6, driploss significantly decreased. Aerobic plate counts (2.8-3.8 CFU/g) and psychrotrophs (2.0-2.3 CFU/g) were low throughout frozen storage and were not impacted by treatment. Results indicate pre-freezing blanching procedures had no significant negative effect on the qualities of frozen sugar kelp hence, offering growers an option to extend marketable shelf life of this product.

Abstract ID :
UMSS19120

Efficacy of Alternative Sanitization Methods on Wild Blueberries

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 319

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Selena Callahan [1] *
Graduate

Author Name : Jennifer Perry [2]

Abstract Description : Recent outbreaks in frozen foods contaminated with Listeria monocytogenes have caused a desire to increase sanitizing capacity of post-harvest processing lines. The goal of this study was to compare the sanitizing capacity of peroxyacetic acid (PAA), and chlorine against Listeria innocua and native microflora on wild blueberries. PAA (80 ppm), chlorine (200 ppm), or or water (control) were applied to inoculated wild blueberries by immersion and/or spraying, alone or sequentially. Following treatment, product was individually blast frozen, stored at -20°C and analyzed for up to two weeks. Data were analyzed by multiway ANOVA with Tukey HSD in R Studio. Application of Chlorine-PAA, or PAA alone ($p > 0.05$) were most effective against L. innocua, resulting in a decrease of 2.6 logCFU/g. Against total aerobic bacteria, PAA-PAA ($p < 0.05$) resulted in a population decrease of 1.9 logCFU/g, versus 0.9 logCFU/g for water and 1.0 logCFU/g for Chlorine-PAA. Yeast populations were high (~7.0 logCFU/g) and treatments investigated didn't reduce these populations significantly. Immersion followed by spraying with maximum sanitizer concentration are recommended to achieve the greatest population reduction on wild blueberries. Producers interested in alternatives to chlorine should not see significant differences in microbial quality with use of PAA.

Abstract ID :
UMSS19133

Elucidating a recently discovered role for brain cells in a deadly and incurable viral infection

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 855

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Michael Wilczek [1] *
Graduate

Author Name : Jeanne DuShane [2]
Graduate

Author Name : Francesca Armstrong [3]
Undergraduate

Author Name : Melissa Maginnis [4]

Abstract Description : Animal models are critical in advancing biomedical research and answering questions to understand the pathogenesis of human disease. Unfortunately, not all diseases can be modeled in a nonhuman host, such as the human-specific virus, JC polyomavirus (JCPyV). JCPyV is the causative agent of the fatal, untreatable disease of the brain known as Progressive Multifocal Leukoencephalopathy (PML). This virus is widespread in the human population, as 50% to 80% of adults are infected. In healthy individuals, it persistently infects the kidneys without causing symptoms, but during immunosuppression, JCPyV can migrate into the central nervous system, where it infects brain cells. Astrocytes are a type of brain cells impacted by JCPyV infection and until recently, their contribution to PML disease pathogenesis has been underexplored and hindered by the lack of an animal model. Current research is limited to using a cell culture model known as SVG-A cells. However, due to their immortalized characteristics and mixed cell type population, we cannot make direct comparisons between the model cell line and pathogenesis in people. To address this problem, we have established an innovative model to study JCPyV infection using primary normal human astrocytes (NHAs). Using infectivity assays and measurements of viral gene production, we have determined that the JCPyV infectious cycle is delayed in NHAs. These data highlight the importance of using NHAs to study JCPyV infection and could bring us closer to understanding the role of astrocytes in PML pathogenies.

Abstract ID :
UMSS19352

Emotion Regulation and Adaptive Social Problem-Solving Predict Self-Regulation

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 102 **Judge Time Slot :** PM2 (2:30 - 3:30)

Graduate

Author Name : Michelle Buffie [1] *

Graduate

Author Name : Lauren Briggs [2]

Author Name : Melodie Godin [3]

Author Name : Hannah Meidahl [4]

Author Name : Douglas Nangle [5]

Abstract Description : Investigating the relationships between transdiagnostic constructs, such as self-regulation (SR), emotion regulation (ER), and social problem-solving (SPS), may help to inform the development of psychopathology at a broad level (Barkley, 2011; D'Zurilla & Nezu, 1982; Thompson, 1994). SR is the ability to monitor and adjust behavior whereas ER is the ability to amplify or attenuate the experience of emotions; SR and ER are distinct but overlapping processes. Adaptive SPS involves a problem orientation and problem-solving style. Positive problem orientation (PPO) involves viewing problems as challenges that can be overcome. A rational problem-solving style (RPS) involves approaching problems in a logical, organized manner. Undergraduate students ($N = 348$) aged 18-24 completed the Self-Regulation Questionnaire (SRQ), Difficulties in Emotion Regulation Scale (DERS), and the Social Problem-Solving Inventory-Revised (SPSI-R). A linear regression was conducted with ER and adaptive problem-solving predicting differences in SR. Together, ER, PPO, and RPS explained 55.5% of the variance in SR, $F(3, 347) = 143.07$, $p < .001$. As hypothesized, SR was uniquely predicted by lower difficulties in ER ($b = -.38$, 95% CI: [-.45, -.32], $t = -11.59$, $p < .001$), higher PPO ($b = 1.27$, 95% CI: [.73, 1.80], $t = 4.63$, $p < .001$), and higher RPS ($b = .36$, 95% CI: [.22, .50], $t = 5.08$, $p < .001$). These findings suggest that being able to regulate emotions and effectively approach problems helps to better regulate overall behavior. The shared components between these processes may be particularly important for the development of psychopathology.

Abstract ID :
UMSS19411

Ending the Stigmatization of Sexually Transmitted Infections

Abstract Topic : Social Sciences

Submission Type : Exhibit
Submission# : 119
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Briana Murphy [1] *
Undergraduate

Author Name : Susan Gardner [2]

Abstract Description : This study looks at the social stigmatization of sexually transmitted infections in analyzing why people who are affected become socially condemned. With various interfering variables such as an inherent socially enforced 'moral standard' as well as a cultural lack of sexual education, it becomes clear these strong negative responses to STI's are due to, not a scientific outcry, but in actuality is based solely off of a misguided social demand for the ostracization of the afflicted. In particular, examining the high levels of social stigmatization with HIV as well as herpes. See, even though sexually transmitted diseases like HIV are extremely common, infecting more than half the sexually active population, there is a clear social consequence that is inflicting social penalties on the harmless people living with the disease. It is vital that we as a society reinforce the reality that having an STI says nothing about your personality or sexual history.

Abstract ID :
UMSS19315

Engineering a Biodegradable CNF Absorbent Pad for Veterinarian Devices Such as IDEXX SNAP Tests

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 222

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Joshua Hamilton [1] *
Undergraduate

Author Name : Muhammad Hossen [2]
Graduate

Author Name : Michael Mason [3]

Abstract Description : Absract: Engineering biodegradable versions of disposable products is important in minimizing the ever growing environmental impact humanity has on Earth. For example, IDEXX has a widely used disposable product for veterinarians known as a SNAP test. The SNAP test is a convenient single use disposable test to diagnose various diseases in animals using fluids from the animal itself, such as blood. The current absorbent pad in the test is a polyurethane and calcium carbonate mixture that is not biodegradable. Due to the hydrophilic nature of cellulose nanofibers (CNF) it could be possible to replace the non biodegradable polyurethane pad with a biodegradable CNF pad. The goal of this project is to design the optimal CNF pad by adjusting variables such as porosity and thickness, as well as testing the effect on absorbance by adding calcium carbonate to the pad. Research for the best production method could also be done for integration by IDEXX. The research process involved continuous adjustment of poroisity, material components, and drying methods. Properties such as wicking time, color, and texture were compared between pads. Our research found that a CNF and cellulose substrate can be used to replicate pads in such devices. We were able to replicate the one minute wicking times as well as the color and texture of industrial non biodegradeable pads. Our hope is to make this technology avaible for consumer veternian use in order to limit our impact on the enviroment.

Acknowledgements: This research was funded by the Center for Undergraduate Research 2018 Summer Fellowship IDEXX for sending SNAP tests Dr. Michael Mason

Abstract ID :
UMSS19301

Enhanced Properties of Liquid-Infused Paper for Bacteria Handling

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 804

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Emily LeClair [1] *
Undergraduate

Author Name : Caitlin Howell [2]
Undergraduate

Abstract Description : Paper-based methods of bacterial detection are a dependable option for point-of-care (POC) diagnostics. Current approaches to POC microbial diagnostics are often hindered by low sample concentration and adhesion challenges, due to the tendency of these organisms to adhere to most surfaces. This project explores the use of bio-inspired 'slippery surfaces' on paper substrates for the creation of a low-cost POC microbial diagnostic system. To do this, our lab mimicked the surface chemistry of Nepenthes the pitcher plant, which uses an immobilized layer of water for predation. Recent work has shown that these layers can be reproduced by using simple, low-cost polymers coated onto paper. The adhesion of green-fluorescent-protein (GFP)-expressing Esherechia coli to the surfaces was tested by running 50 µL droplets containing ~1×108 cells/mL down a either a control surface (polymer coating alone) or a surface which had a liquid layer; the samples were then examined using several fluorescent microcopy images. On the control surfaces, a path of residual droplets remained where the initial droplet had travelled across the surface, while the treated surface with a liquid layer left behind no observable bacteria. The results suggest that creating a bio-inspired liquid layer on paper can reduce the adhesion of droplets and bacteria on surfaces, and that going forward liquid-infused paper could help create cost-effective and efficient microbial POC diagnostic system.

Abstract ID :
UMSS19185

Evaluating and sourcing detritus as a supplementary diet for bivalve aquaculture using stable isotopes and fatty acid biomarkers

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 359

Judge Time Slot : AM1 (9:30 - 10:30)

Graduate

Author Name : Adrianus Both [1] *
Graduate

Author Name : Damian Brady [2]

Author Name : Barry Costa-Pierce [3]

Author Name : Lawrence Mayer [4]

Author Name : Christopher Parrish [5]

Author Name : Carrie Byron [6]

Abstract Description : Ecosystem carrying capacity and aquaculture growth models often incorporate detritus as a diet source for bivalves; however, these models treat detritus as a homogenous entity, which it is not. The purpose of the current study was to assess the viability of detritus from several primary producers to be used as a diet for Mytilus edulis. Sampling throughout 2016 and 2017 has shown that Saco Bay displays a classic temperate estuary cycling with spring and fall blooms. Stable isotope analysis (δ13C) of particulate organic matter (POM) < 100 μm has revealed it closely resembled that of S. alterniflora (-13.0 ± 0.8‰) in the fall and resembled phytoplankton and zooplankton (-22.7 ± 1.2‰) in the summer, except during early July when it more closely resembled macroalgae inputs (-18.8 ± 1.4‰). Mussel δ13C varied little throughout the study period (-19.8 ± 1.2‰) averaging between that of phytoplankton and macroalgae suggesting a mixture of the two are being incorporated into their diets. A repeated measures ANOVA determined that changes in mussel δ13C overtime were statistically significant ($p < 0.05$) the significance driven by the fall peak in mussel δ13C as determined by a Bonferroni post-hoc test. However, subsequent principal coordinate analysis of fatty acids grouped mussels closer to zooplankton and POM than macroalgal and Spartina detritus. Based on these results, mussels did not make use of macroalgal detritus and changes in their δ13C was due to fast growing diatoms which were isotopically heavier than their slower growing counterparts.

Abstract ID :
UMSS19239

Evaluating Biological and Chemical Characteristics in Kombucha Treatments Enhanced with Maple Products

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 333

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Kilee Nile [1] *
Undergraduate

Author Name : Jennifer Perry [2]

Abstract Description : Manufacture of value-added foods from maple products, particularly maple sap, represents a significant economic opportunity for Maine maple producers. Kombucha, a popular beverage produced by fermenting sweetened black tea, was prepared with water and sugar (control), water and syrup, sap and sugar, and sap and syrup. Symbiotic colonies of bacteria and yeast (SCOBYs) were freshly cultured before being added to the varying kombucha treatments. Fermentation efficacy was monitored for 25 days by measurement of yeast population, acetic acid bacteria (AAB), pH, and soluble solids (Brix). Yeasts and acetic acid bacterial populations increased by 1.5 and 1 log, respectively, before decreasing to levels below those observed at Day 0. Variability in AAB was highest at Day 20, with the sap and syrup samples having the largest population (4.7 x 103 CFU/mL) and the water and sugar samples having the smallest population (7.0 x 102 CFU/mL). It took the kombucha treatments an average of 5 days to reach a "finished" pH (3.0) often found in commercial kombucha. On Day 15, all kombucha treatments surpassed the 0.5% alcohol by volume (ABV) On Day 25, only the water and syrup kombucha treatment demonstrated sufficient alcohol reduction for legal compliance. This initial study led to the conclusion maple products can be used to formulate kombucha beverages without impacting the acidity, or microbial populations significantly.

Abstract ID :
UMSS19295

Evaluation of Potential Anti-diabetic Effect of Green Crab Hydrolysates Derived by Commercially Available Enzymes

Abstract Topic : Natural Sciences

Submission Type : Exhibit
Submission# : 300
Graduate

Judge Time Slot : PM2 (2:30 - 3:30)

Author Name : Bouhee Kang [1] *
Graduate

Author Name : Denise Skonberg [2]

Author Name : Angela Myracle [3]

Abstract Description : Despite containing nutritionally important proteins, unsaturated fatty acids, and minerals, invasive green crabs (Carcinus maenas) are not commercially utilized due to their small size [1]. A variety of peptides derived from muscle foods are known to have health benefits therefore, the primary objective of this study was to obtain anti-hyperglycemic peptides via enzymatic hydrolysis to develop commercial value of this unutilized crustacean [2]. Mechanically separated crab meat was homogenized with water (1:1), then hydrolyzed with 1% of Alcalase (AL, pH 8), Protamex (PR, pH 7), Flavourzyme (FL, pH 7), or Papain (PA, pH 6) for 60 min. Enzymes were thermally inactivated, the hydrolysates were centrifuged and supernatant collected, then freeze-dried. Samples were processed in triplicate and evaluated for degree of hydrolysis (DH), α-glucosidase and α-amylase inhibitory activities. Crab mince treated with AL exhibited the highest DH (18.3%), followed by PR (17.1%), FL (16.5%), and PA (15.8%). The PR treatment showed the highest α-glucosidase inhibitory activity (IC503.0 mg/mL) compared to other enzyme treatments (IC50 16.8-40.4 mg/mL) and the Control (IC50 21.9 mg/mL). The α-amylase inhibitory activity of PR (IC5022.6 mg/mL) was lower than its α-glucosidase inhibitory activity. FL showed the highest α-amylase inhibitory activity (IC5023.2 mg/mL) followed by PR, AL (IC5031.9 mg/mL), PA (IC5032.4 mg/mL), and Control (IC50 32.8 mg/mL) samples. Our findings indicate that Protamex treatment has potential to derive carbohydrase inhibitory peptides from green crab and these peptides could be utilized as a health promoting ingredient in food products.

Abstract ID :
UMSS1980

Evaluation of wind induced mortality for precommercial and commercially thinned Spruce-Fir stands in Maine.

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 334

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Soren Donisvitch [1] *
Undergraduate

Author Name : Aaron Weiskittel [2]

Abstract Description : Wind induced mortality is an integral part of the Acadian forest natural disturbance regime (Fraver, 2009). The risk of windthrow and windsnap in managed forest stands that undergo commercial thinning, however, is not well quantified. Precommercial (PCT) and Commercial (CT) thinning are important tools in the management of red spruce (Picea rubens) and balsam fir (Abies balsamea) stands in Maine. Using wind vulnerability modeling, the various impacts of PCT and CT on stand risk of wind mortality can be examined. There are four broad categories that research has shown to be predominant factors for wind induced mortality: regional climate, topographic exposure, soil properties and stand characteristics (Mitchell, 1995). Topographic exposure (Ruel, 2002) will be incorporated using 10-meter digital elevation modeling that will incorporate slope and aspect of sampled sites. The soil properties for each site will be incorporated using depth to water table and soil drainage class. Stand characteristics will include species composition, height to crown ratio, and stand density. Using the Cooperative Forest Research Unit's (CFRU) Controlled Thinning Research Network (CTRN), an 18-year-old yearly sampled study, the model will be based on individual tree data. The CTRN incorporates sites across Maine and consists of seven spatially isolated fifth acre plots having undergone PCT and CT at two levels of intensity, 33% and 50%. This project examines what impacts these industry standard treatments have on risk of windthrow to stands with differing site factors.

Abstract ID :
UMSS1914

EXAMINING ATTITUDES AND WILLINGNESS TO PAY FOR AQUACULTURED SEAFOOD ATTRIBUTES

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 121

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Kofi Britwum [1] *
Graduate

Author Name : Caroline Noblet [2]

Abstract Description : As seafood demand continues to grow, so is the potential for aquaculture expansion. Considered a healthy protein alternative to meat, a report by the National Oceanic Atmospheric Administration (NOAA) notes that per capita seafood consumption in the U.S. increased to 16lb in 2017 from 14.9lb in 2016, the highest in nearly a decade. Despite the growing significance of aquaculture, many studies report stronger consumer preference for wild-harvested seafood over aquacultured seafood. A key consideration is whether the presence of preferred attributes in aquacultured seafood can confer similar notions of value/preference as wild seafood. The primary goal of this study is to examine preferences and willingness to pay for aquacultured seafood with desirable attributes, with a specific focus on aquacultured salmon. The attributes considered for the study are “local”, “organic”, and “produced without antibiotics.” Results reveal that approximately 70% of participants were indifferent between fresh wild salmon and aquacultured salmon with a “desired” attribute, or without the undesirable characteristic when both were priced the same. Estimates from probit models show that price premia for fresh aquacultured salmon ranged between 8% to 28%, with the highest premium recorded for aquacultured salmon produced without antibiotics. This suggest that perceptions of chemical residues in aquacultured seafood may be a strong concern, and an externality consumers would pay to avoid. Taken together, these findings indicate that preference for aquacultured seafood would be better enhanced if they are differentiated in the market with attributes perceived to be desirable, or if characteristic(s) consumers would wish to avoid are emphasized.

Abstract ID :
UMSS19246

Examining Glacier Instabilities: A Case Study of Turner Glacier

Abstract Topic : Physical Sciences

Submission Type : Oral
Submission# : 916
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Andrew Nolan [1] *
Undergraduate

Author Name : William Kochtitzky [2]

Author Name : Karl Kreutz [3]

Author Name : Robert McNabb [4]

Author Name : Ellyn Enderlin [5]

Abstract Description : Alaskan glaciers contributed more to global sea-level rise than any other region in the world from 2003 to 2009. From 1995 to 2013, surge-type glaciers constituted 35% of measured Alaskan glacier mass loss, while only making up 16% of the glacier population. Glacial surges are regularly repeated periods of internal ice flow instabilities characterized by short episodes of accelerated ice flow. Our analysis of the optical satellite imagery archive has revealed five previously unexamined surge events of Turner Glacier in the St. Elias Mountains of Alaska from 1984 to 2017. Surge events were identified by variations in velocity measurements produced by offset tracking and terminus delineation of Landsat images. Surge events occurred in 1985-1986, 1991-1993, 1999-2001, 2006-2007, and 2011-2013. We show that Turner Glacier has a ~5-year surge repeat interval and an active surge phase length of one to two years. Compared to the typical ~15-year repeat interval of Alaskan glaciers, this is the fastest documented surge repeat interval in Alaska and possibly the world. Surge events result in dramatic increases in velocities and terminus advance. Digital elevation models from the 2006-2007 and 2011-2013 surge events show mass build up in the reservoir zone preceding the surge with mass redistribution to the terminus as a result of the surge. We observe surge events to initiate in the winter, consistent with other Alaskan surge-type glaciers. The short repeat interval of Turner Glacier provides a unique opportunity to study the internal ice-instabilities controlling surge kinematics at a higher temporal resolution than ever before. These insights into internal ice-instabilities provide a valuable proxy to the internal instabilities of the major ice streams of Greenland and Antarctica, which are crucial to understand for future sea-level projections.

Abstract ID :
UMSS19340

Examining muscle contraction and angular acceleration to detect balance perturbation

Abstract Topic : Interdisciplinary

Submission Type : Oral

Submission# : 627

Judge Time Slot : PM2 (2:30 - 3:30)

Undergraduate

Author Name : Nicole McGrath [1] *
Undergraduate

Author Name : Daniel Woodhouse [2]

Author Name : Vincent Caccese [3]

Author Name : Babak Hejrati [4]

Author Name : Marie Hayes [5]

Author Name : Sonia Naderi [6]
Graduate

Author Name : Ali Abedi [7]

Abstract Description : Fall incidents are the leading cause of fatal and non-fatal injuries in older adults, calling for an innovative system capable of early detection and prevention of such falls (Hu & Qu, 2016). The purpose of this project was to analyze the top causes of falls in elderly individuals and provide a basis to develop a system that can detect and prevent falls before they occur. It has been found that falls are largely due to balance issues, muscle weakness, and gait deficits (Rubenstein, et. al. 1994). It was hypothesized that falls can be prevented by recruiting a patient's own muscles to counteract their downward acceleration. Data in controlled conditions were collected, using a treadmill to induce perturbation of balance and to study normal gait while walking. Electromyography (EMG) and inertial measurement unit (IMU) sensors were placed on the participant's thigh to collect acceleration, angular velocity , and muscle activity data. The data from these experiments will be used to develop a fall prevention system that can detect and intervene in a fall before it happens. The system will target weak muscles through electromyography and stimulate them with neuromuscular electrical stimulation utilizing an accelerometer to anticipate the fall. The choice of system components is based upon a lead time of 800 milliseconds, which is the average time for a fall to occur (Hu & Qu, 2016). The proposed system could allow aging individuals to stay in their homes and prevent patient falls in hospitals. X. Hu, X. Qu, Pre-impact fall detection. BioMed Eng OnLine (2016) 15:61 DOI 10.1186/s12938-016-0194-x L. Rubenstein, K. Josephson, A. Robbins, Falls in the nursing home. Annals of Internal Medicine (1994) 121:442–51.

Abstract ID :
UMSS19201

Examining The Role of Palmitoylation In Dictyostelium discoidium

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 852

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Chris Tanner [1] *
Undergraduate

Author Name : Robert Gundersen [2]

Abstract Description : Palmitoylation is an important post-translational lipid modification of proteins that is interesting in that it is reversible. Palmitoylation is performed by protein acyltransferases (PATs). Studies have shown that palmitoylated substrates play a role in a number of neurological disorders (such as Huntington's disease and schizophrenia) as well as cancer. In mammalian cells, 23 PATs have been discovered, however the catalytic mechanism and substrate specificity of PATs remains unknown. Using Dictyostelium discoidiumas a model organism, YFP-tagged PAT knock-ins and knock-outs were created in order to examine their localization and expression, and provide insight to where and when they are being expressed in development of this organism. This information will allow for a better understanding of how PATs are used in D. discoidium, and may provide a new tool with which to understand the mechanism of protein palmitoylation.

Abstract ID :
UMSS19202

Examining the Role of Sustainability in the Maine Wine Industry

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 157
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Michaela Murray [1] *
Undergraduate

Author Name : Mark Haggerty [2]

Abstract Description : With increased awareness of humanity's profound impact on the climate, interest in the notion of sustainability has expanded across all disciplines. The inherent link between food and climate has specifically motivated consideration of sustainability within agricultural and food production sectors. The global wine industry has long acknowledged the social, environmental, and economic sustainability concerns (e.g. triple-bottom-line) of their industry. Beginning in 1992 with The Lodi Winegrape Commission in California, several wine regions including France, Australia, and South Africa have developed workbooks and policies for sustainable wine production. The budding wine industry in the state of Maine has yet to explore the concept of sustainability as it relates to their operations. For this project, I work with a community partner, the Maine Winery Guild[1], to conduct interviews of Guild members. The research objective is to understand how sustainability is being defined and enacted by Maine wineries, and what obstacles pertaining to sustainability are being faced. This research will permit the Guild and other relevant stakeholders to target their marketing and development efforts in a manner that will help the Maine wine industry overcome sustainability challenges in order to compete with other sustainability-conscious wine regions. This research was funded by the Center for Undergraduate Research Academic Year Fellowship.
[1] http://www.mainewineryguild.com/

Abstract ID :
UMSS19227

Examining women's responses to prolonged sexism that increases in clarity over time: A review of preliminary findings

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 159 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Shelby Helwig [1]

Author Name : Leah Jennings [2] *
Undergraduate

Author Name : Margaret Gautrau [3]

Author Name : Shannon McCoy [4]
Undergraduate

Abstract Description : When women experience sexism, it may at first be subtle and difficult to label only to become more clear over time. Sexism is often ambiguous in nature and experienced over an extended period; therefore, studying sexism as it occurs in daily life is crucial to extending our understanding of how women cope with discrimination. Past research has shown that women may experience maladaptive physiological responses when exposed to various forms of sexism. In the current study, women confronted sexism while participating in a mock search committee with two male confederates whose sexism became increasingly clear over the course of the meeting (3 rounds of discussion). Physiological reactivity, recovery, and self-report measures of mood and wellbeing were measured throughout the study. Data (N = 56) suggest the research paradigm was successful. Women exposed to sexism reported greater anger, stress, and distress than women who were not exposed to sexism. Initial physiological data demonstrate women in both conditions (sexism and no sexism) have an increase in heart rate from baseline to the second round of discussions (M = 20 bpm). This increase in heart rate demonstrates women remain engaged throughout the task - which is an important prerequisite for examining adaptive versus maladaptive stress responses. In addition, it appears women exposed to sexism recover from the stressor more quickly than women not exposed. This suggests women exposed to sexism may have experienced more adaptive stress in response to the search committee task.

Abstract ID :
UMSS19402

Explaining the Resilience of the Balochistan Insurgency

Abstract Topic : Social Sciences

Submission Type : Exhibit
Submission# : 118
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Tiffany Tanner [1] *
Undergraduate

Author Name : Asif Nawaz [2]

Abstract Description : The Balochistan Insurgency is an enduring armed and nationalist struggle between Baloch Insurgents and the Pakistani government, embroiling Pakistan in five insurgencies since 1948. This research aims to analyze why the current insurgency has outlasted its predecessors by over two-fold, with over fifteen years passing since the most recent conflict erupted. Using historical primary source news articles from 1973-1977, secondary research, insurgency trend data, and the data from the Global Terrorism Database (GTD), this study examines the evolution of the current conflict and analyzes how and why the contemporary insurgency is far more resilient. This research finds that the support base for the ongoing insurgency has become more robust and expansive, and suggests that this unique aspect is the major contributor to the insurgency's endurance. The research findings conclude five reasons for an increased support base: first, the movement is now lead by an expanding middle class; second, there is no violent intra-group rivalry among the separatist actors; third, the support platform has expanded to include cyberspace and social media; fourth, the current insurgency adds the Gwadar Port as an additional and urbanized grievance; and fifth, pre-existing grievances have yet to be resolved. The current insurgency's distinct manifestation reflects a change in Balochistan's status quo through a wide-ranging engagement of civilian support in contrast to the past.

Abstract ID :
UMSS19138

Exploring Public Perception and Preferences of Marine Coastal Issues

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 132
Graduate

Judge Time Slot : PM2 (2:30 - 3:30)

Author Name : Amy Bainbridge [1] *
Graduate

Author Name : Sophie Garbuz [2]

Author Name : Keith Evans [3]

Author Name : Caroline Noblet [4]

Abstract Description : Understanding public awareness and concerns about marine coastal issues is vital to comprehending the complex relationship between people and the ocean and may help improve sustainable management of our coastal zone. Prior research shows that our relationship with the coastal and marine environment, as well as our knowledge, beliefs, trust in science and government, and educational status can all influence perception of how we see coastal and ocean issues. Our research explores this topic at a regional level, investigating coastal Maine marine perception of coastal issues using survey data. Frequencies, cross tabulation, and logistic regression is utilized to 1) investigate perceptions of policy-relevant knowledge concerning ocean and coastal priority areas listed in the Maine Coastal Program; 2) determine what characteristics may be associated with higher levels of regional coastal and ocean awareness and preference; and 3) determine if perception of current ocean and coastal issues, as well as awareness of ocean policy, interaction with the coast, belief in climate change, and confidence in science plays a role in preference for marine planning and protection. Preliminary results show a clear relationship between an individual's perceptions of each of the ocean issues, and those corresponding preferences. On average, there exists a significant positive relationship between those that agree with coastal perceptions related to coastal hazards, ocean resources, wetlands, and impacts of development and their preference level for those coastal issues. Results from our research may assist state and local governments to better understand and advocate for regionally specific concerns.

Abstract ID :
UMSS19189

Exploring Semantic Hierarchies to Improve Resolution Theorem Proving on Ontologies

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 239 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Stanley Small [1] *
Undergraduate

Author Name : Torsten Hahmann [2]

Abstract Description : A resolution-theorem-prover (RTP) evaluates the validity (truthfulness) of con- jectures against a set of axioms classified as a knowledge-base. The axioms each contain a number of predicates which provide information about a domain. When given a conjecture, an RTP attempts to resolve the negated conjecture with axioms from the knowledge-base until the prover finds a contradiction. If the RTP finds a contradiction between the axioms and a negated conjecture, it proves the conjecture. The order in which the axioms within the knowledge-base are evaluated significantly impacts the run time of the program, as the search-space increases exponentially with the number of axioms. Ontologies, knowledge bases with semantic (and predominantly hierarchical) structures, describe objects and their relationships to other objects. For exam- ple, a 'Car' class might exist in a sample ontology with 'Vehicle' as a parent class and 'Bus' as a sibling class. Currently, any hierarchical structures within an ontology are not taken into account when evaluating the relevance of each axiom. At present, each predicate is automatically assigned a weight based on a heuristic measure (such as the number of terms or the frequency of predicates relevant to the conjecture) and axioms with higher weights are evaluated first. My research aims to intelligently select relevant axioms within a knowledge-base given a structured relationship between predicates. I will use the semantic hier- archy over predicates to assign weights to each predicate passed to a weighting function used by the Knuth-Bendix ordering algorithm. The research aims to desig heuristics based upon the semantics of the predicates, rather than solely the syntax of the statements.

Abstract ID :
UMSS19317

Exploring the dynamic relationship between Candida albicans, Pseudomonas aeruginosa and Fluconazole for improved candidiasis treatment

Abstract Topic : Biomedical Sciences

Submission Type : Exhibit

Submission# : 806

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Anna-Maria Dagher [1] *
Undergraduate

Author Name : Robert Wheeler [2]

Abstract Description : Candida albicans is an opportunistic fungal pathogen within the normal human microbiota. Immunocompromised individuals are susceptible to candidiasis, a lethal systemic Candida infection with 40% mortality in bloodstream invasions. Fluconazole is the primary antifungal agent used to treat candidiasis. Fungal resistance to fluconazole treatment presents critical health issues worldwide, especially in developing countries. Methods to increase fluconazole's efficacy include the use of synergistic drugs, which aid in killing C. albicans. Interestingly, Pseudomonas aeruginosa, an opportunistic bacteria that coinfects mucosal tissue with C. albicans, is synergistic with fluconazole. In this proposal, we study the relationship between C. albicans, P. aeruginosa and fluconazole, and investigate mechanisms underlying P. aeruginosa-fluconazole synergism against C. albicans. We will explore how the P. aeruginosa-fluconazole combination affects hyper-resistant C. albicans strains in vitro. This research will provide essential understanding of fluconazole's synergism with microbes to preserve and expand its merit as an antifungal agent.

Abstract ID :
UMSS19160

Exploring the Potential of Bioinspired Liquid-Infused Surfaces for Integrated Detection Platforms

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 860

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Dan Regan [1] *
Graduate

Author Name : Caitlin Howell [2]
Undergraduate

Abstract Description : Daniel P. Regan,1 Caitlin Howell1,2 1Graduate School of Biomedical Science and Engineering, University of Maine 2Department of Chemical and Biomedical Engineering, University of Maine Abstract: Point-of-need (PON) detection platforms provide easy-to-use methods for first responders and scientists for gathering health and safety information on-site without a physical laboratory. There has been a continued effort within the PON detection community to increase the performance of detection methods, especially the sensitivity of these platforms. However, many of these approaches tackle the issue at the detection mechanism. Liquid-infused surfaces may offer a solution to this by providing new methods for droplet manipulation. For example, control of liquid droplets can be achieved via modifications to the underlying surface structure to passively control the direction of droplet movement. Additionally, active control has been achieved with the careful selection of responsive solid substrates and/or overlying liquids to induced temperature gradients, electrical stimulation, and exposure to magnetic fields. Techniques of droplet manipulation with liquid-infused surfaces offer a promising platform to expand the capabilities of PON devices in the areas of biological sample preparation and system integration. Recent work leveraging other advantages of liquid-infused systems such as ultra-low friction, noncoalescence of droplets, liquid–liquid patterning, and fabrication of these surfaces on paper has demonstrated the unique ways in which this approach can be used to both enhance current detection methods as well as enable new ones. Together, these recent developments in the manipulation of droplets on liquid-infused surfaces point to their significant potential for furthering the capacity of PON devices for both biological and environmental samples. Acknowledgements: This work was supported by the University of Maine Vice President for Research and the University of Maine Graduate School of Biomedical Science and Engineering.

Abstract ID :
UMSS19376

Extreme precipitation in Maine: What is the role of atmospheric rivers?

Abstract Topic : Physical Sciences

Submission Type : Exhibit
Submission# : 900

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Adrianne Lovuolo [1] *
Graduate

Author Name : Shaleen Jain [2]

Abstract Description : Extreme precipitation is a phenomenon of particular concern due to the costly and destructive nature of the flooding it produces. Impacts of these events range from infrastructure failures such as stormwater backup and sewage overflow, to lost aquaculture and recreational opportunities from water quality-related closures. Magnitude of precipitation events may be the most eye-catching aspect of shifts in hydroclimatic activity, but the timing alone of these events has the power to turn what would be an ordinary storm in the summer to a highly destructive one in the spring. Atmospheric rivers (ARs) are long, filamentous moisture pathways that route enormous volumes of water vapor poleward from the tropics. Often areas where these ARs make landfall experience significant, if not extreme, rainfall and flooding. Evidence is mounting for the existence of an AR primary affecting the state of Maine in springtime; however, limited knowledge exists regarding the nature of ARs in this expanse with respect to seasonality, regionality, and magnitude. The confluence of these events and a potentially causal relationship between them is the principle focus of this work. This research seeks to quantify the nature of the relationship between the hydroclimatic occurrences of extreme precipitation and atmospheric rivers using satellite-based integrated vapor transport and spatial data, as well as station-based measurements of precipitation in Maine.

Abstract ID :
UMSS19419

Fabrication of anti-oxidant Cellulose Nano-Fibers (CNF) and Kappa-Carrageenan (KC) based polysaccharide films for potential edible packaging applications

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 365

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Suriyaprakaash Lakshmi Balasubramaniam [1] *

Author Name : Balunkeswar Nayak [2]

Abstract Description : Polymers Kappa-Carrageenan (KC) and Cellulose Nano Fibers (CNF) were successfully grafted with gallic acid, to yield gallic acid modified polymers with anti-oxidant capacity and polymer films with considerable mechanical properties. The polymers KC and CNF were modified using two different methods using a radical method, consisting of a redox initiator system containing Ascorbic acid and Hydrogen peroxide and using acylating agents such as toluene sulphonyl chloride and thionyl chloride. The grafted polymer was analyzed using UV-Vis and FT-IR spectrophotometer for evidence of grafting. The anti-oxidant property and the phenolic content of the grafted polymers were analyzed using DPPH assay, ferric ion reducing power assay and Folin-Ciocalteu phenolic content quantification method. Modulus of Elasticity and tensile strength of the films prepared using grafted polymers were determined to inspect its mechanical properties. From the results, all methods resulted in imparting anti-oxidant property to the polymers. The maximum anti-oxidant activity was observed in radical grafted CNF. Mechanical property was enhanced for Microwave assisted radical grafted CNF, while other methods did not result in a film and resulted in an inferior film when composited with pure polymers.

Abstract ID :
UMSS19103

Factors controlling nitrogen removal and retention in marine sediments

Abstract Topic : Natural Sciences

Submission Type : Poster
Submission# : 314 **Judge Time Slot :** PM2 (2:30 - 3:30)
Graduate

Author Name : Rachel Presley [1] *
Graduate

Author Name : Anne Giblin [2]

Author Name : Chris Algar [3]

Author Name : Sean O'Neill [4]

Author Name : Jeremy Rich [5]

Abstract Description : Disruption of the global nitrogen (N) cycle has led to environmental problems and increased interest in the fate of N. Denitrification and anammox remove N from systems as dinitrogen, while dissimilatory nitrate reduction to ammonium (DNRA) retains N as ammonium. Controlling factors on the partitioning between these pathways need to be identified to determine the fate of N in the marine environment. Previous research indicates that availability of organic carbon (C) and nitrate (NO3-) impact partitioning, but other factors such as hydrogen sulfide (H2S) may also play an important role. Using marine sediments from coastal Maine (17 m water depth), we are altering substrate fluxes to sediments using sediment thin disc reactors in experiments that are conducted in an anaerobic glove bag to maintain an anoxic environment. The thin layer of sediment allows for rapid exchange with the overlying water in a flow-through reactor with constant flux of NO3- to the sediment thin discs. Stable isotope techniques, using 13C and 15N additions, are being used to determine C utilization and denitrification, anammox, and DNRA rates. This experimental design is allowing us to quantify a wide range of substrate ratios for C:NO3- and H2S:NO3-, and their effect on partitioning between NO3- reduction processes. Results of this study will be compared to a maximum entropy production (MEP) model and provide insights on controlling factors of denitrification, anammox, and DNRA.

Abstract ID :
UMSS1959

Faking Orgasm: Interview With College Women About How, When, and Why They Pretend to Experience Orgasm

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 144

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Lanie Howes [1] *
Undergraduate

Author Name : Sandra Caron [2]

Abstract Description : Research shows that many women fake orgasm, but only a handful of studies have been done in regards to the context and reasons why women fake orgasm. This study investigated the context in which today's young women fake orgasm, as well as examined the reasons for their faking of orgasm. The way that sexual scripts and societal pressures influence women who fake orgasm is a key component of this study. Specifically, this study involved in-depth interviews with a dozen college women between the ages of 18-22 who have faked an orgasm during sexual intercourse. Interviews were analyzed using established methods of qualitative inquiry. Interviews were coded for common topics and themes were created and will be reported. Results revealed that college women fake for a variety of reasons and in a variety of contexts. It is hoped that this research will open up a larger dialog around women's sexual scripts and how they are influenced by society, sex partners, and friends. This research expands the current body of knowledge and adds to the ever-expanding field of sex research.

Abstract ID :
UMSS19195

Feasibility of a Self-Erecting Shelter with an Inflatable Fabric Arch-Supported Roof and Rigid Walls

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 226

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Jay Wegner [1] *
Graduate

Author Name : William Davids [2]

Abstract Description : Rapidly erected shelters are often required due to military needs, natural disasters, and humanitarian crises. Creating shelters quickly can be difficult due to the amount of labor required for erection. One popular class of rapidly erected shelters consists of parallel, inflatable fabric arches that spring from the ground and are covered with tent fabric. However, while quickly erected, these structures require large capacity air compressors, lack the protection provided by a rigid-walled shelter, and usable interior space is compromised by the arches' shape. The focus of this research is the exploration of a hybrid inflatable-rigid wall structure that overcomes these issues. A central question is whether an inflatable arches can be used to drive erection of such a structure as part of a mechanism. Initial static analyses of the erection mechanism were performed to assess required erection forces. Semi-circular, inflatable arches were then clamped to create the necessary arch span and inflated to heights below their full rise, and the vertical force required to resist additional arch rise was measured as a function of inflation pressure to assess the lifting capacity of one arch. The arch was installed on a structure that utilized the arch to erect the folding wall panels to further validate the arch as an erection device. Finite-element analyses of the inflated arches were conducted using inflatable beam theory to explore the load capacity of the erected structure and more fully define the arch design space. This material is based upon work supported by the US Combat Capabilities Development Command Soldier Center (CCDC Soldier Center) under Contract No. W15QKN-13-9-0001 and W911QY-18-C-0101. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the CCDC Soldier Center. Approved for Public Release – CCDC-SC PAO #: U19-1011.

Abstract ID :
UMSS19355

FeedBack

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 710

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Tyler Rollins [1] *
Undergraduate

Author Name : Jon Ippolito [2]

Abstract Description : The goal of this piece is to create an interactive audio experience. By simultaneously using a technique called sound spatialization and location tracking, the participants of this piece are given the ability to manipulate the overall composition. The composition will fluctuate by detecting where people are, and their spatial relation to others, in the space. This piece stems from the idea of creating unique spatial interactions between people. It forces the participants to realize that they are controllers, and how they interact with others is the objective.

Abstract ID :
UMSS19257

Feminism and Political Partisanship

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 161 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Taylor Cray [1] *
Undergraduate

Author Name : Susan Gardner [2]

Abstract Description : This research will focus on the political divide and partisanship caused by feminist ideologies. More specifically, this research will focus on the ways in which the conversations that we engage in about feminism are diluted by inability to communicate properly with one another. This will be addressed specifically in conversations between individuals who disagree with one another. By analyzing conversations between individuals, and literature from multiple different viewpoints, I will aim to find not only the hurdles that we face when having these conversations, but also any similarities that may exist between the narratives of opposing sides.

Abstract ID :
UMSS19243

Fighting Flower

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 701 **Judge Time Slot :** AM2 (11:00 - 12:00)

Graduate

Author Name : Anna Soule [1] *
Graduate

Author Name : Susan Smith [2]

Abstract Description : Fancy a civilized game of Gin Rummy? How about a loud, expressive game of Hwa-Tu, the Korean Flower game, known in English as Go-Stop? Navigating the dualistic cultural spheres of feminine expectation in a Korean-American household left an impression upon the artist that is glimpsed upon in this video installation of card games. Playing American card games with her father was a very mellow and civilized affair sitting at the "very American" dining table, in chairs. Watching her mother play Korean cards with her friends while sitting on the floor at the little Korean table was another experience altogether: loud, rambunctious, and aggressive, usually involving the smacking down sound of the little hard plastic playing cards. What does it mean to be a female in a multicultural, mixed-race household? A Korean Mother. An American Father. The artist as a mixed medium, navigating expectations of both parents on what it is like to be a "good daughter" with "quality feminine aspects." In the public sphere of American Society, the Asian female is often stereotyped as "demure," "soft," and "quiet," and most likely opposite of a bolder, outspoken American female. However, in the private sphere of the Korean-American household existed a duality of opposites for the artist to navigate. A Korean Mother—a "modern" woman-- as strong leading female who was high-strung, loud, brash, and unapologetic. An old-fashioned American Father with a quiet demeanor was a mellow man of little words. Anna Soule is a Korean-American artist whose work explores the navigation of those in-between spaces that exist along a variable spectrum between spheres of influences that shape Identity. Besides her lived experience of being "mixed up," her artistic research-practice is rooted in the participant/observation of ritual (i.e. of passage, play, mourning, and trauma).

Abstract ID :
UMSS19100

Fire and Blood: Behavior and Thermoregulation in Small Nocturnal Mammals

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 339

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Tal Kleinhause [1] *
Undergraduate

Author Name : Danielle Levesque [2]

Abstract Description : As global temperatures continue to increase, so does the need to better assess the sensitivity of different species to climate change. Such assessments require accurate behavioral and physiological data, including on thermoregulation and the effects of high temperatures on the behavior of endotherms. Seeking to improve current knowledge and methodology, my research evaluated the connections between activity and thermoregulation, using deer mice (Peromyscus maniculatus) as a model species. By using a custom made maze, I was able to simulate an active foraging environment and examine both activity patterns and subcutaneous temperatures in mice during the active-phase of their activity cycle. Due to several circumstances, not all parts of the study were completed. Available data was analyzed for possible relationships between observed Tsub frequencies and activity or amount of consumed food. No significant relationships between subcutaneous temperature patterns and either activity or consumed food were found; as well as no relation between the sum of subcutaneous temperatures and consumed food. Nevertheless, my study emphasizes some of the benefits in using a behavioral maze. Protocols developed during this study could potentially assist in either the reconstruction of the full original study, or in future studies concerning variability in ecological and physiological data.
Acknowledgments: This research was done under the supervision of Dr. Danielle Levesque's lab and was funded by the Center for Undergraduate Research 2018-19 Summer Fellowship and by the USDA National Institute of Food and Agriculture, Hatch project number 21623 through the Maine Agricultural & Forest Experiment Station.

Abstract ID :
UMSS19203

Fitness-based optical diagnostic patch for the observation of cardiovascular disease-risk patients

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 210 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Isabelle Grant [1] *
Undergraduate

Author Name : Chloe Lilly [2]

Author Name : Alex Danner [3]

Author Name : Karissa Tilbury [4]

Abstract Description : The American Heart Association found that in the United States, every 40 seconds there is a death related to cardiovascular disease. Physical activity, to improve an individual's fitness, is proven prevention against 35 chronic conditions including cardiovascular disease. Current available methods to monitor and evaluate an individual's fitness include VO2 Max machines and smartwatch technologies. However, these technologies are expensive, imprecise and non-inclusive for patients experiencing disabilities. Due to this we have designed a compact, accessible, and affordable diagnostic device, the VOx Patch. The VOx Patch has the potential to assess an individual's fitness level by tracking heart rate, saturated O2 levels, and blood pressure over 3 distinct periods: before, during, and after activity. The patch will be 25 mm in diameter and will be placed on three superficial arteries on the body; temporal, radial, and dorsalis pedis, to allow for easy visual placement by the physician, as well as consistent and reliable data acquisition. Our diagnostic will be accessible in a doctor's office or in a patient's home and will allow for streamlined analysis of patient fitness, thus assessing their cardiovascular risk level over time.

Abstract ID :
UMSS19321

Forming a Research-Practice Partnership to Integrate Computer Science into Middle School Science Instruction: Initial Explorations

Abstract Topic : Education

Submission Type : Oral

Submission# : 507

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Mia Callahan [1] *
Graduate

Author Name : Laura Millay [2]

Author Name : Sara Lindsay [3]

Abstract Description : Research-practice partnerships are an increasingly common form of collaboration among researchers and educators who share a common goal (Coburn and Penuel, 2013). For example, the Maine Center for Research in STEM Education is currently working to establish a partnership between university researchers and 30 middle school science teachers from across Maine, with the goal of enhancing student understanding of science content through the integration of computer science concepts into existing science curriculum. A review of the current literature on research-practice partnerships reveals gaps in our understanding of strategies employed by successful partnerships to navigate the difficulties of forming and establishing these collaborations, why such partnerships sometimes fail, and what other consequences might arise from partnership work beyond any change in student outcomes (Coburn and Penuel, 2016). We are using participants' personal definitions of computer science as a lens to examine their vision of success for the partnership and their own role in that success. During the formation of this new partnership, we are conducting interviews to probe teacher and researcher attitudes and knowledge about computer science and the strengths they feel they and their collaborators bring to the work. At the end of the summer, we will distribute surveys to determine how these initial attitudes and ideas have been changed by several months of working in partnership to develop integrated lessons.

Abstract ID :
UMSS19351

Fort Foster Time Machine

Abstract Topic : Interdisciplinary

Submission Type : Exhibit

Submission# : 609 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Annie Hepburn [1] *
Undergraduate

Author Name : Sofian Audry [2]

Abstract Description : The purpose my capstone is to engage one of the oldest communities in Maine in a new immersive technology, allowing for preservation of history and education. Keeping with the theme of connecting the old with the new, I plan on connecting this new technology to antique machinery, making for a new experience via a familiar vehicle. The idea revolves around a Virtual Reality simulation installed in an antique coin-operated binocular machine, often found at popular scenic tourist attractions. The simulation will be installed at the end of the pier at Fort Foster Park in Kittery, Maine. Kittery is the oldest established town in the state of Maine, with a large population of WWII veterans and their descendents. The park has become a popular beach, yet the rich history is not very well known. Starting as an important Native American trading port, then a family-owned farm, later the site of a massive hotel in the 1800's, a Civil War Fort, a WWII Fort, and finally, a town park. My goal is to recreate these historic scenes in Virtual Reality, and allow the user to peer through the "binoculars" and adjust the date, giving them the ability to travel back in time. The simulation is created in the Unity engine and will be exported to a mobile app using Google Cardboard.

Abstract ID :
UMSS19245

Frame of Mind: #1 In Between Relative & Absolute - #2 Frost Bitten & Flame Burnt - #3 internal/external=hidden/revealed=in>side

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 702

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Anna Soule [1] *
Graduate

Author Name : Susan Smith [2]

Abstract Description : Frame of Mind is a series of three separate artworks presented together in one mixed media sculpture installation. The first artwork is titled, In Between Relative & Absolute; the second, Frost Bitten & Flame Burnt; and the third, internal/external=hidden/revealed=in>side

Abstract ID :
UMSS19106

Friendship Quality Moderates the Association between Romantic Experience Stress and Depressive Symptoms

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 126

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Jessica Shankman [1] *
Graduate

Author Name : Rebecca Schwartz-Mette [2]

Abstract Description : In adolescence, peer relationships (e.g., romantic relationships) become increasingly salient and risk increases for emotional problems, such as depressive symptoms. Although romantic experiences (RE) are increasingly common across adolescence, they are often stressful, and have been reliably linked to depressive symptom development. Still, how adolescents manage romantic stress and the role of friendship support in the association between stress in RE and emotional outcomes is poorly understood. Moreover, whether gender impacts these associations is not known. It was hypothesized that the association would differ by gender, given research to suggest differences in depressive symptom development and friendships. The current study tests whether friendship quality (FQ) moderates the association between romantic stress and depressive symptoms, concurrently and over one-month. Participants were 165 older adolescents who completed self-report measures of relationship stress, FQ, and depressive symptoms at two time-points one month apart. Results of moderation analyses indicated that the concurrent relationship between romantic stress and depressive symptoms was significant when FQ was low, but not when FQ was high. Gender did not moderate these associations, and FQ did not significantly impact increases in depressive symptoms over one month. Results of the current study suggest that high levels of FQ may buffer young adults from the potential negative impacts of romantic stress, and appears to be consistent across gender. Future studies should examine the potential protective factors of friendship support over longer periods of time and could explore specific types of friendship experiences that may more clearly implicate gender.

Abstract ID :
UMSS1963

Generalization of Categorical Knowledge between Different Training Methods

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 145
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Rose Deng [1]
Graduate

Author Name : Renee Savoie [2] *
Undergraduate

Author Name : Olivia Stevenson [3]

Author Name : Sahvannah Michaud [4]
Undergraduate

Author Name : Anna Driscoll [5]

Author Name : David Smith [6]

Author Name : Sebastien Helie [7]

Author Name : Shawn Ell [8]

Abstract Description : Assigning objects and events in the environment to separate classes or categories is a vital skill, and an essential component of decision making. Previous work has highlighted the importance of how people learn new categories, and how training methodology may lead to the learning of different types of category representations. The extent to which category representations can be generalized to new tasks and objects were explored. Participants learned about a set of three, novel categories using one of two training methods theorized to lead to different representations. Classification required participants to classify objects as either categories A, B, or C, and emphasized between-category differences. Inference required participants to produce the missing component of an object when provided the category label (A, B, or C), and emphasized within-category similarities. During the training phase, all participants were able to learn the categories regardless of training method. During the test phase, all participants performed the inference task. Only those trained using inference were able to generalize learned category information to novel objects during test. This suggest that when similarities (but not differences) within categories are emphasized and learned, people are better equipped to generalize learned information to novel objects and, more generally, novel situations.

Abstract ID :
UMSS19162

Generation and Recovery of Hospital Food Waste in Maine

Abstract Topic : Interdisciplinary

Submission Type : Poster

Submission# : 618

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Hannah Nadeau [1] *
Undergraduate

Author Name : Deborah Saber [2]

Abstract Description : Abstract: This study explores the ways in which food waste is generated and disposed of in hospitals throughout the state of Maine. From single-use gowns and gloves to disposable medical equipment, hospitals are large producers of many types of waste. While there has been little research about hospital food waste, in Maine as much as 43% of the municipal waste stream is composed of organic material, including food waste, suggesting that hospitals also produce significant amounts of wasted food. Food waste in hospitals may come from food preparation, uneaten patient meals, and staff/visitor meals. This study addresses a critical knowledge gap, as in Maine there is little information on the topic of hospital food waste. We developed a survey to understand what hospitals in Maine do with their food waste and whether or not these practices promote the sustainable management of wasted food. Conducted at seven hospitals across the state, our survey creates a picture of food waste management practices and suggests further areas of research and intervention to promote sustainable food waste management practices. The data generated through this effort not only fills a gap in existing research, but suggests applied solutions to issues of food waste in Maine. Acknowledgements: This project was financially sponsored by the Diana Davis Spencer Foundation, Interdisciplinary Undergraduate Research Collaboratives, and the George J. Mitchell Center for Sustainability Solutions.

Abstract ID :
UMSS19161

Genetic analyses of mass stranding events provide insight into fluid social structure of the Atlantic white-sided dolphin, Lagenorhynchus acutus

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 331

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Kai La Spina [1] *
Undergraduate

Author Name : Kristina Cammen [2]

Abstract Description : Abstract Atlantic white-sided dolphins (Lagenorhynchus acutus) are highly social odontocetes. Their social structure is poorly understood, with seasonal variation likely to be at play. Mass stranding events are common for this species, particularly in the Northeast US, and provide a valuable opportunity to discover more about the poorly understood social structure of L. acutus. However, these events are typically without a clear cause, such as disease or acoustic disturbance that have been linked to mass stranding events in other dolphins and whales. We hypothesized that genetic relatedness of individuals may be a cause of these mass stranding events. Mass strandings within the pilot whale (Globicephala) are attributed to the strength of their social ties, with a "lead animal" stranding themselves and other animals therefore stranding themselves as well. Using a highly variable mitochondrial genetic marker, we characterize genetic diversity of 14 mass stranding events (N = 67 individuals) that occurred on Cape Cod, Massachusetts between 1999 and 2009 and compare within-group diversity to a baseline estimate of population-wide diversity derived from single-stranded individuals (N = 61) over the same time period. Within our mitochondrial analysis, we found the level of relatedness within mass stranding events to be variable. Some groups show higher than expected levels of relatedness and others appear composed of relatively unrelated individuals. The integration of our genetic results with demographic data on sex as well as timing of stranding events within different seasons confirms prior descriptions of the highly fluid social structure of Atlantic white-sided dolphins. Acknowledgements: This project was financially sponsored by the University of Maine. Samples were provided by Katie Pugliares-Bonner, Steven Travis, and the Greater Atlantic Region Marine Mammal Stranding Network.

Abstract ID :
UMSS19249

Genetic analysis of fungal toxin candidalysin in pathogenic Candida albicans causing yeast infections

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 347

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Jane Van Der Schaaf [1] *
Undergraduate

Author Name : Robert Wheeler [2]

Abstract Description : Candida albicans resides in most humans as a commensal organism. In some cases, however, it is pathogenic and causes infection, including yeast infections that are contracted by many women. In an average healthy human this infection only causes slight discomfort, though in immunocompromised patients it can be deadly. But why does it cause infection in some cases but not others? There are many allele variants in the natural population. It is proposed that a strain with one allele may have greater ability to cause disease than another. Initially, fungi were not thought to contain genes that coded for toxins. However, research suggests that some strains of Candida albicans contain the gene ECE1, which codes for the toxin candidalysin. Candidalysin causes damage to epithelial cells which signals an immune response. My hypothesis is that specific alleles of candidalysin are associated with differential pathogenicity of C. albicans in humans. To test this idea, I amplified the DNA and am comparing the sequences of the ECE1 gene of C. albicans strains isolated from healthy individuals to those of infected individuals. If variation in ECE1 drives disease, we could expect that isolates of C. albicans from patients have a more active form of candidalysin than control isolates. If ECE1 allele variants correlate with pathogenicity, ECE1 might be a possible target for drug therapy for yeast infections, leading to more efficient treatment and diagnosis of an active strain that will cause infection.

Abstract ID :
UMSS19125

Genetic Analysis of Ryadg Allele Dosage to Enhance Breeding of a Potato with Extreme PVY Resistance

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 367

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Jillian Doyle [1] *
Undergraduate

Author Name : Kristen Brown-Donovan [2]

Author Name : Gregory Porter [3]

Author Name : Han Tan [4]

Abstract Description : The cultivated potato, Solanum tuberosum L., is a tetraploid crop from the Solanaceae family and the fourth most important food crop in the world. Approximately 40 potato viruses are known to infect potato crops, causing tuber defects and reducing crop yield, which results in a loss of income for potato farmers and a decrease in the overall agricultural economy. Potato Virus Y (PVY), a member of the Potyvirus family, is one of the most common potato viruses and typically decreases potato crop yield by 30-80%. Breeding potatoes with extreme PVY resistance, by using progenitors that are known to be resistant, is therefore of economical and environmental importance. Progenitors that are multiplex (containing more than one copy) for the target resistance gene are ideal for breeding as they will produce more resistant progeny than simplex parents. Extreme resistance to PVY was found in S. tuberosum L. group Andigena, through the Ryadg gene. By using two linked molecular markers, RYSC3 and M6, it is possible to detect progeny that may contain Ryadg. New York 121 (NY121) is a breeding clone that contains Ryadg, but which allele dosage is unknown. Two populations were developed by crossing NY121 to PVY susceptible clones to estimate the allele dosage for Ryadg. This project provides important genetic data to aid in the breeding of PVY resistant potatoes.

Abstract ID :
UMSS19149

Genetic Diversity of Ticks in Maine

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 371

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Kristie Pinto [1] *
Undergraduate

Author Name : James Elliott [2]

Author Name : Pauline Kamath [3]

Abstract Description : The winter tick (Dermacentor albipictus) is increasing in abundance throughout the North, contributing to increased mortality in moose populations across the United States. In this study, we (1) examined the population genetic diversity of winter ticks in Maine, and (2) contrasted winter tick diversity with the genetic diversity of another tick species (deer tick, Ixodes scapularis) in order to gain insight into tick population dynamics. Winter ticks (n = 96) and deer ticks (n = 7) were collected between 2016-2018 from moose and the environment in the state of Maine. We amplified the 28S rRNA and COI gene loci, using Polymerase Chain Reactions, and sequenced these loci in an assortment of ticks. We report that the winter tick species has no genetic diversity, and that genetic diversity in deer ticks is greater. While winter tick has a one-tick host cycle, deer ticks have a three-host life cycle, which could contribute to differences observed in genetic diversity between tick species. This lack of genetic diversity in the winter tick may play a role in the adaptation to survive during the winter months or could be the result of reduced gene flow. This research benefits human and veterinary medicine as well as highlights the role ticks provide to the ecosystem. In understanding tick genetic diversity, we can further examine how they evolve with respect to different host species, thus aiding in the management of tick-borne diseases.

Abstract ID :
UMSS1943

Genetic Screening as a Tool for Personalized Medicine

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 818

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Niklas Hase [1] *
Undergraduate

Author Name : Dakota Archambault [2]
Undergraduate

Author Name : Gina DiFederico [3]
Undergraduate

Author Name : Emily McLaughlin [4]

Author Name : Denry Sato [5]

Author Name : Bruce Stanton [6]

Author Name : Haley Morrill [7]
Undergraduate

Author Name : Benjamin King [8]

Abstract Description : Genetic Screening as a Tool for Personalized Medicine Archambault, Dakota, DiFederico, Gina, Hase, Niklas, McLaughlin, Emily, Morrill, Haley, Sato, Denry, Stanton, Bruce The University of Maine Honors College and Mt. Desert Island Biological Laboratory Genetic screening can be used as a tool for personalized medicine. Various genes exhibiting frequent mutations were analyzed by genetic sequencing. The CYP2C19 gene encodes an enzyme which is responsible for the metabolism and activation of many drugs. Mutations in this gene cause inactive forms of the enzyme which affects drug metabolism and activation. In the CYP2C19 gene, two point mutations were screened, one in exon 4 and one in exon 5. Both of these mutations result in premature stop codons that lead to truncated proteins, which do not metabolize proteins. The mutation in exon 5 was more common than that in exon 4 (90.9% to 9.1% respectivity). Studies were also conducted to examine mutations in exon 10 of the CFTR gene. The first was a point mutation that changes a methionine to valine at the 470th amino acid position (M470V), which contributes to infertility. The second was a 3 base pair deletion, resulting in the deletion of a phenylalanine residue at position 508, which causes Cystic Fibrosis when homozygous. No examples of an F508 deletions were found in the 13 samples, yet significant variation in the genotype at the M470V loci was observed (20% of samples were homozygous for methionine, 40% were homozygous for valine and 40% were heterozygous for valine). Our data suggest that genetic screens for individual gene mutations may improve clinical care by providing information that will inform clinical care paradigms.

Abstract ID :
UMSS19255

Genomic and proteomic effects of Red Raspberry (Rubus idaeus) consumption on inflammation in perivascular adipose tissue of the obese Zucker rat, a model of human metabolic syndrome

Abstract Topic : Biomedical Sciences

Submission Type : Poster
Submission# : 829
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Jasmine Waite [1] *
Undergraduate

Author Name : Natalie VandenAkker [2]
Graduate

Author Name : Dorothy Klimis-Zacas [3]

Abstract Description : The Metabolic Syndrome (MetS) affects 35% of U.S. adults and is an indicator of early death. While pharmacological treatments have been developed for the majority of MetS risk factors, obesity-induced inflammation remains to be addressed. Dysfunctional adipose tissue is a source of inflammation, and perivascular adipose tissue (PVAT) is critical in its pathogenesis. This study investigates the effects of red raspberry (rubus idaeus) diet-enrichment on inflammation of PVAT. The obese Zucker rat (OZR) model of MetS and the lean Zucker rat (LZR) control model were used. Rats received an eight-week control or red raspberry-enriched diet (8% w/w red raspberry powder). RT-PCR was performed on LZR and OZR PVAT homogenates to determine gene expression of pro-inflammatory markers (IL-1β, IL-6, MCP- 1, NF- κB, TNF- α) and anti-inflammatory markers (adiponectin and IL-10), and ELISAs were performed to determine concentrations of a subset of these markers (adiponectin, IL-1β, IL-10, MCP-1).RT-PCR analyses of PVAT indicated a significant down-regulation of pro-inflammatory marker NF-kB in obese control (OC) versus lean control (LC) models. ELISA analyses indicated a significant decrease in anti-inflammatory marker IL-10 concentration in OC versus LC models, a significant decrease in pro-inflammatory marker IL-1B concentration in OC versus LC models, and a significant elevation in anti-inflammatory marker adiponectin concentration in obese raspberry (OR) versus OC models. Findings suggest that red raspberry enrichment does not have a consistent genomic or proteomic effect on PVAT inflammation status. Further investigations are needed to elucidate the molecular mechanisms dictating the pro-inflammatory and anti-inflammatory effects observed.

Abstract ID :
UMSS19377

Geometer's Planetarium: Implementing Dynamic Alteration of Scale

Abstract Topic : Education

Submission Type : Exhibit

Submission# : 500

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Joseph Haney [1] *
Undergraduate

Author Name : Justin Dimmel [2]

Abstract Description : Immersive spatial displays are a tool that allow for native manipulation of a virtual three dimensional environment. They are used in Geometer's Planetarium, a 3D dynamic model of the Earth, that allows users to explore geometric properties of the Earth and the Solar System. The environment initially fixed the user into a position of looking down on the earth at the relative size of a beach ball from space. To expand the user's access to manipulatives within the environment, I originally intended to implement a system of locomotion. Virtual locomotion throughout the solar system is heavily reliant on the scale of distance that users intend to move through (e.g. two points on a planet's surface compared to between planets). Therefore a system for dynamically altering the scale of the objects within this environment has been implemented and tested through a focus group, as a first step toward a complete system of locomotion. The focus group participants were educators who gave feedback on the software and the scaling system in the context of their personal experience with the software and its potential use in a classroom environment. The participants specifically desired to "push" the earth along while altering the scale. This indicates that locomotion will enhance the scale alteration experience by allowing the users to remain near the surface of the model of the earth.

Abstract ID :
UMSS19378

GROWING CONCERNS: ASSESSING THE HEALTH AND WELL-BEING OF MAINE'S AGING FARMERS

Abstract Topic : Interdisciplinary

Submission Type : Exhibit

Submission# : 601

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Jennifer Jain [1] *
Graduate

Author Name : Elizabeth Depoy [2]

Abstract Description : As of 2012, the average age of the Maine farmer is 57 years old (USDA 2012) and growing older. With no plans to retire or pass on the family business (Coughlin 2016), there is a rising concern for the future of the agricultural workforce and succession of ownership. In response to these trends, this research focuses on the health and wellbeing of the aging farmer. To answer the questions about aging farmer assets and unmet needs, this mixed method study was conducted. Farmers in four product sectors participated in surveys and focus groups to ascertain their experiences of aging and to identify their unmet needs related to the passage of time. Furthermore, the farmers were also asked if and how they adapted to their aging bodies. The findings revealed adaptive responses to aging bodies but significant concern with the changing economic and political context of contemporary farming. The results are being used to inform the advancement of a long-term research agenda and service responses to this expanding population. References U.S. Census of Agriculture, "U.S. Census of Agriculture," 19 10 2016. [Online]. Available: https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Farm_Demographics/. ions Coughlin J. Aging Farmers & the Stewardship of America's Agriculture Industry. Think Big. 2016. Available at: http://bigthink.com/disruptive-demographics/aging-farmers-the-stewardship-of-americas-agriculture-industry.

Abstract ID :
UMSS19322

Growing Up Cuban

Abstract Topic : Interdisciplinary

Submission Type : Exhibit

Submission# : 604 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Haley Nelson [1] *

Undergraduate

Author Name : Margo Lukens [2]

Abstract Description : The U.S. embargo against Cuba has strongly influenced how generations of Americans perceive Cuba. Though much of the embargo was lifted by 2018, American understanding of Cuba remains limited. A proposed documentary film about Cuban life today will work to show Cuba as a vibrant and struggling country undergoing rapid changes, as indexed by the daily lives of several Cuban children living in the city of Trinidad. Under this proposed project, I will conduct advance research before filming in Trinidad, Cuba for two weeks during Summer 2019, while the children are out of school. Preliminary work began in January 2019 in Trinidad, identifying locations and subjects. Parents and these children gave preliminary consent to work on the project. The children were filmed briefly. The completed film will chronicle some of the everyday struggles and successes of growing up Cuban. By glimpsing the lives of these children, the documentary hopes to increase U.S. understanding of and appreciation for Cuba and its people.

Abstract ID :
UMSS19294

Gulf of Maine Sea-Surface Temperature During the Past 6,000 Years: Is Modern Warming Anomalous?

Abstract Topic : Natural Sciences

Submission Type : Exhibit
Submission# : 309
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Jonathan Maurer [1] *
Undergraduate

Author Name : Cassandre Stirpe [2]

Author Name : Katherine Allen [3]

Abstract Description : From 2004 to 2013, the Gulf of Maine warmed faster than 99% of the world's oceans1, but the processes driving recent temperature change are not fully understood. The Gulf's increasing temperature poses a threat to ecosystems and fisheries that serve as key economic resources for coastal communities. A deeper understanding of oceanographic trends on time scales beyond instrumental records (~100 years) is needed to provide context for modern changes. Longer-term records also enable testing of past relationships between paleo fishing practices, recorded in archaeological sites, and past ocean temperature2. In this study, we reconstructed sea-surface temperature (SST) of the past 6,000 years by measuring the ratio of magnesium to calcium in shells of the planktonic foraminifer Neogloboquadrina incompta, extracted from a sediment core collected in Jordan Basin. In the modern ocean, Mg/Ca of N. incompta shells increases with SST at a known rate, providing a calibration that allows Mg/Ca of fossil shells to be converted into a record of past temperature. We found that during the past 6,000 years SSTs were variable (~ 5˚C range, similar to the range observed in the past 40 years) with no pronounced thousand-year-scale trend of warming or cooling. When paired with an existing δ18O record from Jordan Basin, the SST variability suggests shifts in the proportions or nature of water masses entering the Gulf of Maine through time. More data are needed to increase temporal resolution and to test and strengthen observations from this pilot study.

Abstract ID :
UMSS19359

H4Q LGBT Resource Application

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 712

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Robert Millett [1] *
Undergraduate

Author Name : Jon Ippolito [2]

Abstract Description : The goal of this project is to develop and create an app that builds an online community available to support LGBT youth and community members who need someone to talk to via audio calls and chats. An available, matched, online community member connects to someone in need which gives them someone to vent to, talk to, ask advice from, or give encouragement to contact other resources more qualified for the problem, if needed. Using voice calls gives the process a more personal tone than one might find in a chat room or forum. The goal of the app is not aimed to replace any professional help or deal with any emergency situations. The app, Here 4 Queers (H4Q) is currently in its developmental phase using React Native. Working under the guidance of Jon Ippolito and a programmer, Mike Gecawicz. The goal is to have at least a messaging system working by the end of the semester. Ultimately, the purpose of this app is to connect LGBT people at risk or in need to people who may have been in their situation before to help prevent any difficult circumstances from escalating from within the LGBT community.

Abstract ID :
UMSS19134

Healing is an International Language

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 425 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Logan Molt [1] *

Undergraduate

Author Name : Hannah Duffy [2]

Author Name : Stephanie Woods [3]

Author Name : Laura Roberts [4]

Author Name : Nilda Cravens [5]

Abstract Description : Focus: The University of Maine Nursing International(UMNI) group completes yearly trips to many different countries, providing health care to underserved communities. Costa Rica is the most recent destination for UMNI, where they visited two communities in the suburbs of San Jose conducting assessments and educating residents of those communities in January, 2019. Process: A total of 36 home assessments were completed and clinics with local physicians were held in community centers. A variety of conditions were treated. UMNI group brought $1,000 of donated medical, and personal care supplies. The group also conducted an afternoon of community playtime where an estimated 40 children attended. Outcomes: The University of Maine nursing students were able to immerse themselves in the educational benefits of holding health clinics in a foreign country in addition to engaging in the vibrant country of Costa Rica. Through their assessments of patients, they were able to gather data regarding the prevalence of specific medical conditions and the amount of patients seen at each community. The students also participated in weekly journals prior to the trip to gain knowledge about global health and to voice concerns, expectations, and personal goals. The major goals of these trips are to promote cultural competence among nurses due to the increasing diversity of the United States, to improve clinical skills, and to improve the health of those that do not have immediate access to health care.

Abstract ID :
UMSS19333

Hmong Americans and Mainstream Politics in St. Paul, MN

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 111

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Thilee Yost [1] *
Undergraduate

Author Name : Amy Fried [2]

Abstract Description : Research has found that Asian American political participation is below the national average and Asian Americans are underrepresented in government. In the U.S. Congress, there are 15 Asian American Representatives and three Senators. With Asian Americans making up 5.2% of the U.S. population (World Population Review 2016), proportional representation would be 22 seats in the House and at least 5 in the Senate. We turn to the Hmong in St. Paul as this community is a special case for diversity in political representation. Currently, over 300,000 Hmong currently live in the U.S. (Pew Research Center 2015) with the largest Hmong population lives in the Twin Cities, St. Paul and Minneapolis, which houses over 72,000 Hmong Americans. The Minneapolis Star in 1979 claimed that Hmong people and their culture was “far removed from the 20th century” and “clashed with American Ways,” (Lee 2015). But today the Hmong are quite politically active in their respective communities. In the 2018 midterms, there was a record for the most Hmong Americans elected for public office in Minnesota. Of those candidates, five Hmong lawmakers were elected and two Hmong judges were elected in the Twin Cities area (Melo 2018). To understand how Hmong Americans have been able to thrive in mainstream American politics, six Hmong Americans were interviewed on their social and political engagement. These interviews served as data for a qualitative analysis on Hmong American political incorporation in St. Paul.

Abstract ID :
UMSS19422

Holocaust Ghettos Project

Abstract Topic : Interdisciplinary

Submission Type : Oral
Submission# : 628
Judge Time Slot : PM1 (1:00 -2:00)
Undergraduate

Author Name : Jordan Morace [1] *
Undergraduate

Author Name : Dakota Gramour [2]

Author Name : Caitlyn Rooms [3]

Author Name : Hailey Cedor [4]

Abstract Description : Abstract Originally, the team worked to create a methodological approach for analyzing hundreds of Holocaust survivor interview transcripts. Sub-team tasks included correcting spellings, using HTML to correct tagged terms (locations, people), and marking the transcripts temporally. The issues that emerged from this time-intensive process led us to focus on transcripts from one specific ghetto region, Krakow. The work on these transcripts has continued, now focused on mapping survivors' journeys and categorizing their descriptions and associations with places where they experienced the Holocaust. In addition, three from the team are now entering information from the USHMM Encyclopedia of Ghettos into a geospatial database. This project will benefit the academic community as it is an interdisciplinary project. Survivor interviews are often used for one given individual's story or to study a particular place. This project is the first to apply methods from computer science and geography to analyze a large corpus of testimony. This year the team has focused on creating a database that will enable visualization of information from the Encyclopedia of Ghettos and demonstrate regional and local characteristics of ghettoization over time. Holocaust ghettos can be newly understood as places of experience by mapping and analyzing their characteristics and studying how they are described in survivor interviews. This year, we tested and refined our methods as part of a three year, ongoing project. Acknowledgements: Thanks to Anne Knowles, Eve Duffy, Anika Walke, Justus Hillebrand, Paul Jaskot, and Levi Westerveld.

Abstract ID :
UMSS1941

Honors 350 CFTR Knockdown and the Innate Immune Response

Abstract Topic : Biomedical Sciences

Submission Type : Poster
Submission# : 816
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Ryan Andrick [1] *
Undergraduate

Author Name : Anna Tyrina [2]
Undergraduate

Author Name : Amanda Cusack [3]
Undergraduate

Author Name : Rachel Bonney [4]

Author Name : Erika Pacheco [5]
Undergraduate

Author Name : Melody Neely [6]

Abstract Description : Cystic Fibrosis (CF) is a genetic disease that not only affects the lungs of patients, but also has a global effect on many processes throughout the body, including the function of the innate immune response. CF affects more than 70,000 individuals globally, with about 1,000 new individuals diagnosed each year [1]. This disease results from a mutation in the Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) gene, which inhibits the normal function of an ion channel that allows the passage of Na+ and the flow of water. Patients affected by this mutation are more susceptible to infection, particularly to the pathogen P. aeruginosa, which becomes prevalent in adult patients. Our goal was to examine the effect of the CFTR mutation on the immune response using the zebrafish infectious disease model. Genetic knockdown of the cftr gene in zebrafish simulates CF individuals with defective ion channels and allows for the analysis of the innate immune response to infection. We observed the innate immune response to infection with P. aeruginosa in the zebrafish with a knockdown of the CFTR protein (CFTR MO) compared with control fish. This was investigated through visualizing neutrophil location among the site of infection/wound with confocal microscopy, and by conducting bacterial burden assays. Individuals with the CFTR knockdown displayed less neutrophil migration to the site of infection than the controls, as well as an increased average bacterial burden. These results suggest that CF patients may have a weakened innate immunity, although these results were not statistically significant.

Abstract ID :
UMSS19208

How different methods of communication impact undergraduate student's attitudes, knowledge, and beliefs towards white-nose syndrome in little brown bats

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 152

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Kiley Davan [1] *
Undergraduate

Author Name : Carly Sponarski [2]

Abstract Description : White-nose syndrome (WNS) is a deadly fungal disease that has killed million of hibernating bats since its introduction to North America in 2006. The little brown bat (Myotis lucifugus), once widespread across the USA, has been the most severely impacted with some colonies experiencing a 99% decline. Scientists believe changing people's behavior is the key to bat conservation as the fungus is spread primarily by humans. Outreach is a common method used to affect behavioral change, but not all outreach methods are equally effective. The purpose of this study was to investigate if different methods of media communication, video and written-text, impacted undergraduate student's attitudes, knowledge, and beliefs towards WNS in little brown bats. Data was collected using an online survey distributed to undergraduate students at the University of Maine (n = 236). We have found that there is not a significant difference between video and text. However, both the video treatment and text treatment significantly impacted beliefs and knowledge towards little brown bats, and beliefs about conservation behaviors. This illustrates how outreach can positively change people's beliefs.

Abstract ID :
UMSS1967

How Heart Failure Education Can Reduce Hospital Readmission Rates

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 421

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Peter Hatch [1] *
Undergraduate

Author Name : Kacie McLaughlin [2]

Author Name : Ryan Lavway [3]

Author Name : Patricia Poirier [4]

Abstract Description : Abstract Background: Heart failure (HF) is a progressive complication where the heart is no longer able to effectively pump oxygenated blood through the body to vital organs. HF affects more than 6.5 million people in the United States with a 5-year mortality rate of 50%. Additionally, HF affects Blacks, Hispanics, and Native American more than White individuals. By 2030, it is projected that nearly 8 million people in the United States will be diagnosed with heart failure. The estimated cost of heart failure in the United States in 2012 exceeded $37 billion and is estimated to increase by 127% to $67.9 billion by 2030. Readmission is correlated with poor patient outcomes and increased cost. Method: A systematic search was done in the following databases: CINAHL, PubMed Central, and Nursing Reference Center. The search included articles from 2013 to the present and included the following search terms: heart failure, interventions, education, prevention, readmission, costs, discharge, and teaching. Outcome: Studies have shown that individualizing patient teaching based on assessment combined with exercise, medication, and nutrition education is highly beneficial to HF patients. Including at least one of these topics in the patient teaching can increase the patient's likelihood of not being readmitted to the hospital [Thomas et al., 2017]. Wan, T, Terry, A., Cobb, E., McKee, B., Treggermann, R., & Barbaro, S.D.S. (2017, April 18). Strategies to modify the risk of heart failure readmission a systematic review and meta-analysis. Health Services Research and Managerial Epidemiology. doi. 10.1177/2333392817701050

Abstract ID :
UMSS19215

How Social Media is Impacting Mental Health in Today's World

Abstract Topic : Allied Health

Submission Type : Poster
Submission# : 427
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Emily Ward [1] *
Undergraduate

Author Name : Abigail Reese [2]

Author Name : Lilli Wiseman [3]

Author Name : Taylor Venema [4]

Author Name : Patricia Poirier [5]

Abstract Description : Abstract Background: Over the past 10 years, the use of social networking sites (SNS) in teenagers and young adults has skyrocketed. Sites like Facebook, Instagram, Snapchat, and Twitter have become a form of entertainment and communication that is used daily. There is conflicting literature about social media use and its effects on mental health and self-esteem (Frost & Rickwood, 2017). Method: A review of the literature was conducted to answer the question, “For people aged 25 and younger, how does social media impact mental health and self-esteem?” Outcome: Although social media has revolutionized networking and convenient communication in the 21st century, research has shown that social media is directly related to decreased self-esteem, anxiety, depression and other mental illnesses. Despite these consequences, social media remains to be a primary form of communication in this new age of technology. It’s purpose, frequency of use, and content may need to be altered in order to improve the mental health outcomes that are occurring in today’s society.

Abstract ID :
UMSS19393

Ice Cores and Hydroclimate in the St. Elias Mountains of Yukon, Canada

Abstract Topic : Natural Sciences

Submission Type : Oral
Submission# : 364 **Judge Time Slot :** AM2 (11:00 - 12:00)
Graduate

Author Name : Erin McConnell [1] *
Graduate

Author Name : Karl Kreutz [2]

Abstract Description : The North Pacific is atmospherically complex, such that regional climate is a reflection of both local and far-reaching oceanic and atmospheric conditions. Predicting the ways in which regional conditions will respond to warming global temperatures represents a knowledge gap that must be filled in order to prepare for impacts on local populations. Glaciers in the St. Elias Mountains of Canada's Yukon present an opportunity to reconstruct past climate variability using ice core records. In June 2018, our group extracted a short ice core (20 m) from Icefield Divide (2,900 m elevation) and analyzed it for stable hydrogen and oxygen isotopes. The coring site contains an automated weather station collecting temperature and snow depth measurements, giving an opportunity to calibrate the ice core proxy record with real-time data. However, summer melt at the site caused the isotope signal to deteriorate below the 2017/2018 snowpack, making this site unsuitable for the collection of a longer ice core record. Here, we show that nearby Eclipse Icefield (3,017 m elevation), where our group has collected ice cores in 2017, 2016, and 2002, can serve as a site for calibration with the Icefield Divide weather station observations. We compare both in situ and remotely-sensed (NASA MODIS) temperature records, as well as in situ accumulation records, over 2002-2017 to show that the temperature signal is coherent between both sites with a consistent offset of 1-2°C, while the accumulation signal appears more spatially variable. Following from this comparison, we discuss ways in which temperature and accumulation differences may contribute to differences in melt and isotope signal preservation at ice core sites, which has implications for paleoclimate reconstruction using ice cores.

Abstract ID :
UMSS1945

Identification of Novel Regulatory Genes with Roles in Muscular Dystrophy

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 824

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Grace Smith [1] *
Undergraduate

Author Name : Michelle Goody [2]

Author Name : Clarissa Henry [3]

Author Name : Erin Bailey [4]
Graduate

Author Name : Benjamin King [5]

Abstract Description : Muscular Dystrophy (MD) causes progressive muscle weakness and loss of muscle mass, affecting 250,000 individuals in the United States. Between the 30 different forms, disease severity and age of onset varies drastically, and even individuals with the same form can vary. Dystroglycanopathic MD is a form of MD for which there is no cure. It is characterized by dysfunctional dystroglycan: a transmembrane protein that requires GDP-Mannose Pyrophosphorylase B (gmppb) for proper glycosylation and function. Several mutations in gmppb have been identified in individuals with dystroglycanopathies. To better understand molecular mechanisms that underlie MD variability, we have characterized genome-wide gene expression by high-throughput RNA sequencing in wild-type and mutant zebrafish embryos where gmppb was mutated using CRISPR/Cas9 technology. We hypothesize that variable phenotypes in MD are due to differences in genetic regulation by a class of genes called long non-coding RNAs (lncRNAs). These genes are known to play regulatory roles in various physiological processes and diseases such as development and cancer, yet they are currently unexplored in MD. We have identified approximately a dozen putative novel lncRNAs that are differentially expressed in the mutants. We aim to characterize these putative lncRNAs using sequence analysis to determine k-mer content, protein alignment, and repetitive elements. As some lncRNAs regulate protein coding genes that are antisense or in close genomic proximity, we will also characterize the nearby protein coding genes. These ongoing studies seek to improve our understanding of the many roles regulatory genes have in controlling MD severity and onset.

Abstract ID :
UMSS19379

Identifying a Candidate Gene for Neuromuscular Disease using a Forward Genetics Approach

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 862

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Paige Martin [1] *

Graduate

Author Name : Jenn Stauffer [2]

Author Name : Greg Cox [3]

Abstract Description : Neurodegenerative diseases are debilitating conditions whose treatment presents a major unmet medical need, limited by our understanding of underlying factors and mechanisms. A hallmark of neurodegeneration is defective protein quality control1,2. When translation stalls specific proteins need to respond in order to properly recycle the ribosomal subunits, as well as remove the partially made protein, which could potentially be neurotoxic3. We have previously identified using a forward genetics approach, two independent mutant variants in a ribosome-quality control (RQC) pathway candidate gene that resulted in progressive neuromuscular degeneration. We hypothesized that human patients with neuromuscular disease would be likely to harbor damaging variants in this gene. Through screening of ALS exome databases we identified a number of variants that may be disease causing. To test if these genetic changes to the gene were damaging we used CRISPR-Cas9 to create an allelic series of the variants as mouse models. Histological characterization shows that mouse models with the human ALS variants display motor axon degeneration, neurogenic muscle atrophy, neuromuscular junction disruption and changes in ability to perform normal motor tasks. Our studies uncover a promising ALS candidate gene and suggest that this protein plays a critical role in motor axon viability. We hope that uncovering its exact role in maintaining motor axon health could lead to much needed ALS and neuromuscular disease therapeutic targets.

Abstract ID :
UMSS19219

Identifying Risk Factors of Parasitic Helminth Infection in the Ruffed Grouse

Abstract Topic : Natural Sciences

Submission Type : Oral
Submission# : 373
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Julia Cleary [1] *
Undergraduate

Author Name : Pauline Kamath [2]

Abstract Description : Ruffed grouse (Bonasa umbellus) are distributed across northern North America and are a prized gamebird throughout their range. Endoparasitism has been explored as a potential cause of population decline in several regions. Although parasitism was exonerated as the sole cause of specific declines, the role that parasitism plays in the lifecycle of ruffed grouse remains largely unknown. Helminth infection can impact individual health and helminths have been found to regulate populations of other avian species. Life history differences between sex and age groups may cause variation in exposure resulting in varying degrees of infection. This research seeks to (1) determine the prevalence and abundance of helminth species in ruffed grouse in Maine and (2) assess whether infection varies by host age or sex. The intestinal tracts and any other organs present of about 30 ruffed grouse were dissected for helminths. A series of washes in sedimentation glasses allowed isolation of the heavier helminths at the bottom, while digestive matter was removed at the top. Age, sex, and all helminths present were recorded for each individual and helminths were fixed and preserved for future identification. Helminths were found in 63% of individuals necropsied and helminth abundance ranged from 0–31 in any single individual with an average abundance of 4.7 across the sampled population. We will examine the relationship between demographic factors and parasite loads using generalized linear models. This research will contribute to baseline data on helminths currently infecting ruffed grouse and will provide insight regarding individual factors influencing infections. Acknowledgements This project was funded by the University of Maine Graduate Student Government and the USDA-National Institute of Food and Agriculture Hatch Project No. ME021908.

Abstract ID :
UMSS19233

Imaging Zebrafish with Duchenne Muscular Dystrophy using Second-Harmonic Generation to Evaluate Myosin Structure

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster
Submission# : 245
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Jordan Miner [1] *
Undergraduate

Author Name : Karissa Tilbury [2]

Abstract Description : Duchenne muscular dystrophy (DMD), an incurable disease that causes weakness and loss of muscle mass, is caused by a mutation in the protein dystrophin, which serves as an anchor between the sarcolemma and the actin filaments. Sarcomeres, the foundational units of muscle contraction, are composed of thick myosin filaments. Myosin is a key protein required for proper muscle contraction and is impacted by DMD. An individual diagnosed with DMD is believed to experience hypercontraction of sarcomeres. By evaluating sarcomere length and myosin arrangement, we seek to understand the structural impacts of four different exercise regiments: endurance, hypertrophy, strength, and power on the myosin in wild-type and DMD zebrafish. Currently, confocal microscopy is used to study the two muscle fiber types: slow- and fast-twitch. However, confocal microscopy uses dyes, whereas second harmonic generation (SHG) imaging is label-free and will not distort the myosin structure. SHG microscopy is used in this study to explore spatial relationship of myosin in individual muscle fibers. Preliminary results show sarcomere length (Z-line to Z-line) of normal, wild-type zebrafish muscle fibers to be 1.83±0.08 μm. By comparing the wild-type sarcomere length to the sarcomere length in zebrafish with DMD, an understanding of the effect DMD has on myosin can be determined. Overall, this study will effectively combine SHG imaging with the use of zebrafish to properly evaluate myosin structure in muscle fibers, furthering our knowledge of DMD. Ultimately, this work aims to facilitate development of scientifically driven exercise routines for DMD patients.

Abstract ID :
UMSS1934

Impact of Stress on Aphasia

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 413

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Jana Watson [1] *
Undergraduate

Author Name : Lauren Emery [2]

Author Name : Olivia Rogers [3]

Author Name : Emily Hernando [4]
Undergraduate

Author Name : Paige Lane [5]

Abstract Description : People who experience aphasia after a stroke often suffer from specialized stress associated with the changes in their language ability (Laures-Gore, Hamilton, & Matheny, 2007). This stress or “linguistic anxiety” (Cahana-Amitay et al., 2011) has been known to impact the treatment outcomes and quality of life of people with aphasia (PWA; Laures-Gore & Buchanan, 2015; Tanner, 2003). However, there has been inconsistent research concerning treatment options that specifically target stress reduction. This paper explores the published literature on the benefits of animal-assisted therapy, mindful meditation, and aerobic exercise and their possible use as supplemental treatment options for PWA. The current research gap in this area prompted the design of a proposed research study that would attempt to manipulate the participants’ stress levels with the introduction of a therapy dog, mindful meditation or aerobic exercise immediately before to speech-language therapy sessions.

References Cahana-Amitay, D., Albert, M. L., Pound, S., Westwood, A., Jenkins, T., Wolford, S., & Finley, M. (2011). Language as a stressor in aphasia. Aphasiology, 25, 593-614. doi:10.1080/02687038.2010.541469 Laures-Gore, J., & Buchanan, T. (2015). Aphasia and the neuropsychobiology of Stress. Journal of Clinical and Experimental Neuropsychology. 37, 688-700. doi:10.1080/13803395.2015.1042839 Laures-Gore, J., Hamilton, A., & Matheny, K. (2007). Coping resources, perceived stress and recent life experiences in individuals with aphasia. Journal of Medical Speech-Language Pathology, 15, 423-431. Tanner, D., (2003). Eclectic perspectives on psychology of aphasia. Journal of Allied Health, 32, 256-260.

Abstract ID :
UMSS19267

Impacts of Invasive Plant Species on Mosquito Larvae Survival

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 349

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Cassandra Steele [1] *
Undergraduate

Author Name : Allison Gardner [2]

Abstract Description : Abstract Invasive plant species can impact the ecology of an ecosystem through modification of habitats, which can influence the ecology and abundance of important disease vectors, such as mosquitoes. Invasive and native plant species harbor different microbial communities, which can alter mosquito survival. It is crucial to understand how invasive species impact mosquito vector abundance because mosquitos are one of the most prevalent disease vectors in the 21st century. The purpose of this project was to compare mosquito emergence rates and bacterial communities associated with the leaf detritus from different native and invasive plants. Adult mosquito emergence rates were measured by adding Culex pipien mosquito larvae to decomposed leaf-litter water of eight plant species (four natives and four invasives), to determine the number of adults that survived. DNA extractions and sequencing were performed on leaf-litter water samples to determine the bacterial species composition that forms as the leaves decompose. Statistically significant differences in mosquito survival were detected among the eight-leaf species. These findings reveal that invasive plant species may influence mosquito survival. Bacterial sequencing data is still being analyzed, however based on the role of microbes in plant decomposition and mosquito diet, we predict differing compositions in the invasive versus native plants. By determining which leaf species and bacterial taxa have an impact on mosquito emergence, proper management strategies can be implemented. Acknowledgements I could not have collect my data without Alyssa Marini and Troy Cloutier. I would also like to thank Allison Gardner for countless hours of aid and guidance on my project. I would like to thank the University of Maine and the Center for Undergraduate Research for funding my project. Finally, I would like to thank my friends and family for believing in me and supporting my love for mosquitoes.

Abstract ID :
UMSS19417

Implications of Vocalizations on Conservation of Large Carnivores (Ursidae, Canidae, Felidae)

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 382

Judge Time Slot : AM2 (11:00 - 12:00)

Undergraduate

Author Name : Evalyn Machia [1] *
Undergraduate

Author Name : Julia McGuire [2]

Abstract Description : Habitat quality impacts animal vocalizations, which influences their social structure. This relationship is important to better understanding ecosystem dynamics, especially as humans accelerate global climate and ecosystem changes. Studying vocalizations may enhance our understanding of where habitat conservation efforts should be focused. Few studies address vocalizations of large carnivores despite the serious threats they face from deforestation and population fragmentation. This literature review explores what is already known about Canidae, Felidae, and Ursidae vocalizations, and assesses them in terms of ecology, social structure, and the application of conservation policies. Habitat quality has noticeable effects on vocalizations since denser vegetation is more likely to absorb and scatter sounds. Researchers have found that animal vocalizations are suitable for their habitat, and have demonstrated that other conspecific individuals can hear, interpret, and respond to the sound. This trend suggests that the animals coevolve with their environments and more research in needed to limit anthropogenic change

Abstract ID :
UMSS1949

In infants with Neonatal Abstinence Syndrome, are non-pharmacological interventions as effective as pharmacological interventions in demonstrating symptom improvement?

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 416

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Katie Cotton [1] *
Undergraduate

Author Name : Marty Bushey [2]

Author Name : Stephanie Woods [3]

Author Name : Valerie Herbert [4]

Abstract Description : Background: Neonatal Abstinence Syndrome (NAS) is a syndrome characterized by newborns who were exposed to opioids in the womb and experience a sudden termination of exposure to the drug upon birth. Signs and behaviors that are indicative of NAS may include: temperature instability, tremors, a high-pitched cry, excessive sneezing, and poor suck. Due to the increasing use of opioids and street drugs among childbearing women, the occurrence of NAS has also increased. Both pharmacologic and non-pharmacologic interventions, such as breastfeeding, swaddling and rooming-in, have been utilized to reduce symptomatology in infants with NAS. Non-pharmacologic interventions have been found to reduce the need for medication therapy; however, research has not shown whether non-pharmacological methods alone are as effective as medication therapy. Method: A literature review was conducted with the objective to determine whether non-pharmacological interventions are as effective as pharmacological interventions in reducing symptomatology in infants with NAS in order to establish a standard of treatment. Outcome: Researchers have identified that non-pharmacological interventions, such as breastfeeding, promote bonding among mother and infant, which reduces NAS symptoms and the need for pharmacological therapies (Knopf, 2016). Currently, there is no universal treatment method for NAS, so a large aspect of care is dedicated to managing symptoms to improve the infant's quality of life. Reference:Knopf, A. (2016). Baby's mother is the best treatment for neonatal abstinence syndrome.Alcoholism & Drug Abuse Weekly, 28(15), 1–4. Retrieved from https://doi-org.prxy4.ursus.maine.edu/10.1002/adaw.30537.

Abstract ID :
UMSS19156

Increased high-moisture alfalfa hay preservation, in vitro ruminal degradability, fermentability, and decreased proteolysis with the novel use of paper mill byproducts

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 358

Judge Time Slot : AM1 (9:30 - 10:30)

Graduate

Author Name : Angela Leon Tinoco [1]
Graduate

Author Name : Colt Knight [2]

Author Name : Changqing Wu [3]

Author Name : Richard Kersbergen [4]

Author Name : Jennifer Perry [5]

Author Name : Lewis Perkins [6]

Author Name : Hannah Dubuc [7]

Author Name : Santiago Rivera [8]

Author Name : Seanna Annis [9]

Author Name : Diana Reyes Gomez [10] *
Graduate

Author Name : Juan Romero [11]

Abstract Description : We evaluated the effect of two previously optimized technical lignins, sodium and magnesium lignosulfonate (NaL and MgL, respectively), on the preservation and nutritive value of high-moisture alfalfa hay. Lignins and propionic acid (PRP; positive control) were added to 36 fresh g of sterile alfalfa hay (69.3 ± 0.6% DM), inoculated with a mixture of spoilage fungi (5.6 log cfu/fresh g), and aerobically incubated for 15 d (25°C). Treatments were the factorial combination of three preservatives (NaL, MgL, and PRP) and four concentrations (0, 0.5, 1, and 3% w/w fresh basis). Data were analyzed as a randomized complete block design replicated five times (5 plots in an alfalfa field) and differences were declared at $P \leq 0.05$. At d 0, the untreated hay had 47.8 ± 1.2, 11.1 ± 0.59, 66.2 ±1.5, 30 ± 1.2 of NDF, sugars, and 24 h in vitro ruminal DM (DMD, % of DM) and NDF digestibility (NDFD, % of NDF), respectively. At d 15, relative to untreated (14.9 ± 0.77%), DM losses were lessened by doses as low as 1% for NaL (3.39) and 0.5% for PRP (0.81). This was explained by a reduced mold count for both NaL at 3% (3.92 ± 0.55 log cfu/fresh g) and PRP as low as 0.5% (3.94) vs. untreated (7.76). Consequently, sugars were best preserved by NaL at 3% (10.1 ± 0.283% DM) and PRP as low as 0.5%

(10.5) vs. untreated (7.99), while keeping NDF values lower in NaL (45.9 ± 0.66% DM) and PRP-treated (45.1) hays at the same doses, respectively, vs. untreated (49.7 ± 0.66% DM). Hay DMD was increased by doses as low as 3% for NaL (67.5± 0.77%), 1% MgL (67.0), and 0.5% PRP (68.5) vs. untreated (61.8). In the case of NDFD, 0.5% for MgL and PRP (30.5 and 30.1 ± 1.09% DM, respectively) and 1% for NaL (30.7) were the lowest effective doses vs. untreated (23.3). At 3%, NaL decreased ruminal NH_3-N (49.6 vs. 58.2 ± 1.50 mg/dL) and increased total volatile fatty acids (111.9 vs. 86.7 ± 1.3 mM) to the greatest extent vs. untreated, respectively. NaL was the best lignin-based preservative, but its effects were lesser than PRP. MgL stimulated digestibility independently of nutrient preservation.

Abstract ID :
UMSS19403

Infection Dynamics of an Acanthocephalan Parasite Profilicollis botulus in the Green Crab Carcinus maenas (L.) on the Coast of Maine

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 301

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Tyler Van Kirk [1] *
Graduate

Author Name : Ian Bricknell [2]

Abstract Description : The European green crab Carcinus maenas is an invasive species to the coast of Maine that shows demonstrable negative impacts to local ecosystems and economies. C. maenas is also the intermediate host of the Acanthocephalan parasite Profilicollis botulus. Little is known about the temporal and spatial infection dynamics of this parasite, and more information will allow ecologists to understand the parasite's role on the coastal ecology of Maine. Crabs were collected from May to August of the Summers of 2017 and 2018. Crabs were sampled from three alternating locations on the Maine coast. Data collected were put through preliminary analysis to test the impact of a variety of factors on parasite prevalence and intensity at each location. Seven pieces of data were collected: sex, color phase, carapace width, claw width, testes weight, parasite presence, and number of parasites. Fisher's Exact Tests and Kruskal-Wallis Tests were used to compare prevalence among different sub-samples. Overall prevalence was 17.8% in 2017 and 12.9% in 2018. for the entire coast, an insignificant increase from 14% in the summer of 2016. Prevalence was significantly higher in the southernmost bioregion of Maine compared to the other two sites. Significant relationships between subpopulations and infection risk were determined for year-to-year, color phase, carapace width, and sex of the crab. These data support the hypothesis that a changing environment could significantly impact host-parasite dynamics of green crabs on the Maine coast.

Abstract ID :
UMSS19207

Infinite Length 3D Printing

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 213

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Kevin Chamberland [1] *
Undergraduate

Author Name : Bradley Guerrette [2]
Undergraduate

Author Name : Jordan Yoder [3]
Undergraduate

Author Name : Wilhelm Friess [4]

Abstract Description : Infinite Length 3D Printing Kevin Chamberland1, Bradley Guerrette1, Jordan Yoder1 Dr. Wilhelm Friess2 1 Department of Mechanical Engineering, 2 Professor of Mechanical Engineering, University of Maine Abstract This Mechanical Engineering capstone project is tasked with the goal of designing and constructing a 3D printer capable of producing parts in "infinite" length. Typical 3D printing methods have limitations based on the size of the printer dictating how long a part can be. In addition, support material is required when making parts with a steep overhang. In this project, a commercial 3D printer has been modified to build parts at a 45 degree angle as opposed to a typical orthogonal build. The project incorporates a belt material driven by conveyor rollers that provide an infinite build surface. The device will operate by printing a specified section of a part, then rotating the belt loop and thus shifting the print allowing the tool-head to print the next segment. The previous segment passes through a delamination zone, separating the part from the build surface and exiting printer volume. When fully operational, this device will have the ability to 3D print parts that are much longer than any conventional printer. This machine can also create an infinite number of small parts by continuously building and removing pieces as the belt shifts them through the delaminatin zone. The end use of this device will provide benefits to hobbyists and professionals who utilize 3D printing but are limited by the current technology of printers on the market.

Acknowledgements: This project was financially sponsored by the Advanced Structures and Composites Center as well as the Mechanical Engineering at the University of Maine.

Abstract ID :
UMSS19299

Influenza A Inactivation Protocols for Studying Neutrophil Migration in Zebrafish

Abstract Topic : Biomedical Sciences

Submission Type : Exhibit

Submission# : 805

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Brian Monahan [1] *
Undergraduate

Author Name : James Barry [2]

Author Name : Mary Astumian [3]

Author Name : Brandy-Lee Soos [4]
Graduate

Author Name : Con Sullivan [5]

Author Name : Paul Millard [6]

Author Name : Carol Kim [7]

Abstract Description : Influenza is a serious respiratory disease that causes massive social and economic strain worldwide. During the 2018 flu season, more than 30,000 laboratory-confirmed cases of influenza resulting in hospitalization were recorded. Neutrophils, a type of innate immune cell, play an important role in vertebrate immune responses to bacterial infection. Until recently, neutrophils had been viewed as non-essential for viral immunity, but recent evidence suggests that they may cause widespread tissue damage resulting from degranulation within the lungs during infection. To better understand neutrophil response to influenza virus infection it is important to develop standard control protocols to inhibit specific phases of the viral replication cycle. If the influenza virions remain intact, observation of neutrophil migration can be attributed to specific properties of the virus, and compared with those of untreated virus. Both the viral proteins required to attach to the cell surface and the RNA genome are good targets for inactivation as both are required during the viral life cycle. Heat is used to inactivate the virus by denaturing viral surface proteins. In contrast, ultraviolet light, which can alter nucleic acids and form thymine dimers, renders the genome inactive because the influenza virus does not possess repair mechanisms. UV and heat inactivation protocols have been developed and electron micrographs of virions exposed to these treatments show that viral inactivation procedures render the virions nonviable but intact.

Abstract ID :
UMSS1968

Innovations in measuring habitat: habitat use of grassland songbirds in northern mixed-grass prairies

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 354 **Judge Time Slot :** AM1 (9:30 - 10:30)

Graduate

Author Name : Nicole Guido [1] *
Graduate

Author Name : Katharine Ruskin [2]

Abstract Description : Identification of habitat conditions driving nest-site selection are essential for the management and sustainability of declining grassland bird populations. Demographic rates and reproductive success alone cannot explain underlying causes driving population decline. Traditionally, habitat is measured from the ground to account for vegetative composition and cover types. Unmanned aircraft systems (UASs), or drones can be used remotely and inexpensively to gather data on grassland habitats over large areas. However, few studies have assessed whether drones can characterize grassland habitat in a way that is meaningful for habitat selection in birds. We combined drone-collected data with ground-collected habitat data at 343 nest sites to examine nest-site selection in four grassland bird species in the mixed-grass prairies of the Northern Great Plains (NGP): Baird's Sparrow, Grasshopper Sparrow, Sprague's Pipit, and Chestnut-collared Longspur. We calculated the normalized difference vegetation index (NDVI) to quantify vegetative biomass, a potentially important factor driving nest-site selection that is not easily estimated from ground measurements. Nests from each of the focal species were partitioned along a gradient ranging from low (e.g., Sprague's Pipit) to high NDVI values (e.g., Baird's Sparrow). We also found similar trends in the ground-collected vegetation data where nests from each of the focal species were partitioned along a gradient ranging from relatively short vegetation dominated by bare ground to tall vegetation dominated by dense grass cover. Our results support that drone-collected spectral data represents habitat conditions similar to ground-collected data that is important for nest-site selection by grassland birds.

Abstract ID :
UMSS19365

Inorganic Nature: A Study of Textures in Printmaking

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 709

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Delaney Burns [1] *
Undergraduate

Author Name : Andy Mauery [2]

Abstract Description : My work this semester has concentrated on taking textures found in nature and translating them into printmaking. I push the patterns and textures I find in nature to a certain abstraction while still maintaining the original integrity of the objects my projects are based on. Previously I have worked with intaglio and screen printing to explore the patterns found on the Eastern Box Turtle and the textures found in the hot springs at Yellowstone National Park. I try to examine things at closer proximity than what is typical. My current project is exploring the patterns of leaves created by the biological structures and the colors created by the pigments in the Croton plant. I like to focus on the relationship between nature and how humans are drawn to it. I love the challenge of relaying something so natural and untouched by people in a way that completely relies on the influence of human beings. I will also experiment with the way color can change the way the viewer interprets the artwork. I will extend my research to different methods of printmaking, including linoleum block printing and potentially mono-printing to further push the ways I can use color and texture to create new and exciting ways to look at naturally occurring patterns. In order to discover effective techniques for doing so, I will also research traditional and contemporary ways that other artists consider naturally occurring patterns. The goal of my research is to develop my own artistic style, but also to introduce others to what can be accomplished through printmaking and how it is done. Research funded by UMaine Top Scholar Award Research Fund.

Abstract ID :
UMSS19360

Inpatient Psychiatric Services in Rural Hospitals of the United States and Canada and Mental Health Outcomes between Regions: A Case Study of Maine and New Brunswick

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 109

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Dominic Gayton [1] *
Undergraduate

Author Name : Angela Daley [2]

Abstract Description : One of the most important points of contact for mental health patients is their nearest hospital, which is especially true in rural regions where outpatient mental health services may be lacking. In the United States, policies are in place which limit the ability of small, rural hospitals to provide inpatient psychiatric services cost effectively, leading many hospitals to forgo offering the services at all. This project compares the situation in the United States with that of Canada—where similar policies are not present under their vastly different healthcare system—to see if inpatient psychiatric services are more or less prevalent in rural Canadian hospitals and whether this potential difference may lead to different mental health outcomes. To study this relationship, Maine and New Brunswick are used as case studies due to their close comparability. This project focuses on a list of comparable rural hospitals between Maine and New Brunswick and on mental health outcomes in these hospitals' surrounding regions. Data on comparable mental health indicators between Maine and New Brunswick are used to explain the potential effect of the presence or absence of inpatient mental health services in that region's small, rural hospitals. The results of this project may have implications for policy makers and healthcare administrators looking to change policies around the provision of rural inpatient psychiatric services, in addition to providing a base for future research on this topic. I would like to acknowledge the guidance of my co-advisors on this project, Dr. Angela Daley and Dr. Todd Gabe, in addition to the support and feedback of my Honors Thesis Committee Members Dr. Kathleen Bell, Sharon Tisher, and Dr. Stefano Tijerina.

Abstract ID :
UMSS1992

Interpersonal and Achievement-Related Stress Moderate the Risk for Suicidality in First-Year College Students

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 123

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Melissa Jankowski [1] *
Graduate

Author Name : Cynthia Erdley [2]

Abstract Description : Suicide rates among young adults have tripled in the last fifty years, and suicide is the second leading cause of death among college students. These youth are often attending school far from both home and friends. They may be living with strangers, far from support systems, and working under intense pressure. Although such stressors are known to be salient risk factors for suicide, it is not understood which of these life events may place first year college students at increased risk. Further, it is not known if those who have previously had thoughts of suicide are especially susceptible to these stressors. The present study seeks to examine the relationship between past year suicidal ideation, life stressors, and current suicidal ideation in college students. A total of 150 participants are being recruited and will complete self-report measures of suicide risk and negative life events. Preliminary data indicate that only achievement- and friendship-related life stressors in the past month were related to current thoughts of suicide. School, job, family, roommate, and partner stressors were not significantly associated with suicidal thoughts. Additionally, analyses showed that achievement- and friendship-related stress explained the transition from past year thoughts of suicide to thoughts of suicide in the past month. As suicide ideation has been found to be an important precursor to later attempted and completed suicide, it is important to understand the types of stress which may place college students at increased risk.

Abstract ID :
UMSS1925

Interventions Supporting Social Communication Skills in Preschool-Aged Children with Autism Spectrum Disorder

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 411

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Paige Hanson [1] *
Undergraduate

Author Name : Paige Castonguay [2]

Author Name : Heather Lowry [3]

Author Name : Taylor Dupont [4]

Author Name : Paige Lane [5]

Abstract Description : Interventions Supporting Social Communication Skills in Preschool-Aged Children with Autism Spectrum Disorder The purpose of this research paper is to analyze pre existing interventions used to improve social communications skills in preschoolers with autism spectrum disorder. Specifically examined are joint attention, peer interactions, and nonverbal social cues. These topics were chosen due to the high prevalence in delays displayed by this population. One of the most effective methods of interventions for joint attention included adult-guided play, as well as play involving circumscribed interests. For improving peer interactions, much of the research supports peer-mediated interventions and the use of augmentative and alternative communication (AAC), with and without speech generating devices. The best results were found for the Prelinguistic Milieu Teaching Intervention and Reciprocal Imitation Training for teaching nonverbal social skills to preschoolers. Collectively, preschoolers with autism spectrum disorder are found to improve in these three skills with interventions that include help from peers and/or technology.

Abstract ID :
UMSS19287

Invading Maine: Spatiotemporal trends of invasive plants and their non-native relatives

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 351
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Kelcie Brown [1] *
Undergraduate

Author Name : Seanna Annis [2]

Abstract Description : Invasive plants are changing the Maine landscape. They often out-compete and harm native plants, including rare plants. Maine is lucky in that the spread of invasive plants has, to date, not been as aggressive as in many other states. Now, more than ever, it is important to understand the spread of invasive plants so that they may be managed before they take root in our native landscapes. Why do some non-native plants become invasive, but other closely related non-native species do not? I used dried plant specimen records from the University of Maine Herbarium to explore spatiotemporal trends, tracking the initial introduction and spread of a selection of the most aggressive terrestrial invasive plants in Maine as well as their non-native, not-currently-invasive relatives. Maps were then generated using collection location data to visualize the extent of invasion over time. Data was collected on flowering time, fruiting time, and leaf dimensions in order to determine what may have allowed the invasive species in each pairing to be more successful than its non-native, not-currently-invasive counterpart. This research creates a basis for what may indicate a non-native species as having the potential to become invasive, which is important for monitoring and planning for future management of invasive plants.

Abstract ID :
UMSS1995

Investigating changes to Greenland’s peripheral marine glaciers through automated analysis of satellite imagery

Abstract Topic : Natural Sciences

Submission Type : Oral
Submission# : 356 **Judge Time Slot :** AM1 (9:30 - 10:30)
Graduate

Author Name : Julia Liu [1] *
Graduate

Author Name : Andre Khalil [2]

Author Name : Ellyn Enderlin [3]

Abstract Description : Melt water from Greenland’s glaciers, ice caps, and ice sheet contributes to nearly half of contemporary global sea level rise [1], which impacts coastal human settlements, marine ecosystems, and atmospheric and oceanic circulation patterns. While changes to the Greenland Ice Sheet and its major outlet glaciers have been extensively studied, changes to the marine-terminating glaciers on Greenland’s periphery are still poorly understood. While these peripheral glaciers and ice caps represent a small fraction of Greenland’s area, they contribute up to 20% to Greenland’s total glacier mass loss [1]. We will examine the behavior of 641 peripheral glaciers by quantifying terminus position changes over the last 20+ years through analysis of satellite imagery. We have adapted a program used to delineate chromosome territories in fluorescence microscopy images using the multi-scale 2D Wavelet Transform Modulus Maxima (WTMM) segmentation method [2] to automatically map glacier termini. To find potential termini, the 2D WTMM objectively identifies regions in satellite images with the greatest change in intensity at various size scales. Its multi-scale analysis adapts to map glacier termini with variable geometries and environmental conditions (i.e. sea ice conditions), leading to more accurate mapping than possible from manual mapping techniques. Here we present results from a representative sample of 11 glaciers and compare the accuracy of these automated delineations to manual delineations. Once we expand this analysis to all 641 glaciers, we will analyze the regional and temporal variations in glacier terminus changes and the environmental variables that drive them.

Abstract ID :
UMSS1987

Investigating the Antiviral Effects of Lobster Hemocyanin on JC Polyomavirus Infection

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 830

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Sarah Nichols [1] *
Undergraduate

Author Name : Jeanne DuShane [2]
Graduate

Author Name : Robert Bayer [3]

Author Name : Melissa Maginnis [4]

Abstract Description : Investigating the Antiviral Effects of Lobster Hemocyanin on JC Polyomavirus Infection Sarah Nichols1, Jeanne K Dushane1,2, Robert Bayer2, Melissa Maginnis1 1Molecular and Biomedical Sciences, The University of Maine1 2The Lobster Institute, The University of Maine2 JC polyomavirus (JCPyV) infects the majority of the human population. Contraction of JCPyV occurs through the peroral route, and the virus persists in the kidneys of healthy individuals without symptoms. In persons with severe immunosuppression, JCPyV can spread from the kidneys to the central nervous system (CNS) where it causes the fatal demyelinating disease progressive multifocal leukoencephalopathy (PML), for which there are no effective treatments. Hemocyanins are biological macromolecules that act as oxygen-transporting proteins in arthropods and mollusks, that promote host defense against bacterial, fungal and viral infections. Hemocyanin derived from Homarus americanus, or the American lobster, has been demonstrated to exhibit antiviral properties against a number of viruses including herpes simplex virus (HSV-1). The objective of the proposed research is to determine whether the effects of hemocyanin can inhibit JCPyV infection. We are currently investigating the role of hemocyanin on JCPyV infectivity in a cell culture model, and preliminary data suggests that hemocyanin exhibits antiviral effects on JCPyV infection during times consistent with viral attachment and entry. Addition of JCPyV to host cells after viral attachment and entry has no impact on infection, supporting this hypothesis. Understanding the effect of hemocyanin on JCPyV would fill a critical gap in knowledge that would help to advance the field and provide important insights for future development of a potential antiviral therapy.

Abstract ID :
UMSS19337

Investigating the Relationship Between Southern Ocean Temperature and Velocity Variability and Iceberg Melting Around Antarctica

Abstract Topic : Physical Sciences

Submission Type : Exhibit

Submission# : 902

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Emily Miller [1] *
Undergraduate

Author Name : Mariama Dryak [2]

Author Name : Thomas Andrew [3]

Author Name : Ellyn Enderlin [4]

Abstract Description : The discharge of icebergs into the ocean exerts a direct control on the mass of glaciers and ice sheets, sea level, and ocean thermohaline properties in polar regions. Iceberg discharge from Antarctica accounts for over half of the freshwater flux into the Southern Ocean and is on the rise - iceberg discharge has increased significantly from the Western Antarctic Ice Sheet and the Antarctic Peninsula over the last two decades. In situ hydrographic observations acquired in close proximity to West Antarctic glaciers indicate that changing ocean conditions have driven the increase in iceberg discharge. However, these data are limited in space and time, preventing detailed analysis of changing ice-ocean interactions around Antarctica. Here we explore the use of satellite remotely-sensed estimates of iceberg melt rates as a means to infer changes in ocean conditions at the marine margins of Antarctica's glaciers and ice sheets. We quantify iceberg melt volumes and rates at ~14 sites around Antarctica using high-resolution WorldView satellite images acquired from 2011-2018. These data are then compared to monthly to annual temperature and velocity estimates from the Southern State Ocean Estimate (SOSE) model output. Our iceberg melt rates show a consistent spatial pattern with known ocean conditions around the Antarctic Ice Sheet. Because of the coarse resolution of the SOSE model, it fails to capture realistic near-shore bathymetry, potentially leading to large errors in the model outputs.

Abstract ID :
UMSS1960

Is There a Demand for Aquaculture Insurance? An Analysis of New England's Oyster Market

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 122
Graduate

Judge Time Slot : PM2 (2:30 - 3:30)

Author Name : Avery Cole [1] *
Graduate

Author Name : Nicholas Alvarez [2]

Author Name : Xuan Chen [3]

Abstract Description : Aquaculture growers in New England have identified a number of critical impediments to future development of the industry (LaPointe 2013). First and foremost, they identify the risks associated with aquatic crop loss as a burden on existing businesses but also as a significant barrier to market entry. One risk mitigation strategy that should be considered is a crop insurance program. In this paper, we consider the plausibility of an actuarially-sound, regional crop insurance program by examining the willingness-to-pay (WTP) across oyster growers in New England. We consider data collected in 2017 survey of aquaculture growers in New England. Using a conjoint analysis, we estimate a WTP for an insurance program that would cover one or several risk factors. Respondents were asked as part of a recursive process to indicate preferences for insurance plans that could cover either storms, disease, both, neither, or all production risks in the event of catastrophic losses. We utilize a generalized multinomial logit model to analyze our survey results. Results suggest that for both storm and disease insurance, grower WTP is approximately four percent of their annual revenue. There is an additional WTP of two percent of annual revenue to cover all other production risks. Preliminary calculations assessing WTP versus the costs of implementing a program indicate that a regional insurance program could operate on an actuarially sound basis. Finally, this paper also seeks to better understand what types of characteristics encourage growers to see themselves as the most risk averse.

Abstract ID :
UMSS1979

Isolation and Annotation of Gordonia Phage Trax

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 836 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Andrew Fournier [1] *
Undergraduate

Author Name : Ryan Worthington [2]

Author Name : Samuel Deelsnyder [3]

Author Name : Kyle Murawski [4]

Author Name : Sarah Low [5]

Author Name : Angela Burke [6]

Author Name : Melody Neely [7]

Abstract Description : Bacteriophage are viruses that infect bacteria. There are approximately 1031 bacteriophage in the world. Of the 5633 sequenced bacteriophage genomes, 1763 are from Mycobacteriophage and only 142 are from Gordonia phage. In order to better understand phage genomics and life cycle characteristics, we can explore the vast diversity of bacteriophage found in the environment. The research reported here presents the analysis of Gordonia phage Trax, a lysogenic Siphoviridae belonging to the DU cluster. Following genome sequencing, it was determined that Trax has 75943 base pairs, 125 genes, 9 tRNAs, and 13 orphams. Compared to the majority of Gordonia bacteria having a GC content of approximately 68%, Trax stands out with a much lower GC percentage of 58.7%. Interestingly, Trax was found to share 95% of its genome with cluster DU Gordonia phage Neville, and was immune to Neville superinfection. This suggests that Trax and Neville are closely related although Trax has many unique sequences. Another notable feature is that the integrase is located on the left arm of the gene, while the integrase is normally located in the middle of a bacteriophage's genome. Understanding Trax's genome is critical in understanding exactly how the phage infects host cells and carries out its life cycle. Further research will be conducted in order to get a better understanding of Trax and cluster DU phage as a whole.

Abstract ID :
UMSS1972

Isolation and Characterization of Novel Bacteriophage SleepyHead

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 817

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Ryan Andrick [1] *
Undergraduate

Author Name : Marissa Kinney [2]
Undergraduate

Author Name : Trevor Dugal [3]
Undergraduate

Author Name : Dylan Taplin [4]

Abstract Description : Bacteriophage (phage) are viruses that infect bacteria. There are an estimated 1031phage particles in the biosphere, making them the most abundant biological entity. Research has led to advances in the understanding of their impact on antibiotic resistant bacterial strains, as biocontrol agents in respect to agriculture, and in the creation of vaccines. Phage SleepyHead was isolated using Rhodococcus erythropolis. Electron microscopy showed Sleepyhead was part of the Siphoviridae family, with a a 350-nm tail and 50-nm icosahedral head. Through lysogen isolation, SleepyHead was determined to be a temperate phage with 17.7% lysogeny efficiency. Genomic DNA was isolated from SleepyHead and sequenced. The SleepyHead genome is 43,943 base pairs in length, has 61% GC content, and encodes 67 putative genes, including 37 orphams, genes unrelated to any other sequence in the database. SleepyHead was clustered as a Singleton because 55% of genes are novel. Future research includes analysis of the integrase cassette to better characterize how lysogeny is established and maintained. Further characterization of genes with unique functions expressed during lysogeny would help us to better understand how SleepyHead could impact host fitness. In addition, future tests to determine a potentially larger host range which could be important for medical treatments, or other industrial applications.

Abstract ID :
UMSS19148

JC polyomavirus entry: a novel role for beta-arrestin

Abstract Topic : Biomedical Sciences

Submission Type : Oral
Submission# : 858 **Judge Time Slot :** AM2 (11:00 - 12:00)
Graduate

Author Name : Colleen Mayberry [1] *
Graduate

Author Name : Ashley Soucy [2]

Author Name : Conner Lajoie [3]

Author Name : Jeanne DuShane [4]
Graduate

Author Name : Melissa Maginnis [5]

Abstract Description : JC polyomavirus (JCPyV) establishes a lifelong, asymptomatic, infection in the kidney of healthy individuals. However, under conditions of severe immunosuppression, JCPyV may reactivate within the brain and cause progressive multifocal leukoencephalopathy (PML), a fatal neurodegenerative disease. Currently, there is a lack of effective therapies to treat PML. However, current efforts in developing new treatments is focused on preventing the onset and spread of JCPyV infection by targeting attachment to and entry of the virus into host cells. Initiation of JCPyV infection begins with binding to the host cell through interactions with alpha-2,6 sialic acid containing lactoseries tetrasaccharide c (LSTc). Following attachment to the cell, viral internalization is mediated by 5-hydroxytryptamine (5-HT)2 serotonin receptors. However, this entry process, and the cellular factors that mediate viral internalization, are poorly understood. Using biochemical and molecular biology approaches our findings demonstrate that JCPyV usurps clathrin-mediated endocytosis for internalization, specifically hijacking the cellular proteins clathrin, beta-arrestin, AP2, and dynamin in this process. Furthermore, we have characterized a beta-arrestin binding motif within 5-HT2Rs that is critical for internalization, facilitating viral infection. Together, these data increase our understanding of JCPyV internalization strategies that result in viral infection. Thus, these findings can serve as the basis for the future development of new therapies to treat or prevent the development of PML, through the hindrance of viral attachment and entry.

Abstract ID :
UMSS19141

JCPyV-induced activation of the MAPK cascade is required for viral transcription

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 856

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Jeanne DuShane [1] *

Graduate

Author Name : Kashif Mehmood [2]

Graduate

Author Name : Michael Wilczek [3]

Graduate

Author Name : Melissa Maginnis [4]

Abstract Description : JC polyomavirus (JCPyV) infects the majority of the human population and presents as an asymptomatic lifelong infection in the kidney. In individuals who are immunocompromised, JCPyV can spread to the central nervous system and result in the incurable and fatal demyelinating disease, progressive multifocal leukoencephalopathy (PML). Through biochemical analysis of JCPyV-induced signaling pathways, our work has demonstrated that JCPyV infection induces the mitogen-activated protein kinase (MAPK) cascade in order to hijack host-cell transcription machinery. In particular, JCPyV infection requires the presence of the core MAPK proteins including Raf, MEK, and the extracellular signal-regulated kinase (ERK). Through siRNA transfection assays, we have determined that JCPyV infection requires these core proteins to promote successful infection. Using confocal microscopy, we have elucidated that upon JCPyV-induced MAPK activation, ERK translocates into the nucleus in order to promote viral gene transcription through the recruitment and activation of host-cell transcription factors such as cMyc. These findings demonstrate how JCPyV activation of the MAPK signaling cascade drives infection enhancing our understanding of JCPyV pathogenesis.

Abstract ID :
UMSS19157

Kinetics of Phenol Hydrodeoxygenation over Ru/TiO2 Catalysts in a Flow Reactor

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral

Submission# : 261
Graduate

Judge Time Slot : PM2 (2:30-3:30)

Author Name : Daniela Stuck [1] *
Graduate

Author Name : Thomas Schwartz [2]

Abstract Description : Converting biomass to alternative fuels has attracted significant interest in recent decades. Lignin, a principal component of biomass, is composed of phenolic monomers, which can be depolymerized using fast pyrolysis to yield a "bio-oil". However, bio-oil is not immediately suitable as a biofuel because of its high oxygen content, and it is necessary to efficiently remove these oxygen atoms using hydrogen, where the last hydroxyl group is especially difficult to remove selectively. Therefore, we have studied the hydrodeoxygenation of phenol as a model compound. The optimal pathway is direct deoxygenation (DDO), but at relevant temperatures, C-C double bond saturation is a significant side reaction, following the hydrogenation pathway (HYD). Previous research in our group has shown that Ru/TiO2 can achieve high selectivity for direct deoxygenation, due to active sites present at the support-metal interface. [1] In the DDO pathway, water suppresses vacancy formation in TiO2, helps in the phenol and H2 adsorption and also facilitates the C-O bond cleavage. [2] Here, we evaluated different operational parameters of a high pressure flow reactor, to achieve the reaction happening in a kinetically-controlled regime. The following step is evaluate the kinetic performance of the catalyst: effect of water, temperature and crystal structure of the TiO2 support will be evaluated.

Abstract ID :
UMSS19369

KLEAR Packaging- Think Outside The Box

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 708

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Haley Campbell [1] *
Undergraduate

Author Name : Jon Ippolito [2]

Abstract Description : Packaging acts as a gateway to a product. I'm sure everyone reading this has seen packaging with too much going on, with so much squeezed on the package that it's hard to even understand. We add more text, colors, and logos covering every square inch of a package. This can overwhelm and confuse any shopper. When people look at packaging they respond to how it makes them feel in that moment. With the right stimuli (not busy text-filled print) but interactive, purposeful design, the consumer's perception of a product changes. The aim of my project is to turn minimal passive print into a visually stimulating experience using augmented reality. My packaging concept is simple and mysterious, essentially being just a small black box. Apart from the logo on front side, the 3 other sides have different basic designs each corresponding to a possible product inside. Using augmented reality via a cellphone, he or she can get a 3D view of each possible product inside the packaging. This visual approach not only stands out on the shelf, but also calls the someone to interact, furthering the bond between company and consumer.

Abstract ID :
UMSS19289

Laboratory investigation of soil carbonation: comparison of soil treated with lime and Ground Granulated Blastfurnace Slag (GGBS)

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 234
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : SK Belal Hossen [1] *
Graduate

Author Name : Warda Ashraf [2]

Author Name : Aaron Gallant [3]

Abstract Description : Carbonation shows promise as a ground improvement alternative to stabilize subgrade materials. This process requires introduction of carbon dioxide (CO2) gas that reacts with alkali minerals, naturally occurring and/or added to the soil, in the presence of moisture, and form stable carbonate minerals. These carbonated minerals act as binding agent which increases the strength and stiffness of subgrade materials. The goal of the study is to provide a fundamental understanding on how the addition of different alkaline minerals and the duration of carbonation affect the performance of subgrade materials. Ground Granulated Blastfurnace Slag (GGBS) or lime (Ca(OH)2) was thoroughly mixed with soil as alkali source before carbonation. GGBS and lime were both used to investigate differences in the efficacy of these alkali sources. Carbonating soils with GGBS and CO2 gas, both of which are industrial waste, would offer an alternative method to utilize these by-products while also decreasing their environmental footprint. Compacted specimens were prepared by mixing GGBS or lime for three different soil types, including clean sand and sands with 20 and 50 percent nonplastic silt, with 15% (weight basis) water content before introducing CO2 gas in a carbonation chamber at 1 atm. A series of experiments were performed to characterize the carbonation behaviour of soil including unconfined compressive strength (UCS) tests (after 3 and 24 hours of carbonation), X-ray diffraction (XRD), and thermogravimetric analysis (TGA). Based on preliminary results, GGBS increased the UCS for all soil types, and UCS increased with mineral content and carbonation time. Thermogravimetric analysis (TGA) revealed around 2~ 5% by weight carbonated mineral formation due to carbonation. These carbonated minerals were found to be in the form of calcite and vaterite (polymorphs of calcium carbonate) based on the XRD patterns.

Abstract ID :
UMSS19405

Linear and nonlinear responses to Nor'easters coupled with Sea Level Rise: A tale of two bays

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 302

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Stephen Moore [1] *
Graduate

Author Name : Huijie Xue [2]

Abstract Description : The influence of Sea Level Rise (SLR) on coastal storm responses is highly complex and not well understood. This study aimed to dissect the influence of SLR on storm responses in two bays in the Gulf of Maine through high-resolution three-dimensional hydrodynamic modeling. This approach was chosen as it provided unique insight into how different coastal structures may react to SLR and allowed us to analyze these behaviors on scales much finer than what had previously been possible. Saco Bay, an open bay characterized by shallow coastal slopes, provided a contrast to the sheltered, steep coastline of Casco Bay. The Finite-Volume Coastal Ocean Model (FVCOM) was implemented for the Saco and Casco bays to simulate the February 1978 Nor'easter and an April freshwater discharge event in 2007 following the Patriot's Day Storm. Both of these events were simulated under SLR scenarios ranging from 0 to 7 ft. Modeled storm responses were first identified from the 1978 blizzard simulations and were tracked across SLR scenarios. We then analyzed how the shape of the bays changed in a highly dynamic manner over small spatial scales in response to SLR, and how, consequently, these structural changes drastically altered how five chosen estuaries reacted to storm conditions. This activity is supported by National Science Foundation award #IIA-1355457 to Maine EPSCoR at the University of Maine.

Abstract ID :
UMSS19166

Linking Predictive Toxicology and Mitochondrial Bioenergetics

Abstract Topic : Natural Sciences

Submission Type : Oral
Submission# : 372
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Madeline Dorr [1] *
Undergraduate

Author Name : Zheng Wei [2]

Author Name : Remy Babich [3]

Author Name : Bradlyn McEttrick [4]
Undergraduate

Author Name : Nishad Jayasundara [5]

Abstract Description : Evaluating and predicting human health and ecosystem level impacts of rapid environmental change due to anthropogenic pollution and climate change remain a complex challenge. In this research, we integrated biological sciences with big-data statistical approaches to develop a statistical tool for predictively computing the capacity of an organism to maintain energy homeostasis with exposure to environmental stressors (e.g., chemical pollutants, including pharmaceuticals, and other stressors that are predicted to occur due to climate change). Organismal metabolism and mitochondria (the energy powerhouse of the cell) are common targets of abiotic stressors. When exposed to a stressor, organismal capacity to maintain energy production, i.e. metabolic plasticity (MP), is critical in maintaining its fitness and survival. Thus, MP can serve as a key metric in evaluating and predicting response to environmental stressors. We have developed code in R studio to examine and predictively model this phenomena based on a mitochondrial toxicity dataset focusing on ~20 different anthropogenic chemicals. Our approach includes automated code to clean the data and running a series of statistical tests. Four parsimonious nested growth models that account for both within-person and between-person changes over time were calculated for each stressor. Analysis of Covariance models were calculated in order to compare how different dose levels of a stressor affect the MP. These tests also allow for observing differences caused by the stressors in both initial MP levels and differences over time. Both sets of tests are important in order to fully account for biphasic dose response.

Abstract ID :
UMSS19334

Low-Dose Arsenic Exposure Further Impairs Innate Immune System Function in CFTR Morphant Zebrafis

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 801

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Brandy-Lee Soos [1] *
Graduate

Author Name : Liz Saavedra [2]

Author Name : Carol Kim [3]

Author Name : Benjamin King [4]

Abstract Description : Cystic Fibrosis (CF) is a genetic disorder that currently affects 70,000 people worldwide. Affected patients have mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene that render the protein incapable of shuttling chloride ions across cell membranes. Persistent lung infections are common in CF patients and Pseudomonas aeruginosa (PA14) is the most prevalent infection. In Maine, it is estimated that more than 100,000 people are exposed to arsenic in drinking water from private wells at levels higher than 10 ppb. The zebrafish (Danio rerio) is an established model system to study the innate immune system response to PA14 infection. Both cftr morpholino knockdown and low-dose (2 ppb and 10 ppb) arsenic exposure has been shown to inhibit the immune response to PA14 infection in zebrafish. We hypothesize that the combination of cftr knockdown and low-dose arsenic exposure will result in even greater inhibition of the innate immune response to PA14 infection than to either factor alone. Our preliminary studies show that the survival of cftr morphants exposed to 2 or 10 ppb arsenic and infected with PA14 at 2 days post fertilization was reduced as compared to control morphants. Our preliminary studies also show an increase in bacterial burden cftr morphants exposed to 2 or 10 ppb arsenic and infected with PA14 over control morphants. These studies combined with gene expression studies will provide new insight into the mechanisms of innate immune responses and inform the development of new therapies for CF patients.

Abstract ID :
UMSS19380

Maine Agriculture Apps

Abstract Topic : Interdisciplinary

Submission Type : Exhibit
Submission# : 608 **Judge Time Slot :** PM1 (1:00 -2:00)
Undergraduate

Author Name : Jack Lampinen [1] *
Undergraduate

Author Name : Joline Blais [2]

Abstract Description : Maine Agriculture Apps (MagApps) research and development project is building a mobile app to aggregate sensor network data for Maine farmers operating food and horticulture operations in season extension and year round greenhouses. The app provides real time and historical data visualization for sensors and IoT devices that are becoming increasingly common and cost effective for small farmers in Maine and around the world. Primary goals of the tool are: integrating metrics for data driven decisions based on highly detailed environmental analysis for small farmers using IoT devices improving the visualization and accessibility for environmental and biological data in production and utility costs for small farmers prioritizing mobile tools for small diversified family farmers who operate intensive operations on modest budgets For our research, a series of sensor arrays designed for small farmers were installed in multiple greenhouses across Maine. These devices submit data to a database which was used to create the app. React Native was the framework used to develop both an iOS and Android version of the app simultaneously. Information collected from the sensors is used to populate a display of historical and real-time data visualizations. Special care is being taken not to replace farming tasks with AI or AR systems but rather combine useful environmental analysis with farmers traditional perennial wisdom of observation to create biological feedback tools that improve a small farms work flow and the value of labor, while also providing earlier detection of potential issues that would otherwise damage crops and reduce yields.

Abstract ID :
UMSS19101

Maine Beekeeping & Adapting to the Effects of Climate Change: Areas for Potential Future Research

Abstract Topic : Interdisciplinary

Submission Type : Poster

Submission# : 617

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Hunter Merchant [1] *
Undergraduate

Author Name : Kathleen Tims [2]

Author Name : Anthony Zenga [3]

Author Name : Sara Velardi [4]

Abstract Description : Bees are a major pollinator that play a crucial role in plant reproduction. As an interest in beekeeping is on the rise in Maine, it is important for people to stay informed on the economic, ecological, and cultural impacts that these organisms have on us and our way of life. The issue of climate change has been discussed increasingly over the past several years, primarily regarding the negative impacts it has on the environment. The implications of climate change are not only a problem for our global population, but have momentous effects on bees and beekeepers in Maine. Drawing from material and experiences in an Honors Tutorial: Reflections on Cultural Aspects of Maine Agriculture, this poster will address some of the current challenges Maine beekeepers are experiencing that could be amplified with the onset of climate change. These challenges include: (1) overwintering hives, (2) pesticides, (3) and economic hardships with owning and maintaining honeybee colonies in Maine. This poster will provide a current synopsis of the beekeeping industry related these three areas in Maine with potential research questions and recommended methods for future research. This type of information could benefit the beekeeping industry, the public, and university researchers to identify the diverse and important areas for future research to help address these problems tied to climate change and its effects on beekeeping in Maine. Our poster's collective goal is to help improve success in Maine beekeeping and in maintaining an interested and informed public on the implications of climate change.

Abstract ID :
UMSS19298

Maine’s Forestry and Logging Industry: Forecasting with a Vector Error Correction Model

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 105

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Jonathan Gendron [1] *
Graduate

Author Name : Andrew Crawley [2]

Abstract Description : The forestry and logging industry is a crucial aspect of Maine’s economy. From 2000 to 2017, 10 out of the total 16 processing mills across the state have closed, which has had devasting effects across the state1. Our research utilizes key macroeconomic variables for Maine’s forestry and logging industry including industry employment in Maine, industry wages in Maine, number of Maine firms in the industry, output (measured as Maine’s real gross domestic product), prices for US lumber and wood products, and the impact of the Canadian to US exchange rate on Maine’s industry. We forecast these variables with a Vector Error Correction (VEC) model utilizing Johansen’s multivariate time series analysis. Although prior literature has utilized various stationary and cointegrated modeling techniques, our research utilized cointegrated modeling due to the “law of one price” which has proven that U.S. lumber market data is non-stationary2. We use monthly data from the Bureau of Economic Analysis, Bureaus of Labor Statistics, and Federal Reserve spanning from 2001Q1 to 2018Q1. Our model estimates provide Impulse Response Functions (IRFs) which were then utilized to perform macroeconomic forecasts up to 2024Q1. The resulting forecasts suggest that in 5 years output will slightly increase, employment will fall, prices will stay level, and the number of firms will decrease. The forecasting results imply that although the contribution of the industry will remain stable due to level prices and a slight increase in output, the local community will be worse off due to lowered employment and business. [References 1 & 2 available upon request]

Abstract ID :
UMSS19183

Making Maine's Food System Sustainable: Undergraduate Students from Multiple University of Maine Campuses Working Together as an Interdisciplinary Team

Abstract Topic : Interdisciplinary

Submission Type : Poster

Submission# : 619

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Hannah Nadeau [1] *
Undergraduate

Author Name : Skyler Horton [2]
Undergraduate

Author Name : Deborah Saber [3]

Abstract Description : Abstract This study highlights the benefits of approaching food waste management from an interdisciplinary perspective. As the leading type of waste in Maine, there have been many efforts to combat unused organics but many of these efforts have not produced substantial long-term improvements. Contributors in the group come together to create a multi-campus, multi-perspective solution for the issue of food waste within the state of Maine and potentially at larger scales. The group is composed of nine undergraduate students from three University of Maine campuses; the students are advised by a PhD student and faculty mentors. When looking at a large-scale problem with a single-disciplined group, there is a tendency to narrow the focus of study, causing important social, economic, and/or ecological factors to be forgotten. By having contributions from multiple disciplines, solutions can be presented that offer the most complete analysis of outcomes. Each case study allowed for the different parts of the circular food system to be examined in relation to Maine, this showed the similar issues created and how each affect a different part of the cycle. This expanded interdisciplinary team acts as a model for future groups interested in finding long term answers to problems that require complex understanding and analysis.

Abstract ID :
UMSS19314

Making science useful to decision-makers in the context of tidal power development

Abstract Topic : Interdisciplinary

Submission Type : Oral

Submission# : 622

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Gabriella Marafino [1] *
Graduate

Author Name : Gayle Zydlewski [2]

Author Name : Teresa Johnson [3]

Author Name : Jessica Jansujwicz [4]

Abstract Description : A major barrier to bridging the gap between scientific knowledge and decision-making is the lack of "usable" information. Data are often not presented in a form that fits the specific needs of diverse stakeholders, and it is challenging to integrate data from disparate sources and scales. In response, this research focuses on knowledge co-production and sharing to support decision-making for sustainable tidal power development in eastern Maine. A series of four stakeholder workshops are being organized to discuss existing information, knowledge gaps, and data integration strategies to generate a more complete understanding of the ecosystem at the proposed tidal power site. Key stakeholders are being engaged to tailor data integration and sharing in a way that fits the needs and capacities of decision-makers. The groups engaged in these workshops include state and federal regulators, the industry developer, and a tribal environmental department. Stakeholders involved in the first workshop identified that it would be useful to have a central repository for the ecosystem information, as well as to have the data represented spatially to serve as a decision-support tool. Subsequent workshops and interviews will be used to monitor how responsive the decision-support tool is to stakeholder concerns. Although marine renewable energy is relatively new, it is becoming increasingly important as an alternative to traditional fossil fuels. Applications of this case study could help improve decision-making in other locations seeking information about the feasibility of developing marine renewable energy.

Abstract ID :
UMSS19171

Mapping the Residence Time of River-Flushed Particles in the Jordan River Estuary in Maine

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral

Submission# : 255 **Judge Time Slot :** PM1 (1:00 -2:00)

Graduate

Author Name : Sohaib Alahmed [1] *
Graduate

Author Name : Lauren Ross [2]

Abstract Description : Estuarine ecosystems provide a crucial environment and habitat for many marine species. The behavior of these delicate systems is linked to many physical, chemical and biological processes that collectively dictate the water quality in the estuaries. A key element in characterizing the estuarine water quality is residence time. Residence time is defined as the required time for a water parcel or material element to leave the aquatic system from an initial location somewhere in that system. Quantifying residence times in estuarine systems is essential to understanding how materials (e.g. dissolved oxygen, contaminants, etc.) are transported within the estuary and exchanged with the adjacent coastal ocean. The goal of this work is to investigate the residence time of river-flushed particles in the Jordan River. The objective of this study is to quantify the time required for freshwater runoff particles brought from the river to be flushed out the estuary during freshwater runoff events. To pursue the objective of this study, the numerical model TELEMAC3D, a powerful integrated finite element model for fluid flow simulation, is used. The preliminarily results revealed that the Jordan River estuary exhibits a complex flow pattern involving many recirculating gyres due to the estuary geometry. The gyres were found to increase residence times due to particle entrapment and, as such, can potentially impact water quality. Reference [1] A. Valle-Levinson, Contemporary issues in estuarine physics. Cambridge University Press, 2010. [2] J. T. F. Zimmerman, “Mixing and flushing of tidal embayments in the western Dutch Wadden Sea part I: Distribution of salinity and calculation of mixing time scales,” Netherlands J. Sea Res., vol. 10, no. 2, pp. 149–191, 1976. [3] C. Moulinec et al., TELEMAC: An efficient hydrodynamics suite for massively parallel architectures, vol. 51, no. 1. Elsevier, 2011.

Abstract ID :
UMSS19140

Material Optimization of Maine-Produced Cross Laminated Timber

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 228
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Charlie Gardner [1] *
Graduate

Author Name : William Davids [2]

Abstract Description : Previous research conducted at the University of Maine investigated engineering properties of Cross Laminated Timber (CLT) made from Spruce-Pine-Fir (South) (SPFs), as well as hybrid laminated strand lumber (LSL) and SPFs panels [1]. The objective of this research was to study the effect of gaps between transverse layers of CLT on panel shear strength. While such gaps might cause stress risers and reduce the effective shear strength and stiffness, gaps can also serve as an attribute: if large enough, they can significantly reduce panel weight, be used as utility chases, or be filled with insulation to reduce sound transmission and/or improve thermal properties. In this study, 5-ply CLT panels were manufactured from SPFs No. 2 & Better lumber, as well as hybrid CLT panels using LSL in transverse layers and SPFs in longitudinal layers, both with transverse layer gaps of 0 (control), 6, 89 and 178 mm. Structural three-point bend testing was performed following procedures defined by ASTM D198 [2] on specimens cut from panels to assess panel strength. In addition, a digital imaging correlation system was used to assess local strain distributions in core layers near the gaps. One main finding was hybrid panels with 89 mm gaps demonstrated similar strength with control SPFs panels. Further, all panel types met shear strength values required by ANSI/APA PRG-320 [3], the performance standard for CLT. These results indicate that gaps can be introduced between transverse boards without compromising shear strength. Acknowledgements This project was supported through US Department of Agriculture, Agriculture Research Service Cooperative Agreement 58-0204-6-003. We are also grateful for the materials provided by Pleasant River Lumber, Louisiana-Pacific Corporation and Henkel Corporation.

Abstract ID :
UMSS1996

Mechanisms of Defective Neuromuscular Development in a Novel Zebrafish Model of GMPPB-Associated Dystroglycanopathy

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 865

Judge Time Slot : AM2 (11:00 - 12:00)

Undergraduate

Author Name : Lily Charpentier [1] *
Undergraduate

Author Name : Emily Robinson [2]
Undergraduate

Author Name : James Seuch [3]
Undergraduate

Author Name : Kodey Silknitter [4]
Undergraduate

Author Name : Grace Smith [5]
Undergraduate

Author Name : Erin Bailey [6]
Graduate

Author Name : Michelle Goody [7]

Author Name : Clarissa Henry [8]

Author Name : Benjamin King [9]

Abstract Description : Muscular Dystrophy (MD) affects ~250,000 individuals in the United States and is a debilitating group of diseases characterized by progressive skeletal muscle degeneration. Individuals with mutations in a gene required for dystroglycan glycosylation, GMPPB (GDP-mannose pyrophosphorylase B), clinically present with variable MD phenotypes and ages of onset ranging from birth to adulthood. In order to determine the underlying mechanisms for variable phenotypes in GMPPB-associated dystroglycanopathy, we studied gene expression in a novel zebrafish model where gmppb was mutated using CRISPR/Cas9 and compared to wild-type (normal) zebrafish. Embryonic gmppb-/- mutant zebrafish exhibit mild to severe neuromuscular phenotypes. We hypothesize that the severity of GMPPB dystroglycanopathies are due to differential expression of key regulatory genes and pathways involved in neuromuscular development. This interdisciplinary research collaborative aimed to better understand GMPPB dystroglycanopathies by integrating developmental biology, genomic, and computational approaches to identify dysregulated pathways in gmppb-/- mutants. RNA Sequencing was performed on gmppb mutants and corresponding wild-type controls at 4 days post fertilization (dpf) to identify differentially expressed genes, including mmp9 and mmp13 which have known roles in MD. Ongoing studies of coding and non-coding genes expressed at 4 and 7 dpf seek to characterize how gene regulatory networks differ in gmppb-/- mutants with either mild or severe neuromuscular development phenotypes. A better understanding of the pathways misregulated in GMPPB dystroglycanopathies is essential to identifying new targets for

therapeutic drugs. Acknowledgements: This project was funded by the Interdisciplinary Undergraduate Research Collaborative Program and the Maine INBRE Program (NIH P20GM103423).

Abstract ID :
UMSS19414

Mental Time Machine

Abstract Topic : Art

Submission Type : Exhibit
Submission# : 705 **Judge Time Slot :** AM2 (11:00 - 12:00)
Graduate

Author Name : Aylah Ireland [1] *
Graduate

Author Name : Susan Smith [2]

Abstract Description : I have a partially constructed time machine; this object represents the concept of mental time travel in a literal, yet playful sense. Mental time travel is a concept which I am pursuing in my work. Mental time travel is an internal, exclusively subjective experience that can be had by every human capable of remembering. In a state of deep recollection, a person can almost re-experience a memory. I, inspired by researchers in the field, compare this to time travel because the memory is in a point in time which is not the present. During the research for this topic I discovered an interesting fact that has compelled me to build this time machine: H.G. Wells' story The Time Machine was the first human narrative ever written that considered interactive travel through time. The aesthetic and inspiration for this project is largely inspired by my love for Wells' The Time Machine. This exhibit will showcase my art process, both conceptual and physical, while allowing an opportunity for conversation. I will be exhibiting my time-machine alongside field notes, and samples of other absurd sci-fi notions, as well as my plans for the future of the machine.

Abstract ID :
UMSS19102

MET and FitBit Correlation

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 148 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Taylor Williams [1] *
Undergraduate

Author Name : Taylor McMillan [2]

Author Name : Kaitlyn Nadeau [3]

Author Name : Fayeza Ahmed [4]

Abstract Description : There has been a recent boom of interest in the general public for monitoring physical activity [3]. It started with pedometers and has increased in complexity with measurement of heart rate, activity intensity, and calories burned [3]. However, the accuracy of these commercially available, advanced measures is debatable. Among researchers, a metabolic equivalent (MET) is a common calculated variable to quantify exercise intensity [1]. MET uses the resting metabolic rate as a multiple for energy cost of physical activities and is equal to 3.5 mL oxygen per body weight (kg) multiplied by minutes [2]. In the current study, we aimed to examine the accuracy of data from the Fitbit Alta, a common wearable device for activity monitoring, with the standard MET measurement. Undergraduate students at the University of Maine reported their weekly exercise regimens and wore the Fitbit Alta for one week. Our variables include weekly MET for physical activity and the Fitbit calculations of active calories burned and total active minutes. We are also examining the strength of relationship between the Fitbit's recording of total steps and MET values. Data analysis is in progress, as we are continuing to collect data. Acknowledgements: This project is part of a larger study in the faculty mentor's lab.

Abstract ID :
UMSS19361

Microscopia: A Museum of Organisms Created with SEM Photogrammetry

Abstract Topic : Interdisciplinary

Submission Type : Exhibit

Submission# : 607

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Ian Donnelly [1] *
Undergraduate

Author Name : Sofian Audry [2]

Abstract Description : For many, insects and other minute organisms are regarded with disgust, disinterest, and labeled as “pests.” Often they are either in the way or out of sight. There is, however, more than meets the eye. These organisms not only play a monumental role in the world’s ecosystems, but they also have astounding physiological complexities that humans can’t quite see without the aid of a microscope. The scanning electron microscope (SEM) offers a highly detailed view, the ability to see specimens from all angles, and a glimpse into the intricacies of creatures that walk amongst us every day. Unfortunately, this technology is expensive to use and is rarely experienced by the public. Microscopia is an attempt to emulate the eye-opening experience of seeing organisms through an SEM and take it one step further—allowing users to seemingly shrink down to their size. By capturing SEM images of specimens in various rotational series and processing them through photogrammetry software, 3D models are generated. The models are displayed in two contexts, both built with Unity game engine. The first is a virtual reality experience that incorporates narration, sound, and a simulated shrinking of the user. The second is an augmented reality mobile companion app that allows users to effectively bring the museum with them.

Abstract ID :
UMSS19154

Mitigating environmental mastitis microbes with the novel use of paper mill byproducts

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 322

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Angela Leon Tinoco [1]
Graduate

Author Name : KwangCheol Casey Jeong [2]

Author Name : Dave Marcinkowski [3]

Author Name : Ann Bryant [4]

Author Name : Anne Lichtenwalner [5]

Author Name : Hannah Dubuc [6]

Author Name : Ma Zhengxin [7]

Author Name : Santiago Rivera [8]

Author Name : Diana Reyes Gomez [9] *
Graduate

Author Name : Juan Romero [10]

Abstract Description : To identify potential bedding conditioners for prevention of mastitis in dairy cattle, we determined the minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC) of a set of technical lignins. A broth macrodilution assay using Mueller Hinton media modified to pH 6 was used to evaluate antimicrobial activity against Streptococcus uberis, Staphylococcus hyicus, Escherichia coli, Klebsiella pneumoniae, and Pseudomonas aeruginosa isolated from mastitic and metritic cows. Technical lignin treatments (TRT) evaluated were: 1) alkali Kraft lignin (AKL), 2) sodium lignosulfonate (NaL), 3) magnesium lignosulfonate (MgL), and 4) washed Kraft lignin (WKL). The MIC and MBC assays were carried out in duplicate in each of three runs. In this study, gram positive bacteria were more susceptible to the antimicrobial activity of NaL compared to gram negative bacteria, with E. coli being the most resistant (Table 1). AKL was the most effective lignin against K. pneumoniae,but its activity against all the other bacteria was limited compared to NaL. Except for K. pneumoniae, MgL required a much higher concentration to kill bacteria relative to the dose that inhibits growth. In the case of NaL, this large difference was observed only against K. pneumoniae. Overall, NaL had the broadest antimicrobial spectrum against the bacteria tested and has potential to be a novel bedding conditioner that can help to control environmental mastitis pathogens in stalls.

Abstract ID :
UMSS19131

Modeling optimal thermal habitats of major aquaculture species in Casco Bay, ME

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 321 **Judge Time Slot :** PM2 (2:30 - 3:30)

Graduate

Author Name : Andrew Goode [1] *
Graduate

Author Name : Damian Brady [2]

Abstract Description : Sustainable, domestic seafood sourcing has become a major contribution to Maine's economy, $24 million annually. Aquaculture siting dictates which species that can be grown, and how effective that species will grow. In a changing and variable climate, it is an ever-growing concern as to where aquaculture will be the most resilient and profitable. Identifying regions most resilient to change will inform and help shape the future of aquaculture in Maine. A fine-scale FVCOM hydrodynamic model was developed and employed to identify the temperature structure of Casco Bay, ME. Model-derived temperature data were used to identify the size and seasonal duration of optimal growth conditions for three aquaculture species; the eastern oyster (Crassostrea virginica), Atlantic deep-sea scallop (Placopecten magellanicus), and sugar kelp (Saccharina latissima). Gulf of Maine warming rates (0.37 °C decade-1) were applied to model-derived temperatures to characterize potential change in the size and seasonal duration of optimal growth conditions over the next 50 years. Using 2014 modeled conditions, we identified the regions within Casco Bay that are most thermally suitable for aquaculture of the three investigated species. Optimal growing season length was 275, 135, and 40 days for sugar kelp, deep-sea scallop, and eastern oyster, respectively. We found that warming over the next 50 years results in substantial, and non-uniform, change in growing season length. We found that the most resilient species to ocean warming in this region is the eastern oyster, which throughout Casco Bay had about a 50-day lengthening in growing season. Both sugar kelp and the deep-sea scallop had a near 30 day decline in growing season length in most of the Bay, but experienced a few nearshore regions where growing season lengthened.

Abstract ID :
UMSS19332

Modeling Wave Attenuation by Kelp Farms

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 201
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Longhuan Zhu [1] *
Graduate

Author Name : David Fredriksson [2]

Author Name : Kimberly Huguenard [3]

Abstract Description : Conventional engineering structures are often used to protect the coastal communities from natural hazards including waves, storms and surges. Due to the high cost of the engineering structures as well as the impacts on environment and ecosystems, there is a growing need for innovative and sustainable ways to protect coastal environments. In this work, the capacity of kelp farms to damp wave energy has been investigated. A theoretical solution for the wave attenuation was obtained by simplifying the kelp farms as a group of longlines with equivalent rigid flat plates. The equivalent rigid flat plates are shorter rigid flat plates than the original flexible kelp blades but can damp the same wave energy. The lengths of the equivalent flat plates were determined by a fluid-structure interaction model. After comparison with physical model tests in a wave tank, the method was applied for in situ scenario studies in Maine. The preliminary results showed a promising reduction of wave energy through hundreds of longlines. The performance of suspended kelp farms is less affected by water level changes (e.g., tides, storm surge, and sea level rise) compared to bottom rooted aquatic vegetation. This analysis suggests that kelp farms may be a resilient shoreline protection measure in a changing climate. The ability of kelp farms to attenuate waves also provides a new opportunity for expansion of the aquaculture industry.

Abstract ID :
UMSS19135

More Than Ticks: Investigating the Effects of Socioeconomic Factors on Lyme Disease Incidence

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 337

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Meghan Frisard [1] *
Undergraduate

Author Name : Allison Gardner [2]

Abstract Description : Nationally, Maine is the state with the second highest incidence of Lyme disease. While the spread of Lyme disease is generally attributable to ecological factors that affect the life cycle of Lyme-spreading ticks, socioeconomic factors may have substantial impacts on diagnosis and reporting of human cases. Socioeconomic factors could influence one's ability to see a healthcare provider and ultimately be diagnosed with and treated for Lyme. Additionally, access and treatment within the healthcare system is often gendered. I hypothesize that certain socioeconomic factors will have a negative correlation with Lyme disease incidence among the general population and among women, and that other socioeconomic factors will have a positive correlation, depending on how they promote or inhibit healthcare access. Ordinary Least Squares regression analyses were performed to determine significant socioeconomic factors that correlated with patterns of Lyme disease incidence in 411 zip codes across 10 counties in southern Maine, an endemic area for Lyme disease transmission. Geographically Weighted Regression analyses were performed to understand how these relationships varied spatially. Total family income, per capita income, percent of the population with public health insurance, and percent of the population that speaks a language other than English all have significant correlations with overall Lyme incidence. Percent of the population with any health insurance has a significant correlation with the percentage of Lyme disease cases that are women. Conclusions from this work could inform public health departments, school departments, health insurers, and healthcare providers about which populations are most at risk for Lyme disease.

Abstract ID :
UMSS19387

Morphosis

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 711 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Nick Dieffenbacher-Krall [1] *
Undergraduate

Author Name : Sofian Audry [2]

Abstract Description : This research project investigates different kinds of artificial intelligence approaches to control a robotic system in the context of a new media art installation. More specifically, it involves a series of experimentations with a robotic “ball” that learns how to “roll” using machine learning. The research is part of a larger research-creation project titled “Morphosis” by University of Maine professor Sofian Audry (New Media, SCIS) and new media artist Rosalie Dumont-Gagné (Canada) to create a new media artistic installation where the audience can witness such robotic systems learning how to move in real time. In this project, we intend to use the trial-and-error process through which the robot will have to learn how to move, as a way to generate an emotional response in the viewer. In other words, the final objective of the project is to use the learning process itself as an aesthetic device. Principal research activities focused on finding the machine learn and AI techniques that would best achieve this objective.

Abstract ID :
UMSS19386

Mothering Soldiers: Connections Between 19th Century Motherhood and Civil War Nurses

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 107

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Brianna Ballard [1] *
Undergraduate

Author Name : Liam Riordan [2]

Abstract Description : Throughout the 19th century there was a new demand for morally correct members of society. Women became responsible for the domestic sphere which included control over the home, care of their husband and children, and was a place where cultural constructs were formed and developed, including a new way to view motherhood. This new ideal overlapped with concepts of womanhood during the time of the 19th century where women became seen as more delicate, fragile, and caring. Women were seen as models of purity and virtue, which posed a problem for women trying to become nurses during the Civil War as aspects of this position directly violated these concepts of womanhood. The Civil War brought with it a huge demand for labor that made it impossible for women to not be included. Women took charge in the care of soldiers which was in direct conflict with Victorian norms at the time. Instead of allowing for these narrow definitions to prevent women from becoming nurses, many of these women employed these Victorian concepts, like that of the new ideal of motherhood, to create authority within their roles as nurses. Women like Dorothea Dix, Harriet Eaton, Amy Morris Bradley, and Elizabeth Akers Allen were just a few out of many who interacted with Victorian culture in complex and varying ways. However, all four used the concept of motherhood to create authority in their role as a nurse during the Civil War. My research connects overarching cultural constructs with the individual and the primary sources that they have left behind. These women all interacted with the concept of Victorian motherhood in complicated ways, but they were still able to use it to their advantage in their role as nurses despite its restricting nature.

Abstract ID :
UMSS19180

Motivations for and barriers to adoption by aquaculture training program participants in Maine

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 125

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Caitlin Cleaver [1] *
Graduate

Author Name : Samuel Hanes [2]

Author Name : Karen Pianka [3]

Author Name : Teresa Johnson [4]

Abstract Description : Aquaculture is a growing industry in Maine and is viewed as a potential diversification strategy for commercial fishermen as well as a way to sustain Maine's working waterfronts and coastal communities in the face of environmental change. The Aquaculture in Shared Waters program provides an opportunity for commercial fishermen to learn more about shellfish and seaweed aquaculture while also providing an opportunity to understand the types of commercial fishermen who are considering the adoption of aquaculture. The program has run eight times in multiple towns since 2018. We will report results from pre- and post-course structured surveys completed by training program participants with a focus on motivations for considering the adoption of aquaculture, potential barriers to adoption and a description of the demographics and fishing experience of these individuals. Most participants report looking to aquaculture as an opportunity to diversify and are most concerned about learning all aspects of running an aquaculture operation. They report lower levels of concern about environmental uncertainty, the regulatory process, and managing community relations.

Abstract ID :
UMSS19132

mTERT as a Tool to Identify Novel Adult Neural Stem Cell Populations

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 827

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Joshua Passarelli [1] *
Undergraduate

Author Name : Gabriel Jensen [2]

Author Name : Kristy Townsend [3]

Abstract Description : Obesity and the metabolic syndrome, which pose a significant challenge in modern medicine, are characterized by a dysfunction in maintaining energy balance. Adult neural stem cells (ANSCs) are likely important for the brain to coordinate energy balance, in part, by supplying the turnover of new neurons in the brain's energy balance center, the hypothalamus. There is currently no single, specific, and unique marker for ANSCs, however, we hypothesize that mouse telomerase reverse transcriptase (mTERT) could be utilized as a putative marker of a novel population of ANSCs in the ventricular niches of the adult mouse brain. mTERT lengthens telomeres in cells that need to continually divide, and has been shown to mark adult stem cells in the gut, kidneys, and endometrium. This marker was used in transgenic mouse lines to track the fate of the ANSCs across differentiation, in order to allow characterization of these cells. Our data thus far favors the potential use of mTERT as a specific and unique marker for ANSCs and shows mTERT expression in known ventricular neurogenic niches. Furthermore, mTERT expression has been found in areas not classically considered neurogenic, the choroid plexus, but it is not yet clear if these mTERT+ cells are truly stem cells, and this is the focus of current work. Taken together, the data supports the use of mTERT to track ANSCs and substantiates the importance of investigating other possible locations of neurogenesis in the adult brain using this new tool. Acknowledgments This research was funded in part by the Center for Undergraduate Research 2018 Summer Academic Fellowship.

Abstract ID :
UMSS19268

Multi-index summer flow regime characterization to inform environmental flow contexts

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 235
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Nuha Abdullah [1] *
Graduate

Author Name : Shaleen Jain [2]

Abstract Description : Summer flow regime is an important determinant of the health and integrity of riverine ecosystems. In particular, summertime low flows and the range of variability impact the extent and connectivity of habitat, production in and composition of ecosystems, and water quality. The following streamflow-based metrics are used in the analysis and assessment of summertime hydrologic variability and trends: UK Institute of Hydrology Flow Duration Curve-based Index, Base flow Index, Lane's variability Index, and Seven-day low flow Index. In this study, historical streamflow records at 33 locations in New England (USA) were analyzed to understand the nature of trends as well as the extent of changes, individually and collectively, for the four indices. The main contribution of this paper is to develop a comprehensive characterization of the regional flow regime and trends therein. The two complementary statistical analyses applied are as follows: (a) interrelationship between flow indices based on nonparametric probability density estimation approach and (b) quantile regression-based estimates of the spatial and temporal patterns of changes in flow indices variability over the past six decades. Our analyses highlight the importance of understanding variability and change based on a multi-index approach, one better suited to inform the impact of hydrologic change on ecosystem health. Finally, we discuss the applicability of our results to water allocation rulemaking in the New England region.

Abstract ID :
UMSS19367

Multi-sensory Immersive Environment

Abstract Topic : Interdisciplinary

Submission Type : Exhibit
Submission# : 610 **Judge Time Slot :** PM1 (1:00 -2:00)
Undergraduate

Author Name : Cullen Shortt [1] *
Undergraduate

Author Name : Nimesha Ranasinghe [2]

Abstract Description : Multisensory Immersive Environment Abstract: In 2018, it was known that over forty million Americans had a mental illness. Mental illnesses are a challenging disease because they affect people differently and in many forms. Among those over forty million people, Veterans are a large cohort, and currently, it is estimated approximately 20% of veterans who return from war suffer from PTSD, also known as Post Traumatic Stress Disorder. A better understanding of these mental disorders, starting with PTSD is a substantial step in improving the treatment of the disease as well as promoting social awareness. Therefore, in this proposal, we propose developing an immersive environment using wearable technologies to assist the people with PTSD and to garner a better understanding of this seemingly invisible issue. This proposed multi-sensory immersive environment and wearable technology will consist of video exhibits as well as other sensory feedback including hot and cold temperature, smells and wind simulations to deliver realistic simulations to the patients.

Abstract ID :
UMSS19142

Multi-Tiered Systems of Support in Schools to Promote Positive Student Outcomes

Abstract Topic : Education

Submission Type : Oral
Submission# : 508
Graduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Karen Robbie [1] *
Graduate

Author Name : Sherry Pineau Brown [2]
Graduate

Author Name : Jim Artesani [3]

Abstract Description : Across the country and state of Maine, schools are incorporating a preventative, universal public health model to address the complex needs of an increasingly diverse student population. To meet academic, social-emotional, and behavioral needs of students, schools have moved away from disconnected programs, and instead, are organizing their services into a multi-tiered system of support (MTSS) framework. The MTSS framework maximizes the selection and implementation of evidence-based prevention and intervention practices along a multi-tiered continuum that addresses the academic, social-emotional, and behavioral competence of all students. When implemented with fidelity, student achievement increases, school climate improves, and positive learning environments are sustained (Jimerson, Burns & VanDerHeyden, 2016). This oral presentation provides a review of the literature examining the roots of MTSS in schools, current implementation practices, and the impact of an MTSS framework on desired outcomes (Dunlap, Sailor, Horner & Sugai, 2009). Presenters will describe the logic model and three-tiered structure of MTSS including examples of the elements included in each tier. Evaluation strategies regarding student outcomes and implementation fidelity from a state funded grant will be shared. The presentation will conclude with a call for alignment of school initiatives such as Response to Intervention (RtI), Positive Behavior Interventions and Supports (PBIS), and Trauma-Sensitive Schools into one MTSS framework. Schools are an integral part of every community. Come and learn from long-time educators and doctoral students in Prevention and Intervention Studies how your community's school can create an environment of success for all students. References Dunlap, G., Sailor, W., Horner, R., & Sugai, G. (2009). Overview and history of Positive Behavior Support. In Handbook of Positive Behavior Support (pp. 3–16). Springer. https://doi.org/10.1007/978-0-387-09632-2 Jimerson, S. R., Burns, M. K., & VanDerHeyden, A. M. (2016). Handbook of response to intervention: The science and practice of multi-tiered systems of support (Second ed.). New York [New York]: Springer.

Abstract ID :
UMSS19199

My SEA Fellows Story: Developing a data capture & sharing platform for Maine ocean data

Abstract Topic : Interdisciplinary

Submission Type : Oral

Submission# : 625

Judge Time Slot : PM2 (2:30 - 3:30)

Undergraduate

Author Name : Kaitlyn Raffier [1] *
Undergraduate

Author Name : Heather Leslie [2]

Abstract Description : In summer 2018 my research focused on developing a framework to gather metadata (a.k.a. data about data) related to the environmental and human dimensions of Maine's ocean. My project was one of 22 featured in the SEA Fellows Summer Science Symposium at the DMC in August 2018. SEA (Science for Economic Impact and Application) Fellows is an undergraduate research and engagement training program that supports research related to Maine's marine economy, as well as the ecosystems and coastal communities that support it. In addition to supporting my summer research, the program also enabled me to gain valuable experience in science communication and engagement with a diverse set of environmental scientists and practitioners. Through a mixture of independent research and social science methods, including surveys and interviews with experts at the University of Maine Darling Marine Center (DMC) and other institutions, I gained a clearer picture of data that have been generated at the DMC over the last 20+ years, and the tools needed to develop a data management and sharing plan for the DMC and Maine ocean-related data more broadly. I began to develop a data repository and sharing system, and synthesized best practices and possible next steps through a technical report delivered to my advisor and DMC Director, Heather Leslie. My work was an important step towards ensuring that data about Maine's ocean are curated and accessible for future science and management needs. Save the date for the 2019 Symposium - Tuesday, August 6, 2019!

Abstract ID :
UMSS1933

Nanocellulose Conduits for Enhanced Regeneration of Peripheral Nerve Injury

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 809

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Nicklaus Carter [1] *
Graduate

Author Name : David Neivandt [2]

Abstract Description : Nanocellulose Conduits for Enhanced Regeneration of Peripheral Nerve Injury Carter, N.1,2, Dewey, M.2, Millard, C.2, Castillo, R.2, Bourque, M.2, Neivandt, D.1,2 1Graduate School of Biomedical Science and Engineering, University of Maine 2Department of Chemical and Biomedical Engineering, University of Maine Peripheral neuropathy is estimated to afflict 20 million people in the United States. Most cases of neuropathy result from physical injuries and trauma arising from automobile accidents and war. Peripheral nerves have the intrinsic ability to regenerate over time, bridging the injury gap caused by the trauma. Current methods utilized to assist in the regeneration of peripheral nerves include nerve autografts and implantation of conduits. Nerve autografts are regarded as the most effective method, but require a second surgical site to access a donor nerve. Allografts are similar to autografts except the donor nerve is from another individual and requires a prolonged regimen of immunosuppressant medication. Conduits currently on the market have equal or lower success rates relative to nerve autografts. Issues that arise with the use of the current generation of conduits involve foreign body reaction and potential second surgeries to remove the conduit. It is proposed that a biocompatible material such as nanocellulose may serve as a viable alternative conduit construction material. The current work determines means by which cellulose nanofibril conduits may be produced, and evaluates their efficacy in regeneration after a sciatic nerve injury in a murine model. Development of a GMP compliant process to produce such cellulose nanofibril conduits has been completed.

Abstract ID :
UMSS19311

Narrative; Self and the External

Abstract Topic : Art

Submission Type : Exhibit
Submission# : 703
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Thomas Griffith [1] *
Graduate

Author Name : Susan Smith [2]

Abstract Description : Dear submission committee, This is my submission to exhibit a sculpture titled Narrative; Self and the External in the upcoming University of Maine Graduate Symposium. I am a graduate student in the IMFA program here at UMaine. My research focuses currently deals with how elements of Sci-Fi in literature and cinema can be used to speak to social issues without being an actual written story or movie. This sculpture is made of 3D printed parts, wood and other materials and has led lighting. Even though the sculpture creates an opportunity for audience interpretation the essential theme speaks to the contemplation of the complex nature of how one interacts with the external and where the intersection of external and internal exist. The piece asks, is one overwhelmed and blinded by the haze of the noise flowing in? Does one don a mask to protect the within and does that mask become the cover of the book of who we are and thereby how we are judged to be by others? Thank you for your consideration, Thomas R Griffith

Abstract ID :
UMSS1947

Neonatal Hypoxic Ischemic Encephalopathy: Initiating Active Cooling Measures

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 415 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Mikayla Morin [1] *

Author Name : Julianne Fitzpatrick [2]
Undergraduate

Author Name : Theresa Murray [3]
Undergraduate

Author Name : Patricia Poirier [4]

Abstract Description : PICO Question In neonates with suspected hypoxic ischemic encephalopathy (HIE), does active cooling measures, in comparison to not actively cooling, result in decreased mortality rates and improved brain activity? Abstract Background: Hypoxic-Ischemic encephalopathy (HIE) is a serious condition among the neonatal population that causes significant mortality and long-term morbidity. Brain hypoxia and ischemia due to reduced cerebral blood flow can lead to HIE in the neonate (Martinello, Hart, Yap, Mitra, & Robertson, 2017). Methods: A review of the literature explored whether abstaining from active cooling versus initiating active cooling measures result in decreased mortality and improved brain activity in neonates with suspected HIE due to perinatal events. Outcome: The literature suggests that providing active cooling to produce hypothermia within a few hours of injury for infants greater than thirty-six weeks can provide a neuroprotective effect to prevent further brain damage.

References Martinello, K., Hart A.R., Yap S., Mitra, S., & Robertson, N. (2017). Management and investigation of neonatal encephalopathy: 2017 update. Archives of Disease in Childhood - Fetal and Neonatal Edition, 102(4), 346-358. doi: 10.1136/archdischild-2015-309639

Abstract ID :
UMSS19418

Neuroplastic Autopoietics, A Life Practice.

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 706

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Joshua Couturier [1] *

Author Name : Susan Smith [2]

Abstract Description : This work is a Neuroplastic andAutopoietic life and art practice system. A practice that moves through disciplines creating from living experiences and learning from creations in a self maintaining system that is directly involved in creation and the "doing" of art making. The making informs and changes the maker which then change the art, so on and so forth... "Autopoiesis is the property of a living system (such as a bacterial cell or a multicellular organism) that allows it to maintain and renew itself by regulating its composition and conserving its boundaries." [1] "Neuroplasticity is the ability of the brain to form new connections and pathways and change how its circuits are wired, a changing by doing." [2] [1] Meriam-Webster, "Autopoiesis", March 10, 2019. [2] Bergland, What is Neuroplasticity?, Feburary 8th, Bergland, 2017.

Abstract ID :
UMSS19383

Nonlinear heat conduction theory

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 223
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Benjamin Thompson [1] *
Undergraduate

Author Name : Aaron Joy [2]

Abstract Description : Engineered technologies such as concentrated solar thermal systems and atmospheric re-entry vehicles often experience rapid, spatially localized changes in heat content. Understanding the propagation of non-uniform temperature distributions is paramount to the design of robust, efficient, lasting systems; all critical to the protection of investments in technology. Fourier's law of heat conduction is a linear approximation of a more general heat conduction theory[1], however only parametric modelling has been conducted to test the validity of the nonlinear theory of heat conduction. My proposed experiment will simulate heat propagation in one dimension using a circular rod of Aluminum Oxide, wrapped in ceramic blanket insulation and heated rapidly on one end. Data acquired by embedded thermocouples would be regressed to determine material coefficients for the proposed model, with validation against supplemental data and comparison against linear conduction.

Abstract ID :
UMSS19112

Nonresident Father-Teen Communication Technology Use

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 143

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Allison Cyr [1] *
Undergraduate

Author Name : Patrick Cheek [2]

Abstract Description : Nonresident Father-Teen Communication Technology Use Communication technology has been rapidly changing and has a major influence on families. This current study is looking at the use of communication technology among teens and their nonresident fathers. Many studies have focused on families in a broad sense, but few studies have analyzed nonresident father-teen relationships. We intend to discover how often communication technology is used between teens and their fathers, including a wide array of technology ranging from mobile devices to various online platforms. In addition to determining the frequency of use, we intend to analyze the importance and value teens associate to this type of communication. Our estimated sample size is 120 individuals who have nonresident fathers. Data collection is currently underway and will be presented at the symposium. References [1] Duggan, M., Lenhart, A., Lampe, C., Ellison, N.B. "Parents and Social Media." Pew Research Center, July 2015.

Abstract ID :
UMSS19258

Novel RORβ mutant displays characteristic "high-stepper" gait phenotype and retinal abnormalities.

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 811

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : George Murray [1] *
Graduate

Author Name : Abby Tadenev [2]

Author Name : Robert Burgess [3]

Abstract Description : Murine retinoid-related orphan nuclear receptor (Rorb) has two splice variants with alternative first exons and encodes a transcription factor thought to play a role in neuronal cell fate determination. Rorb-203 is expressed in layer IV of the somatosensory cortex and in the retina. Rorb-201 is expressed only in the retina, and mutations in the two isoforms have been observed in spontaneous mutants that display the high-stepper gait phenotype. Some of these mutants also show photoreceptor degeneration dependent on the exact nature of the mutational event and the isoforms impacted (Tadenev et al., Unpublished). For instance, a high-stepper mutant (Hstp1) on the C57BL/6J background with a duplication impacting exon 1 of Rorb-203 showed the gait phenotype with no retinal abnormality. Histological and immunofluorescence approaches performed on a novel high-stepper mutant with a DBA/1J background retrieved by deviant search at The Jackson Laboratory depict photoreceptors lacking outer segments. Sequencing of each Rorb isoform revealed a single nucleotide substitution causing a missense mutation in the start codon of Rorb-203. This result suggests that mutation of Rorb-203 is sufficient to induce both the gait phenotype and photoreceptor abnormality on the DBA/1J background and that genetic background may modulate the severity of phenotypes associated with Rorb mutations.

Abstract ID :
UMSS1927

Nurses Role in Central Line-Associated Bloodstream Infection Prevention

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 412

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Laura Roberts [1] *
Undergraduate

Author Name : Julia Schnee [2]

Author Name : Bronwyn West [3]

Author Name : Alex Roderick [4]

Author Name : Valerie Herbert [5]

Abstract Description : Background: Central line-associated bloodstream infections (CLABSI) are a preventable, yet prevalent issue in healthcare today. There are two effective identifiable preventative measures: care bundles and chlorhexidine baths. Care bundles consist of hand hygiene compliance, strict aseptic technique with insertion and changing of the dressing, chlorhexidine skin antiseptic, optimal site selection, accessing the catheters only with sterile devices, scrubbing the access port or hub with antiseptic immediately before access, and evaluation of the necessity of the line each shift (Conley, 2016). The Center for Disease Control and Prevention reported that the use of prevention care bundles decreased the incidence of CLABSI by 50% between the years 2013 and 2014 (Sheth, Trifan, Feterik & Jovin, 2017). Method: A review of the literature was conducted to answer the question: If these care bundles are so effective, why are CLABSI rates still a problem? Outcome: The literature has suggested ways to increase compliance with care bundle practices and techniques for nurses to decrease the rates of CLABSI. Mandatory compliance education sessions, repeated reinforcement of the information through flyers and posters, skills stations, and peer-review were all found to greatly increase nurse CLABSI prevention measure compliance and reduce the CLABSI rates (Conley, 2016; Zavotsky, Malast, Festus & Riskie, 2015). Conley, S. B. (2016). Central line-associated bloodstream infection prevention: Standardizing practice focused on evidence-based guidelines. Clinical Journal of Oncology Nursing, 20(1), 23-26. doi:10.1188/16.CJON.23-26 Sheth, H., Trifan, A., Feterik, K. & Jovin, F. (2017). Expanding central line care bundle to address line manipulation. Canadian Journal of Infection Control, 32(4), 217-221. Zavotsky, K. E., Malast, T., Festus, O. & Riskie, V. (2015). Reducing central line-associated bloodstream infection on inpatient oncology units using peer review. Clinical Journal of Oncology Nursing, 19(6), 655-658.

Abstract ID :
UMSS1964

OCEAN ACIDIFICATION ALTERS THERMAL CARDIAC PERFORMANCE, HEMOCYTE ABUNDANCE, AND HEMOLYMPH CHEMISTRY IN SUBADULT AMERICAN LOBSTERS

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 353

Judge Time Slot : AM1 (9:30 - 10:30)

Graduate

Author Name : Amalia Harrington [1] *
Graduate

Author Name : Heather Hamlin [2]

Abstract Description : Increased anthropogenic input of carbon dioxide into the atmosphere has caused widespread patterns of ocean acidification (OA) and increased the frequency of extreme warming events. We explored the sublethal effects of OA on the hemolymph chemistry and physiological response to acute thermal stress in the American lobster (Homarus americanus H. Milne Edwards, 1837). We exposed subadult lobsters to current or predicted end-century pH conditions (8.0 and 7.6, respectively) for 60 days. Following exposure, we assessed hemolymph L-lactate and calcium concentrations (as indicators of oxygen carrying capacity), ecdysterone concentrations, total protein content, and total hemocyte counts (THCs) as an indicator of immune response. We also assessed cardiac performance in the context of an acute warming event using impedance pneumography. Calcium, total protein, and ecdysterone concentrations were not significantly altered ($P \geq 0.10$) by OA exposure. Control lobsters, however, had significantly higher levels of L-lactate concentrations compared to acidified lobsters, suggesting reduced oxygen carrying capacity under OA. THCs were also 61% higher in control vs. acidified lobsters, suggesting immunosuppression under chronic OA. Lobsters exposed to acidified conditions exhibited reduced cardiac performance under acute warming as indicated by significantly lower ($P = 0.040$) Arrhenius Break Temperatures compared to control lobsters. These results suggest that although some physiological endpoints of American lobster are not impacted by OA, the stress of OA will likely be compounded by acute heat shock and may present additional physiological challenges for this species in the face of future change.

Abstract ID :
UMSS19390

Optical Metabolic Investigation of Lobster Hemocyanin Anti-Cancer Effects Using a Home-Built Two-Photon System

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral

Submission# : 254

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Patrick Breeding [1] *
Graduate

Author Name : Mitchell Harling [2]

Author Name : Karissa Tilbury [3]

Abstract Description : Hemocyanin is the primary respiratory protein found in arthropods and is known to play several roles in invertebrate immune systems. Numerous hemocyanins, such as the Keyhole Limpet Hemocyanin (KLH), are being evaluated for use as an anti-cancer therapeutic. These studies have demonstrated the ability of KLH to shift cancerous cellular metabolism to induce apoptosis (programmed cell death). Although its applications are promising, overharvesting of the Keyhole Limpet for biomedical purposes is leading to species endangerment, thus, alternatives are in rising demand. The lobstering industry stands to offer a such a suitable replacement, as hemocyanin is the primary protein found in lobsters and is discarded as a waste byproduct in processing plants. The goal of this study is to investigate the anti-cancer potential of American Lobster hemocyanin (LH) against A549 and H1299 lung carcinoma cell lines. MTT assays were used to determine dosing ranges and two-photon microscopy was utilized to investigate metabolic shifts via the normalized optical redox ratio of NADH and FAD. Caspase-3/7 activity, an indicator of apoptotic cells, was measured using a fluorogenic substrate labeling kit. Preliminary results indicate hemocyanin inhibits cancerous cell growth in a dose-dependent manner by shifting cellular metabolism, ultimately activating an intrinsic apoptotic pathway. Future work will aim to further elucidate the cellular mechanism and dosage on a wide variety of cancer cells. Overall project success has the potential to usher the development of a widely accessible biological therapeutic from an otherwise wasted material, yielding a significant value-added product to stimulate sustainable commercial lobstering practices.

Abstract ID :
UMSS19251

Optical-based methods used to detect phytoplankton community composition in the North Atlantic Ocean

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 324

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Alison Chase [1] *
Graduate

Author Name : Emmanuel Boss [2]

Abstract Description : Phytoplankton are microscopic organisms found throughout the world ocean, both forming the base of the oceanic food web and producing a significant portion of Earth's breathable oxygen via photosynthesis. The composition of the phytoplankton community, i.e. the variety of species present, during the annual cycle of growth and accumulation in the North Atlantic Ocean is of great interest due to the important role the North Atlantic plays as a sink of atmospheric CO2 and hence on climate. To understand patterns in phytoplanktoncommunity composition on large spatial scales, we use an extensive dataset from the North Atlantic Ocean to investigate how optical measurements can be linked to the presence of different phytoplankton groups. We hypothesize that optical-based measurements of phytoplankton accessory pigments will explain the presence of major phytoplankton groups present in the water. Our results show that chlorophyll b, an accessory pigment found in several phytoplankton groups but not found in diatoms, can be used to identify times and areas when an increase in phytoplankton biomass is not driven by increased diatom concentration. Diatoms are often assumed to be the dominant phytoplankton group during periods of increased phytoplankton biomass, and understanding the limitations of this assumption has direct implications for knowledge of ocean food web dynamics and biogeochemical modeling of carbon export. Optical-based methods for investigating phytoplankton community composition such as the work presented here have future application to satellite data, which in turn provides information on the surface ocean at spatial scales otherwise unachievable.

Abstract ID :
UMSS19110

Optically Investigating the Role of MMP-13 in the Spatial Relationship of Collagen and Nerve Fibers in Healthy and Obese Adipose Tissue

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 243

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Mitchell Harling [1] *
Undergraduate

Author Name : Andre Khalil [2]

Author Name : Cory Johnson [3]

Author Name : Kristy Townsend [4]

Author Name : Patrick Breeding [5]
Graduate

Author Name : Karissa Tilbury [6]

Abstract Description : Neuropathy is an obesity associated disease in which damage to the peripheral nervous system is caused in part by excess collagen deposition in adipose tissue resulting in disruption of tissue innervation. The mechanism by which obesity affects innervation in adipose tissue is not well known, therefore, investigation into the architecture of fibrotic adipose tissue is a necessary endeavor to uncover valuable diagnostic and mechanistic information. One proposed mechanism involves the role of MMP-13, a collagenase encoding gene, in altering the collagen matrix in obese tissue. The goal of this study was to assess composition of healthy and obese tissues in the presence of MMP-13, using two-photon microscopy to three-dimensionally image tissue sections. Two-photon microscopy overcomes the limitations of traditional confocal microscopy by minimizing excessive scattering and unwanted absorption with higher wavelength excitation, ultimately allowing for deep, high-resolution imaging. This technique was used to image Alexa 594-labeled nerves, and image collagen with a label-free, two-photon process called second harmonic generation (SHG). Colocalization analysis was performed using an ImageJ algorithm combined with an adapted astrophysics analysis routine called the Metric Space Technique (MST). These imaging tools and analyses provide insight into MMP-13 enzymatic activity and potential collagen deposition contributions to alterations in innervation and thus, neuropathy.

Abstract ID :
UMSS19303

Optimal Electrode Parameters and Contouring of Lateral Field Excited AT-Cut Quartz Crystal Microbalances for Improved Implementation in a Sensing System

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 205
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Jequil Hartz [1] *
Graduate

Author Name : John Vetelino [2]

Abstract Description : Thickness field excited (TFE) AT-cut quartz crystal microbalances (QCMs) are the industry standard sensor for in-situ monitoring of thin film deposition for their ability to detect mass on the order of nanograms per unit area. Coupled with appropriate techniques, these devices can be applied to various fields as mass or viscosity sensors for detection of a variety of entities. However, TFE QCMs lack the ability to detect electrical properties such as conductivity and permittivity crucial to realization of extremely sensitive sensors for a large range of applications including disease detection and monitoring in humans and detection of harmful entities in food production. Previous research has validated the use of lateral field excited (LFE) QCMs for their improved sensitivity and detection of electrical properties relative to TFE QCMs. This work succeeds that research in optimizing LFE device performance for use in a sensing system. Desired response optimization is conducted through varying the parameters of a common LFE electrode configuration and the contour of the surface which eliminates the presence of undesired modes. Several LFE QCMs are tested with a network analyzer to determine their electrical responses with magnitude/phase shifts under air loading used to compare intensities. Response data is used to model the responses to an equivalent circuit to compare to existing TFE circuit values and apply in integration into an electronic system. Current promising designs within the range of parameters used have been analyzed under mass loading and compared to the existing TFE QCM.

Abstract ID :
UMSS19260

Origami-Inspired Design of Rapidly Deployable Structures

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 203

Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Anthony Verzoni [1] *
Graduate

Author Name : Masoud Raisrohani [2]

Abstract Description : Origami-inspired design is a growing field with numerous engineering applications. The application of interest in this research is design of rapidly deployable shelters with rigid flat panels that must fold and unfold in a kinematically compliant fashion. Exploration of different design concepts inspired by the folding kinematics of origami has led to numerous novel shelter concepts. Altering panel size and shape yields shelter designs with varying volumetric capacities and some configurations that can be used in establishing a multi-unit shelter cluster. Thin or zero-thickness panels are initially used to model shelters as traditional origami is not concerned with finite thickness of each folding facet. Thick panels have a large influence on the connectivity of the shelter walls, which is addressed through nesting of the panels to accommodate proper folding kinematics. An analysis model is developed using the principle of virtual work to determine the loads required to erect a shelter of variable size. The analytical expressions developed using this method are validated using a rigid body dynamics solver. Torsion springs as a mechanical assist system are investigated to reduce the loads associated with shelter erection and lead to simple and intuitive erection processes. Preliminary structural analysis models for use in topology and sizing optimization of the shelters are developed and will be updated accordingly to satisfy design and kinematic requirements. This material is based upon work supported by the US Army Combat Capabilities Development Command Soldier Center (CCDC-SC) (formerly known as NSRDEC) under Contract No. W15QKN-13-9-0001 and W911QY-18-C-0101. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the CCDC-SC. Approved for Public Release - CCDC-SC PAO#: U19-833

Abstract ID :
UMSS19124

Overcrowding in the Emergency Department and the Impact on Patients

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 424

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Lindsey Bertwell [1] *
Undergraduate

Author Name : Shannon Buzzell [2]

Author Name : Logan Molt [3]
Undergraduate

Author Name : Patricia Poirier [4]

Abstract Description : Background: Emergency Department (ED) overcrowding has become a significant public health issue worldwide. There has been a 41% increase in the number of annual visits to the ED from 1996 to 2009. This statistic paired with a 27% decrease in the amount of ED's country-wide has led to an overwhelming strain on health care professionals and patient populations within the ED setting (Sayah, Rogers, Devarajan, Kingsley-Rocker & Lobon, 2014). Between extensive wait times and overcrowding, the ED has become a significant factor in decreased patient satisfaction rates and has unintentionally reduced the priority of safety within health care facilities. Method: A review of the literature was conducted to identify evidence-based interventions to improve ED overcrowding and wait times. Outcomes: Interventions, such as utilizing the use of a rapid assessment zones (RAZ), triage and tracking tools, and telehealth resources, have been shown to improve ED overcrowding and wait times, ultimately resulting in better patient satisfaction and quality patient-centered care.

Abstract ID :
UMSS1928

Overwintering strategies of the salmon louse Lepeophtheirus salmonis

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 315

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Emma Taccardi [1] *
Graduate

Author Name : Carrie Byron [2]

Author Name : Ian Bricknell [3]

Abstract Description : The salmon louse Lepeophtheirus salmonis is the primary parasitic disease of salmon aquaculture and affects populations of wild and farmed fish. Despite the current understanding of its detrimental effects on host salmonids, its complete life history strategy remains uncertain – particularly regarding overwintering prior to infection blooms in the spring. Baseline ecology and physiology of overwintering sea lice in Maine were investigated via host choice comparisons of adults, tissue analysis throughout larval development, and assessment of heat energy reserves in egg strings and larvae. Stable isotope analysis was investigated as a quantitative tool to distinguish where sea lice originate from, in terms of host population and geographical region. δ13C and δ15N isotopic values of parasites were compared across host cohorts (salmon tissue type, and farmed versus wild salmon) and geographical region. Results suggest clear separation in isotope signatures across months, and between farmed and wild hosts. Survival at each larval stage was tracked in two 12°C incubators, while subsamples of developing egg strings and larvae were histologically processed for semi-quantification of lipid reserves. Preliminary results demonstrate that egg strings at three developmental stages have varying lipid patterns. Other subsets of developing sea lice were placed in a differential scanning calorimeter to measure heat flow and heat capacity throughout varying seasons. Preliminary data suggest that egg strings and larvae have different thermodynamic properties in the winter. With an improved understanding of the parasite itself, the salmon industry may more effectively move towards proactive pest management strategies on farms. This activity is supported by National Science Foundation award #IIA-1355457 to Maine EPSCoR at the University of Maine.

Abstract ID :
UMSS19190

Parental Relationships and Academic Performance

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 154

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Sarah Oakley [1] *
Undergraduate

Author Name : Steven Barkan [2]

Abstract Description : Academic achievement has a great impact on the life of an individual. Individuals who receive a college education are less likely to live in poverty, earn 10% more on average, and have better overall health. Societies with more educated individuals have higher GDPs, lower child and maternal mortality rates, and better rates of equality. Given the importance of education on both individuals and society as a whole, it is important to study factors that impact school performance in order to improve grades and access to higher education. Because children's relationships with their parents are crucial during early development, this study examines whether these relationships are associated with school outcomes. The paper assesses these associations with data from the first wave of the 2003 National Study of Youth and Religion (NSYR). Results show that children's relationships with both their mother and their father affects their grades, their levels of truancy, and their rates of suspension. This relationship is mediated by the teen's substance use as well as their attitudes about the importance of schooling.

Abstract ID :
UMSS19170

Perceived stigma in Washington County professionals about substance abuse

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 135 **Judge Time Slot :** PM2 (2:30 - 3:30)
Graduate

Author Name : Carsten Mackeldey [1] *
Graduate

Author Name : Nicole Cannizzaro [2]

Author Name : Kathleen Lookner [3]

Author Name : Elizabeth Depoy [4]

Abstract Description : Perceived stigma in Washington County professionals about substance abuse The opioid epidemic has caused severe damage to rural as well as urban communities all over the United States. This research project focuses on the development of knowledge about the magnitude of stigma towards substance abuse perceived by professionals working in Washington County Maine as a basis to plan and implement interventions. The researchers rely on Goffman's classic definition of as an "attribute that is deeply discrediting" and further that reduces someone "from a whole and usual person to a tainted, discounted one". Goffman continues to describe those who become stigmatized as having a "spoiled identity" (Goffman, 1963). In 2010 Luoma et al. further advanced Goffman's theory to expand perceived stigma as "beliefs that members of a stigmatized group have about the prevalence of stigmatizing attitudes and actions in society" and developed the Perceived Stigma in Substance Abuse Scale (PSAS scale). This 8- item measure quantifying perceived stigma (Luoma et al. 2010) was administered to answer the following research question: What is the magnitude of perceived stigma in professionals working in Washington County about substance abusers? The population was comprised of human service professionals in Washington County. Th results of the study will inform an understanding of stigma related barriers that need to be mediated in order for efficacious professional services to be delivered. References: Goffman, E. (1963). Stigma: Notes on the management of spoiled identity. Englewood Cliffs, N.J: Prentice-Hall. Luoma, J. B., O'Hair, A. K., Kohlenberg, B. S., Hayes, S. C., Fletcher, L. (2010). The development and psychometric properties of a new measure of perceived stigma toward substance users. Substance Use and Misuse, 45, 47-57.

Abstract ID :
UMSS19385

Perceptions and Barriers to the Utlization of Needle Exchange Programs

Abstract Topic : Allied Health

Submission Type : Exhibit

Submission# : 402

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Theresa Murray [1] *
Undergraduate

Author Name : Mary Tedescoschneck [2]

Abstract Description : Objective: In 2018, over 586,000 US citizens were reported to be addicted to intravenous heroin. It was reported by the Centers for Disease Control (CDC) that in 2017, 70,237 people ages 25 years to over 65 years died from a drug overdose in the United States; analogous to roughly the number of people residing in Portland, Maine. Needle exchange programs have been found to be effective at reducing needlestick injuries in the community, reducing associated health care costs and improving the short term and long term health of PWUID. Of all health care providers, emergency department nurses are most likely to come in contact with IV drug users and have the opportunity to provide resources and compassionate care to individuals struggling with injection drug use, thus they are uniquely positioned to inform PWUID of the availability and benefits of needle exchange programs. The purpose if this study is to describe the perceptions of emergency department nurses regarding the needle exchange program in Bangor, Maine. Methods: An anonymous survey to determine perceptions of needle exchange facilities was distributed to emergency department nurses (ED) in Bangor, Maine. . Results: By examining the surveys distributed to ED nurses who are most likely to come in contact with PWUID, this thesis will be able to elaborate on how NEP's can be better utilized in the local community in order to further decrease the rates of HIV, hepatitis C, needlestick injuries in the community, rates of heroin overdoses, and decrease overall healthcare costs. References American Addiction Centers (2019). Statistics on Drug Addiction. Retrieved from: https://americanaddictioncenters.org/rehab-guide/addiction-statistics/ Charms, D. (2017, October 07). Maine's Heroin Epidemic: 'Goodnight moon, goodnight mum'. Jezek, A., & Weedle, A. (2018). Infectious diseases and opioid use disorder. Retrieved from https://www.idsociety.org/globalassets/idsa/news-and-publication/press-releases/2018/id-and-the-opioid-epidemic-policy-brief_3-19-2018-updated.pdf. Kulikowski, J., & Linder, E. (2018). Making the case for harm reduction programs for injection drug users. Nursing, 48(6), 46-51. doi:10.1097/01.nurse.0000532745.80506.17

Abstract ID :
UMSS19319

Perceptions of Aquaculture in Maine Coastal Communities: Examining Regional Differences and the Impacts of Aquaculture Knowledge

Abstract Topic : Social Sciences

Submission Type : Oral

Submission# : 165

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Erin Brown [1]
Undergraduate

Author Name : Nicholas Alvarez [2] *
Undergraduate

Author Name : Caroline Noblet [3]

Abstract Description : In Maine, the aquaculture industry generates approximately $73 million in revenue and over 500 jobs (Cole et al., 2017). Despite the importance of the aquaculture industry in Maine's economy, little is known about coastal Mainers' perceptions of aquaculture and how those perceptions vary by region. This research was conducted with two surveys, one with policy-focused questions and one with media-focused questions, with response rates of 15.6% and 12.6%. The purpose of this research is twofold: to explore how Maine citizens view expansion and restriction of aquaculture development and to understand how knowledge of aquaculture affects Mainers' perceptions of aquaculture. Mainers report a low level of baseline knowledge about aquaculture and a desire for increased knowledge. Preliminary results suggest a strong relationship between reported knowledge of aquaculture and perceptions of the risks and benefits of aquaculture. Additionally, we find that those who reported a high level of knowledge are more likely to feel that aquaculture has positively impacted their use of Maine coastal areas than those who reported zero knowledge of aquaculture. Perceptions of aquaculture are found to vary across different regions in Maine. More specifically feelings towards expansion or restriction are especially varying. Preliminary results have found a statistically significant difference in support for expansion depending on where the expansion is taking place. Where citizens live is a key component to predicting support for aquaculture. Understanding perceptions of aquaculture is crucial to developing aquaculture policy that is supported by citizens and viable to the industry. Acknowledgements: This activity is supported by National Science Foundation award #IIA-1355457 to Maine EPSCoR at the University of Maine. References: A. Cole, A. Langston, and C. Davis, "Maine Aquaculture Economic Impact Report", 2017.

Abstract ID :
UMSS19119

Phenotypic Variation in a Zebrafish Muscular Dystrophy Model

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 854

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Erin Bailey [1] *
Graduate

Author Name : Benjamin King [2]

Author Name : Joshua Kelley [3]

Author Name : Michelle Goody [4]

Author Name : Mary Astumian [5]

Author Name : Amneh Wise [6]

Author Name : Daisy Drinkert [7]

Author Name : Elisabeth Kilroy [8]

Author Name : Emma Crooks [9]

Author Name : Clarissa Henry [10]

Abstract Description : Summary: Muscle tissue is composed of individual fibers that anchor to their external surroundings to form cell-matrix adhesion complexes that are essential for muscle homeostasis. A number of muscular dystrophies occur due to genetic mutations in proteins and enzymes that facilitate these interactions. These include dystroglycanopathies, a unique subset of muscular dystrophies that present with a broad spectrum of symptoms and severities, even when the disease causing mutation has been identified. The mechanisms that govern this variability remain unknown. To address this, we engineered a zebrafish model of dystroglycanopathy associated with a GMPPB mutation via CRISPR/Cas9 mutagenesis. We determined that gmppb mutants exhibit both mild and severe neuromuscular phenotypes during early development, including abnormalities in muscle structure, muscle function, and the neuromuscular junction (NMJ). Intriguingly, by 7 days post-fertilization, half of gmppb mutants initially presenting with a severe phenotype recover to a milder phenotype. Our work suggests the presence of a unique phenotypic shift that could be mediated by differences in regenerative capacity and/or intrinsic compensatory mechanisms. Future work will employ interdisciplinary approaches to elucidate the mechanisms underlying phenotypic variation in this new model. Acknowledgements: This work was financially sponsored through March of Dimes Award Number: #1-FY14-284 to Dr. Clarissa Henry, NIH R15HD088217 to Dr. Clarissa Henry, a University of Maine Interdisciplinary Undergraduate Research Collaborative Program Grant to Dr. Benjamin King and Dr. Clarissa Henry, and a University of Maine Chase Distinguished Research Assistantship to Erin Bailey.

Abstract ID :
UMSS19238

Phone Use Habits and Microbial Density

Abstract Topic : Allied Health

Submission Type : Poster
Submission# : 428 **Judge Time Slot :** AM1 (9:30 - 10:30)
Undergraduate

Author Name : Ella Glatter [1] *
Undergraduate

Author Name : Jennifer Perry [2]

Abstract Description : Abstract: Smartphone usage has increased exponentially over the last decade. Use of phones in certain situations or locations could lead to the transfer of bacteria of public health significance. This project assessed connections between phone usage and the different microflora that can be found on the phone surfaces, with a focus on potential food safety implications. Project methodology was approved by the UMaine IRB. Enterobacteriaceae, Staphylococcus aureus, and total aerobic bacteria enumerated by swab sampling of phones belonging to 25 participants. All participants completed a survey regarding their phone usage. Survey results found that 36% of participants had never cleaned their phones (Figure 1), and all phones testing positive for Enterobacteriaceae (4) belonged to participants in this group. 88% of participants used their phones in the kitchen while either cooking or preparing food every day or multiple times a week (Figure 2). It was also found that those who did not use their phones as often in the kitchen were found to have lower levels of staphylococci and aerobic plate counts. Of the 25 participants, 28% always used their phones in the bathroom and 28% used their phones sometimes in the bathroom. It was concluded that the correlation between the presence of Enterobacteriaceae bacteria on the surface of phones to use phones in the bathroom was not significant but more regular cleaning could help lower levels of Enterobacteriaceae. Further research will need to be conducted to see the effects of more regular cleaning on the prevention of Enterobacteriaceae bacteria. Figure 1: How often do you clean your phone? pie graph Figure 2: How often have you used your phone when cooking or making food in the kitchen? pie graph

Abstract ID :
UMSS19370

Photoswitchable CRAC Channel Inhibitors

Abstract Topic : Physical Sciences

Submission Type : Exhibit

Submission# : 904

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Ryan Bray [1] *
Undergraduate

Author Name : Michael Kienzler [2]

Abstract Description : Calcium release-activated calcium channels, or CRAC channels, are a specialized calcium ion channel that is important in many physiological processes such as immune system function. However, defects in CRAC channels can cause Severe Combined Immunodeficiency disorder (SCID). My goal is to synthesize light activated CRAC channel inhibitors. There are many existing compounds that have been shown to selectively inhibit CRAC channels. I am using these compounds as a template by altering their structures by replacing an amide bond with an azo bond that photoisomerizes with light. We may be able to control whether the compounds are biologically active by irradiating with light and therefore altering its shape and function. The azo bond is prepared by reacting a nitroso group with an amine, which is done using commercially available starting materials. The structure of the compounds will be evaluated with NMR and mass spectroscopy and UV-vis is used to characterize the photoswitch. The ability of these compounds to inhibit the CRAC channels will be tested by a collaborator who will do electrophysiology experiments to evaluate and measure efficacy. I'd like to thank the College of Liberal Arts and Sciences for the Undergraduate Research and Creative Activity Fellowship. (1) Tian, C.; Du, L.; Zhou, Y.; Li, M. "Store-operated CRAC channel inhibitors: opportunities and challenges," (2016). Future Medicinal Chemistry 8(7): 817-832. (2) Jairaman, A.; Prakriya, M.; "Molecular pharmacology of store-operated CRAC channels," (2013) Channels 7(5): 402-414.

Abstract ID :
UMSS19338

Photoswitching Azobenzene to Bind at Potassium Channels

Abstract Topic : Physical Sciences

Submission Type : Exhibit

Submission# : 903

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Charlize Castro [1] *
Undergraduate

Author Name : Michael Kienzler [2]

Abstract Description : TREK-1 is a K2p (two pore domain) potassium ion channel that is involved in a wide array of physiological and pathological conditions, such as pain, ischemia, epilepsy, and depression. It also displays pharmacological properties like modulation by lipids and volatile analgesics. Quaternary ammonium ions have the ability to block TREK-1 by binding at the pore to stop ion flow through the channel. We are synthesizing light-activated blockers to more exactly study this important channel using photopharmacology. A new method was devised to synthesize these compounds. Previously, the azobenzene linked to a series of differing carbon chain lengths with direct formation of an ammonium group. The new method starts with the azobenzene linked with varying lengths of carbon chains followed by addition of either a mono- or disubstituted amine. These substituted amines vary in carbon chain length to provide variable amounts of hydrophobicity in the final product. Once the intermediate products are made, carbon chains will be added to create the quaternary ammonium which will act as the potassium channel blocker. This project is still ongoing, and a series of these compounds are being made for evaluation as a photoswitchable blockers for the TREK-1 channel. These various blockers will be tested by using electrophysiology experiments. This will be done by our collaborator to measure efficacy. I would like to thank the Center for Undergraduate Research (CUGR) for funding this research. (1) Honoré, Eric. “The Neuronal Background K2P Channels: Focus on TREK 1”, (2007). Nature Reviews Neuroscience 8: 251-261. (2) Piechotta, Paula L et al. “The Pore Structure and Gating Mechanism of K2P Channels”, (2011). The EMBO Journal 30(17): 3607-3619.

Abstract ID :
UMSS19175

Physician Assisted Death: Ethical Consideration and the Nurse's Role

Abstract Topic : Allied Health

Submission Type : Poster
Submission# : 407
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Patricia Miles [1]

Author Name : Karen Bushey [2] *
Graduate

Author Name : Sarah Somers [3]

Author Name : Patricia Poirier [4]

Abstract Description : Physician-Assisted Death: Ethical Consideration and the Nurse's Role Background Physician-assisted death (PAD) occurs when a physician provides a lethal dose of medication to a terminally ill patient at his/her request, to be taken at a chosen time to end life. Nationally, PAD is an option by law in five states and the District of Columbia. The public remains divided on whether to legally permit PAD for terminally ill patients with intractable suffering. The ethical concerns and moral beliefs surrounding PAD are based on religious, political, medical or personal beliefs. The moral values that guide the arguments for or against euthanasia are the framework for professional nursing ethics. Methods A literature search was completed utilizing databases at University of Maine and Eastern Maine Medical Center, including web searches of CINAHL and Pubmed. Several multidisciplinary professionals were interviewed for their views of PAD. Outcomes Nurses' role in PAD, begins with recognizing their own knowledge, attitudes, beliefs and biases. Nurses spend the greatest amount of time with end-of-life patients and frequently are the first ones to hear the patient's request for PAD. Nurses do not have to agree with an individual's choice, but must respect each patient as a person and advocate for the patient's choice. They act as a liaison between the patient/family and the medical community. It is incumbent upon nursing to provide emotional, spiritual, and cultural support to patients and families as they navigate through the PAD process. It is the role of nurses to educate and inform patients and families about all end-of-life choices.

Abstract ID :
UMSS19218

Physician-Assisted Death: An Analysis of Ethical Considerations

Abstract Topic : Allied Health

Submission Type : Poster
Submission# : 408 **Judge Time Slot :** AM2 (11:00 - 12:00)
Graduate

Author Name : Sarah Somers [1] *
Graduate

Author Name : Patricia Miles [2]

Author Name : Karen Bushey [3]
Graduate

Author Name : Patricia Poirier [4]

Abstract Description : Background: Society remains in debate on the question of whether to legally permit physician-assisted death (PAD) for terminally ill patients with intractable suffering despite palliative measures taken. It is also referred to as physician-assisted suicide, physician aid-in-dying, and patient administered hastened death. PAD occurs when a physician provides a lethal dose of medication to a terminally ill patient at his/her request and who is suffering, to be taken at a time of his or her choosing to end life. Legally, PAD continues to be a controversial subject internationally with accompanying ethical and moral concerns being based on religious, political, medical or personal beliefs. Internationally, PAD is legal and medically practiced in Switzerland, Germany, Japan, and Albania. In the United States, District of Columbia, Hawaii, Oregon, Vermont, Washington, and Montana currently permit PAD. In Canada, the scope of practice for nurse practitioners has expanded to included PAD. Healthcare providers struggle with moral and ethical tenets and reconciliation of an act prohibited by their professional oath. They are positioned to contribute their knowledge, experiences, and encouraged to become active in shaping future policy and practice regarding PAD. Review of the Literature: A comprehensive literature review was conducted using keywords: Physician-assisted death, Physician-assisted suicide, PAD, Ethics, Ethical Issues, Quality of Life, Pain, Suffering, End of Life, Nurse Practitioners. Outcomes: There are multiple ethical positions which influence public policy surrounding PAD. This can impact nurse practitioners as it may challenge their ethical, religious, and personal beliefs while meeting the needs of their patients.

Abstract ID :
UMSS19347

Phytoplankton community composition in relation to dimethyl-sulfide (DMS) in the North Atlantic Ocean

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 306
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Faith Hoyle [1] *
Undergraduate

Author Name : Lee Karp-Boss [2]

Abstract Description : Phytoplankton are known producers of dimethylsulfoniopropionate (DMSP), a compound which is converted to dimethyl-sulfide (DMS) by bacteria in the water column. When DMS is oxidized in the atmosphere it forms sulfate aerosols which act as nuclei for cloud formation. Clouds are an integral part of the global climate system because they reflect incoming solar radiation. Therefore, understanding the physical and biological processes that affect the production and flux of DMS to the atmosphere is crucial in understanding ocean-atmosphere-climate interactions. This study examined the potential link between phytoplankton community composition and DMS concentration in the water. High resolution chlorophyll (a proxy for phytoplankton biomass), DMS concentration in the water, and phytoplankton imagery data were collected along a transect in the North Atlantic Ocean. In addition, discrete water samples were collected for HPLC analysis of accessory pigments (which are used as an indicator for the presence of certain taxonomic groupings of phytoplankton). Preliminary results show that chlorophyll a is not a good predictor of DMS concentration, in agreement with previous field observations. However, differences in community composition could explain some of the variability observed in the North Atlantic. Initial results of the study show that locations with similar chlorophyll a concentrations but different DMS concentrations can vary greatly in community composition. Although community composition may explain some of the variability observed, further research should consider the role of additional physical and biological drivers to gain a more comprehensive understanding of DMS production.

Abstract ID :
UMSS19265

Pipeline Development for the Rapid Identification of Chromothriptic Plants Following Genome Elimination

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 343

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Charles-Alexandre Roy [1] *
Undergraduate

Author Name : Han Tan [2]

Abstract Description : Haploid induction is any process in which the number of chromosomes in an organism is reduced by half, resulting in haploid progeny. One of the ways to achieve haploid induction (HI) is via a mechanism known as genome elimination, where uniparental loss of chromosomes in vivo ensues after a HI cross. In Arabidopsis thaliana, genome elimination can be achieved via the manipulation of centromere-specific histone H3. Haploid inducing crosses in Arabidopsis have been found to result in chromothripsis, a phenomenon in which a chromosome becomes highly restructured following a catastrophic event. In cancers, chromothripsis is typically a terminal event; however, in Arabidopsis, we have found that chromothriptic chromosomes can be heritable. Therefore, Arabidopsis thaliana provides an excellent model to study the evolutionary and biomedical implications of chromothripsis on an organism scale, which are still not fully understood. Because chromothripsis only occurs in a limited number of offspring from genome elimination, a method was needed to identify and isolate chromothriptic plants for further study. This project describes the development of a pipeline for the rapid identification of chromothriptic plants using DNA extraction, sequencing, and dosage analysis in R. Work was also performed to determine the minimum amount of tissue to collect for sequencing and whether image analysis could save time by accurately predicting collected tissue for mass and purity. This workflow will prove useful for the rapid growth and characterization of chromothriptic plants and can be readily adapted for studying genome elimination and chromothripsis in other organisms in the future.

Abstract ID :
UMSS19223

Planning for uncertainty: The role of educational leadership in rural community vitality

Abstract Topic : Interdisciplinary

Submission Type : Oral

Submission# : 626

Judge Time Slot : PM2 (2:30 - 3:30)

Undergraduate

Author Name : Dominic Gayton [1] *
Undergraduate

Author Name : Owen VanDerAa [2]
Undergraduate

Author Name : Ismael Thadal [3]
Undergraduate

Author Name : Kathleen Bell [4]

Author Name : Mindy Crandall [5]

Author Name : Catharine Biddle [6]

Abstract Description : As rural economies across the nation shift away from manufacturing, youth and adults wishing to remain in rural places face an uncertain work future which requires the ability to adapt and innovate over the course of their lifespan. This study examines the changing economic and educational needs of forest-based rural communities to understand the mechanisms for these communities to better leverage schools to promote the alignment between education and local workforce needs. This study is being conducted by an interdisciplinary team with faculty and undergraduate researchers from education, economics, and forest resources. This pilot study is ongoing; an extensive interdisciplinary literature review has been conducted and currently data collection is underway. This review uncovered the impact of an increasingly post-productive forest economy on forest-based rural communities. Data collection currently consists of conducting interviews with key informants from the three rural communities being studied and will soon expand to the use of empirical data to further test our hypotheses. At the 2019 Student Symposium, we will present findings from our literature review that are driving our research in addition to some preliminary findings from our data collection process. This will include anonymized profiles of our three forest-based communities using information from the key informant interviews. The findings of this project will have implications for rural forested communities in Maine and beyond. We also hope to take questions, comments, and suggestions from the UMaine community on where the project might lead in the future. This research is funded and supported by the University of Maine Interdisciplinary Undergraduate Research Collaborative. We would also like to thank our community-based key informants for their participation, in addition to the reviewers and attendees of the National Rural Education Association 2018 National Forum to Advance Rural Education and Educate Maine's 2018 Annual Education Symposium and Leadership Luncheon.

Abstract ID :
UMSS19329

Potential value-added utilization of wood ash in construction materials

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral

Submission# : 257

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Naveen Saladi [1] *
Graduate

Author Name : Edwin Nagy [2]

Abstract Description : The ash products from the biomass plants are currently being disposed of as landfilling material that causes severe economic and environmental concerns. This project focuses on the feasibility study of using this woody bio ash in construction materials. The chemical analysis revealed that the chemical composition of wood ash does not change over time and the presence of considerable amounts of calcium-silica-alumina and amorphous phases triggering the utilization of wood ash as supplementary cementitious material (SCM). Because of the probable pozzolanic properties, wood ash can also partially or fully replace fly ash in the production of Controlled Low Strength Materials (CLSM). Because of a significant amount of calcium carbonate phase, wood ash can also be used in the production of cement. The results illustrate that the workability of wood ash blended samples are found to reduce as the replacement level is increased, this is because of the presence of alumina in its unoxidized form. The replacement of wood ash in both ground and sieved form is studied because of the presence of less fine particles. The ground samples are noted to give better strength than that of the sieved ones. In SCM it is observed that with more than 30% replacement level the strength reduces by 50% when compared to the regular cement systems. Hydrations effects are evaluated by isothermal calorimetry and wood ash is found to have hydraulic properties. Microstructure analysis revealed an increase in ettringite levels with an increase in wood ash content.

Abstract ID :
UMSS19254

Prevalence, patterns, and potential health impacts of a tick-borne pathogen in Maine moose (Alces alces)

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 368

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Caroline Dickson [1] *
Undergraduate

Author Name : James Elliott [2]
Undergraduate

Author Name : Lee Kantar [3]

Author Name : Sandra De Urioste-Stone [4]

Author Name : Anne Lichtenwalner [5]

Author Name : Pauline Kamath [6]

Abstract Description : In recent years, winter ticks have become an increasing concern for the vitality of New England's moose population, because in large abundances they have been shown to cause severe anemia. To our knowledge, no research has been conducted to determine if winter ticks transmit tick-borne pathogens (TBPs), and whether TBPs add compounding stress on population health. The purpose of this study was to (1) screen for tick-borne pathogens of the Anaplasma genus in Maine moose and winter tick, and (2) identify potential predictors of individual health outcome, in terms of Anaplasma infection status and calf mortality. Using a PCR-based assay, we found 54% of 157 moose and < 1% of 274 winter ticks tested positive for Anaplasma. Further sequencing and phylogenetic reconstruction based on the 16S rRNA locus suggested that Anaplasma from moose and winter tick were divergent strains. We compared logistic models using demographic variables, weight at capture, a host-genetic character, and tick-load to identify predictors for Anaplasma infection and calf survival. The best fit model for Anaplasma infection excludes winter tick load. Furthermore, our observation that the uncharacterized Anaplasma spp. found in moose did not persist in winter ticks suggests that winter ticks are an unlikely vector for the bacteria. The best fit model for calf mortality included tick-load, weight at capture, and Anaplasma infection status, suggesting infection could have a negative effect on health. These results highlight the need for future research to determine the vector of this novel species and the physiological consequences of infection.

Abstract ID :
UMSS1983

Prevalence, risk factors, and health impacts of lymphoproliferative disease virus in Maine's wild turkey population

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 355

Judge Time Slot : AM1 (9:30 - 10:30)

Graduate

Author Name : Stephanie Shea [1] *
Graduate

Author Name : Matthew Gonnerman [2]

Author Name : Erik Blomberg [3]

Author Name : Kelsey Sullivan [4]

Author Name : Pauline Kamath [5]

Abstract Description : Lymphoproliferative disease virus (LPDV) is an avian exogenous retrovirus that can cause lymphoid tumors and lesions. The virus was only recently identified, in 2009, in a wild turkey in the United States and subsequent surveys revealed a high prevalence of LPDV in wild turkeys across 17 states. With 82 percent prevalence in Maine's turkey population, local-scale research is warranted to gain insight into the effects of infection on wild turkey health. This project (1) evaluates the prevalence of LPDV across the state, (2) assesses risk factors of LPDV infection, and (3) examines the relationship between LPDV infection and both nest success and survival to elucidate population-level impacts. Samples were collected from hunter-harvested and live-captured wild turkeys in Maine and DNA was extracted from bone marrow or blood, respectively. Infection status was determined through PCR procedures. Hens were fitted with radio-transmitter or GPS backpacks to gather data on nest success and daily survival. We found an overall LPDV prevalence of 77%, which did not significantly vary by site, study area, or sex. Adults had a significantly higher prevalence (89 percent) than juveniles (46 percent). Hens infected with LPDV had a lower weekly survival probability (0.971) compared to uninfected hens (0.994), but there was no effect of LPDV infection on hen nest success. This research will provide data not only to inform monitoring strategies and the management of disease in this valuable game bird species, but also to evaluate the risk to humans, backyard poultry farms, and agriculture.

Abstract ID :
UMSS1950

Preventing Psychiatric Hospital Readmissions

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 410

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Samantha Davis [1] *
Undergraduate

Author Name : Taylor Roy [2]

Author Name : Hannah Moutal [3]

Author Name : Patricia Poirier [4]

Abstract Description : Abstract Background: Patients suffering from mental health disorders have a higher rate of hospital readmissions than any other medical condition. It is recorded that roughly fifty percent of the psychiatric readmissions are within 30 days of their discharge. Method:A review of the literature was conducted using the CINAHL database to answer the question, “For patients with mental health disorders, does the use of longer admission time and increased significant patient education reduce the readmission compared to acute admission length of stay?” Outcome: A total of 10 research studies were deemed relevant to the PICO question. It was found that readmission of psychiatric patients is associated with shorter hospital stays, inadequate discharge education, and lack of outside resources. This also extends to several individual factors in the psychiatric patients including their type of diagnosis, age, several environmental factors, post discharge follow up, continued outside treatment, and, of course, patient compliance (Kalseth, Lassemo, Wahlbeck, Haaramo, & Magnussen, 2016). Identifying these patient risk factors prior to discharge and supplying the resources necessary is key to preventing or reducing risk of readmission. Reference: Kalseth, J., Lassemo, E., Wahlbeck, K., Haaramo, P., & Magnussen, J. (2016). Psychiatric readmissions and their association with environmental and health system characteristics: A systematic review of the literature. BMC Psychiatry,16 (376), 1-9. doi:10.1186/s12888-016-1099-8

Abstract ID :
UMSS19248

Production and Validation of a Fluorescent Ligand Specific to Zebrafish Neutrophils

Abstract Topic : Physical Sciences

Submission Type : Poster
Submission# : 910
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Sadie Novak [1] *
Undergraduate

Author Name : Matthew Brichacek [2]

Abstract Description : Fluorescent bioimaging has proven to be a powerful tool for non-invasively studying biological processes in living systems. One application of this technique is through the use of a transgenic zebrafish model to study the innate immune response to infection of Candida Albicans. The specimens are genetically engineered to include a promoter in the genome that results in the expression of fluorescent proteins on neutrophils, so that interactions may be visualized. This method, however, is limited by time constraints that arise when having to depend upon the ability to modify the genetics of the fish model. To overcome this challenge, we are working to produce a previously developed biofluorescent probe, which was validated in a mouse model. The probe consists of three components, a hexapeptide, a fluorophore, and a polyethylene glycol (PEG) polymer. The peptide was found to bind to the formyl peptide receptors (FPRs) of the neutrophils in mice. Synthesis of this peptide was accomplished using solid phase peptide synthesis and standard Fmoc-chemistry . The peptide was purified via high performance liquid chromatography (HPLC), then characterized via mass spectrometry and 1HNMR, and resulted in a yield of 9mg. The PEG polymer, important in increasing the bioavailability of the probe, was conjugated to the peptide in a sodium borate acetonitrile buffer system. This molecule was characterized via MALDI mass spectrometry and 1HNMR. Further studies will verify the successful conjugation of the fluorophore to the PEG polymer. Once characterized, the probe will be validated through application to an unmodified zebrafish model.

Abstract ID :
UMSS19165

Production of pharmaceutical precursors from woody biomass

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 233
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Hussein Abdulrazzaq [1] *
Graduate

Author Name : Thomas Schwartz [2]

Abstract Description : 3-hydroxybutyrolactone (HBL) is a chiral building block used in the pharmaceutical industry and for organic synthesis. In this project, we seek to produce chiral HBL starting from woody biomass. Our preliminary observations suggest that glucose can be oxidized using pyranose-2-oxidase (POx) to glyconsone, followed by dehydration using aldose-2-ulose dehydratase (AUDH) to yield a cyclic intermediate we call "trione". This trione can undergo a retro-aldol reaction over a basic ($NaHCO_3$) catalyst, followed by hydrolysis over an acidic (Amberlyst-15) catalyst to produce HBL with glycolic acid as a byproduct, with products quantified by NMR. In this work, we will focus on analyzing our preliminary results and identifying the reaction products by using High-Performance Anion Exchange Chromatography (HPAEC). Preliminary results indicate promising conversion of trione into HBL over a mixed oxide catalyst MgO-ZrO_2. The HPAEC showed good resolution of the five anomers of trione and for the reaction products. Typically, trione has five anomers were quantified by NMR before, but HPAEC separated all these anomers perfectly. Notably, the mobile phase of the HPAEC is NaOH that we found, it subsequently reacts with the HBL species inside the HPAEC column and lead to open the HBL ring. These observations were validated by NMR via analysis of two different samples: pure HBL and a mixture of HBL and NaOH, the latter of which should ring-open under ambient conditions. Both samples showed different NMR spectrums which led to conclude that the opening ring of HBL species

Abstract ID :
UMSS1974

Prophage BPs drives differential gene expression in pathogenic Mycobacterium chelonae

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 832

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Sarai Smith [1] *
Undergraduate

Author Name : Sally Molloy [2]

Abstract Description : Pathogenic bacteria cause lower respiratory infections, diarrhoeal diseases, and tuberculosis are the cause of death for nearly six million individuals worldwide each year. Nearly all pathogenic bacterial species contain integrated bacteriophage genomes, or prophage, which often contribute to the virulence and fitness of the host cell. One example is the enhanced virulence of E. coli O157:H7 due to the presence of a shiga toxin-encoding prophage. All pathogenic strains of the Mycobacterium tuberculosis complex likewise contain prophage regions, most often phiRv1 and phiRv2. However, the impact of mycobacterial prophage on host gene expression is poorly understood, as these regions do not encode obvious virulence genes. Nontuberculous Mycobacterium species, such as M. chelonae, are fast-replicating and effective models for studying the effects of prophage on mycobacterial gene expression. RNAseq analysis of M. chelonae with and without prophage BPs reveals unique differential expression of 7.4% of the host genome. This includes significant differential expression of genes whib7, tap, and eis, which are related to antibiotic resistance and enhanced intracellular survival of M. tuberculosis in macrophage. We hypothesize that changes in gene expression will translate to phenotypic differences in BPs-M. chelonae as compared to wild-type M. chelonae. Antibiotic sensitivity and macrophage survival assays are currently being conducted to quantify these proposed phenotypic differences. As M. tuberculosis and M. chelonae are clinically-relevant pathogens, understanding their mechanisms of virulence are critical in the development of novel treatment strategies.

Abstract ID :
UMSS19362

Purchasing Approval System

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit
Submission# : 219
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Justin Alcorn [1] *
Undergraduate

Author Name : Syed Akhtar [2]

Author Name : Ben Bailey [3]

Author Name : Kyle Goodale [4]

Author Name : Brian Westhoven [5]

Author Name : Terry Yoo [6]

Abstract Description : The Composites Center at the University of Maine uses a purchase request system that currently suffers from errors and redundancies. A purchase request begins its life as an Excel spreadsheet. A user who submits a request does not know if they filled out the spreadsheet incorrectly until it has made it to the final approval stage, where it is either approved or denied. Along the way, the spreadsheet is emailed, printed, and scanned multiple times. This leads to a system riddled with errors. A modern system was needed. A web-based approach would allow instant feedback for people submitting purchase requests and would also give administrators more control over each request. Our web-based purchasing approval system uses modern technologies to provide a seamless and error-free experience for people at the Composites Center who wish to submit purchase requests. Our system integrates into the pre-existing myComposites website, an internal website used at the Composites Center. We used the Model-View-Controller framework to create a system that centralizes all purchase requests. The system provides three major benefits. First, users no longer need to wait until final approval to find that they have incorrectly submitted information as requests cannot be submitted by a user until the form is filled out correctly. Second, purchase requests are digitized and stored in a centralized database, which is useful for auditing purposes. Third, it allows administrators to view, approve, and deny requests, all from a single location.

Abstract ID :
UMSS19313

Quantifying Physiological Diversity of Wild Blueberries at a Single Site for Precision Agriculture

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 369

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Aldous Hofmann [1] *
Undergraduate

Author Name : Yongjiang Zhang [2]

Abstract Description : As one of Maine's most important crops, the wild blueberry has been facing increasing environmental stresses and showing a decline in production. Wild blueberries growing on the farm are highly diverse genetically with two primarily distinct species, requiring precision management techniques. Therefore, detecting the physiological diversity among blueberry plants of the farm is important for developing better management practices and increasing on-farm resource use efficiency. In this project, we began to quantify the variation in stem vessel size and density of wild blueberries across the farm (single site). Vessel size and density has a direct correlation with water transport capacity and plant productivity. We have collected stem samples of both wild blueberry species from across the Blueberry Hill Farm. Then, for this project, we measured vessel size and density of the stem samples collected. This information will advance our understanding on wild blueberry physiology and the response of this unique crop to warming and temperature-related stresses. In addition, we hope to provide the local farmers with information regarding physiological diversity on the farm and recommendation for precision agriculture and increasing on-farm water use efficiency.

Abstract ID :
UMSS19296

Quantifying tidally driven transport in the Jordan River estuary

Abstract Topic : Physical Sciences

Submission Type : Exhibit

Submission# : 901 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Gwyneth Roberts [1] *
Undergraduate

Author Name : Sean Smith [2]

Author Name : Lauren Ross [3]

Abstract Description : The Jordan River in Trenton, Maine is host to commercial mussel harvesting activities. These local aquaculture operations are susceptible to point source pollution and freshwater runoff induced closures, which are inherently linked to the dynamics of the estuary. This study aims to characterize the circulation patterns in the Jordan River estuary on various temporal scales to identify the controls of material transport in this system. In order to achieve this goal, a combination of in-situ collected data and analytical modeling was used to understand water level variations and tidal current velocity patterns in the river and to improve understanding of the hydrodynamic conditions and their implications for water quality. The model is based on the horizontal Reynolds Averaged Navier-Stokes equations in the shallow water limit with scaling parameters defined from characteristics of the estuary. Preliminary results of data analysis indicate that ebb velocities are dominant in the intra-tidal dynamics, indicating that subtidal (transport) velocities will be prominent in this system. Model results for subtidal flows show that there is outflow over the shoals and inflow over the channel driven by a combination of advection and Stokes drift. This pattern indicates that pollutants introduced to the system near the banks (from land-based sources) will be advected out of the system while pollutants introduced in the center (or from the seaward boundary) will be advected into the system. Thus, land-based pollutants will spend less time within the estuary. These results can be used to inform management decisions to minimize closure time throughout the harvest season.

Abstract ID :
UMSS1977

Race To Lysis; Characterizing Novel Gordonia Phage MagicMan

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 835

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Caiden Fraser [1] *
Undergraduate

Author Name : Emmie Baillargeon [2]

Author Name : Alec Ballinger [3]

Author Name : Zachary Williams [4]

Author Name : Keegan Gray [5]

Author Name : Melody Neely [6]

Abstract Description : Bacteriophage (phage) are viruses which infect and kill bacteria. Phage are the most plentiful organisms in the universe, with an estimated 1031 particles in the ecosystem. Novel Gordonia phage MagicMan was isolated from soil in Orono, ME using Gordonia terrae as a host. Of the 15,050 known Actinobacteriophage, only 2.5% are Gordonia phage which have been sequenced (PhagesDB). MagicMan particles have a head diameter of 150 nm and a tail length of 700 nm. MagicMan is a temperate, Siphoviridae cluster DB phage which is closely related to cluster DB Gordonia phage Schwabeltier. MagicMan is a temperate Gordonia phage with a GC content of 67.1% encoding 70 putative genes, of which 5 are orphams (genes with no known homologues). Bioinformatic tools are used to analyze and determine the location and function of genes in the MagicMan genome, including PhagesDB, PECAAN, Phamerator, and DNA Master. MagicMan is a unique Gordonia phage, which demonstrates the mosaicism and diversity present in bacteriophage. Genetic diversity and simplicity of phage genomes provide opportunities to learn about bioinformatics and phage biology. Phages targeting G. terrae have been isolated from industrial sludge and can destroy the biofouling products formed by Gordonia species.

Abstract ID :
UMSS19234

Rapid Prototyping to Roll-to-Roll Printing

Abstract Topic : Biomedical Sciences

Submission Type : Poster
Submission# : 853 **Judge Time Slot :** AM1 (9:30 - 10:30)
Undergraduate

Author Name : Chris Toothaker [1] *
Undergraduate

Author Name : Bailey Corless [2]

Author Name : Amber Boutiette [3]

Author Name : Caitlin Howell [4]
Undergraduate

Abstract Description : Point of care (POC) diagnostics is a growing market for personalized medicine which can use microfluidic components for customized treatments without the need to travel to a care facility or an inconvenient wait in results. However, current microfluidic component production is expensive and time-consuming, both of which can hinder the high-volume production necessary to meet market needs. The purpose of this project is to evaluate the process of roll-to-roll (R2R) manufacturing for lowering the cost of mass-producing microfluidic mixing components for POC devices. To accomplish this, theoretical models of fluid flow were first created using SOLIDWORKS and COMSOL simulations. Experimental data were compared with the theoretical data for two test patterns: one isotropic channel system that induced mixing purely by diffusion at the boundary between fluids, and a second system with diamond-shaped protrusions to disrupt laminar flow and induce chaotic advection for enhanced mixing. The isotropic mixer had a theoretical mixing index of 0.139 and an experimental mixing index of 0.446, while the diamond mixer had a theoretical mixing index of 0.880 and an experimental mixing index of 0.448. These discrepancies in the mixing indexes is likely due to imperfections in the experiments run. Nevertheless, this work moves us closer to the goal of rapidly prototyping microfluidic components in a cost and time efficient manner, which may eventually enable high-volume production for the POC market.

Abstract ID :
UMSS19197

Reconciling community visions of coastal change: Participatory approaches for interpreting risk and resilience in Maine

Abstract Topic : Social Sciences

Submission Type : Oral

Submission# : 163 **Judge Time Slot :** PM1 (1:00 -2:00)

Graduate

Author Name : Kevin Duffy [1] *

Graduate

Author Name : Laura Rickard [2]

Abstract Description : While aquaculture is publicized as a sustainable solution to offset production declines in many wild-caught fisheries, it is suffering serious "image problems." Unlike traditional fisheries, marine aquaculture does not provide the vivid exemplars typically associated with the cultural identity of Maine's coastal users. This identity, paired with a general lack of public knowledge about aquaculture, can influence public attitudes and even provoke conflict. Disputes concerning risks to the social and natural environment are among the most common. However, the current sites for community participation do not permit sufficient public voice in decision-making because they largely uphold the top-down, "decide, announce, defend" strategy for resource management. To adequately reconcile different visions for coastal development, it is critical to engage the expertise of community members in a context that is not limited by the rigid timing or rules of public meetings or comment periods. To do so, the present research employs photovoice, a participatory action-based research method that engages community perceptions through photo elicitation and analysis. The method offers a collaborative framework to evaluate how communities visualize multi-use environments and why certain visualizations become incompatible with development. Applying both photovoice and Q method, the proposed mixed-method, multi-phase research seeks to understand Maine coastal users' preferences for local viewsheds by defining "sense of place" through landscape features that promote perceptions of risk and resilience. This research will help managers respond to visual risk-based concerns related to aquaculture development, and it supplements a growing trend to incorporate visuals in participatory resource management.

Abstract ID :
UMSS1988

Red Blood Cell Diameter as a Proxy for Anemia in Moose

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 831

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Ryan LaGross [1] *
Undergraduate

Author Name : Anne Lichtenwalner [2]

Abstract Description : The moose (Alcesalces) is the largest living species of the Cervidae family. Because of their size, these animals are prone to infestation by high numbers of winter ticks.Accumulatively, these parasites causesevere blood loss that can lead to chronic or acute anemia. Anemiais a decrease in the amount of circulating red blood cells (RBCs), as indicated by the packed cell volume (PCV) of a blood sample. Anemic individuals are likely to release larger, immature red blood cells (RBCs) into circulation to compensate for the lack of smaller, mature RBCs. The goal of this project is to determine whether RBC diameter, evaluated using a moose blood smear, can be used as a proxy for anemia. To do this, we will test whether there is a correlation between RBC diameterin blood smears, versus PCV measured from whole blood. This will be done by measuring the diameter of RBCs in samples of blood from healthy moose and comparing it to the PCV of those individuals. Moose were sampled as part of routine health monitoring by the Maine Department of Inland Fisheries and Wildlife, and blood slides were stained with Wright Giemsa stain for cytologic evaluation. Images of the samples were captured using an Olympus DP71 system, and cell diameter measured using ImageJ software. It is anticipated that finding a correlation between RBC diameter and PCV will allow for RBC diameter to be used a proxy for evaluating anemia in moose.

Abstract ID :
UMSS19397

Refining the James Webb Space Telescope NIRSpec's Post-Pipeline Data Analysis

Abstract Topic : Physical Sciences

Submission Type : Oral

Submission# : 915

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Alex Koch [1] *

Graduate

Author Name : David Batuski [2]

Abstract Description : Using simulated data from the James Webb Space Telescope's (JWST) Near-Infrared Spectrograph (NIRSpec) instrument, we are working to test and refine the telescope’s post-pipeline data analysis methods. Simulated data was developed by NASA's Space Telescope Science Institute (STScI) and is based on Hubble Space Telescope eXtra Deep Field (XDF) observations of 230 distant (redshift > 2) galaxies. By developing a program in the Python coding language, we are able to plot 1-dimensional spectra of these distant galaxies. Because these galaxies have known redshifts from XDF observations, we can also estimate where important spectral lines such as hydrogen-alpha and hydrogen-beta should be located within the spectrum. Finally, we use a curve-fitting routine included in the Python SciPy package to measure emission line widths of these known spectral lines for several galaxies. By refining the post-pipeline data analysis for JWST using simulated data, we aim to develop best practices for designing observations and their subsequent analysis, thereby maximizing the early scientific return of JWST, which is scheduled for launch in 2021. These techniques can be used to analyze a variety of properties such as rotation curves, AGN activity, and star formation rates of galaxies which existed in the earliest epochs of the Universe.

Abstract ID :
UMSS19222

RELATIONSHIPS BETWEEN NORTH PACIFIC SEA SURFACE TEMPERATURE AND FRASER RIVER SOCKEYE SALMON (Oncorhynchus nerka) RETURNS

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 344

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Thomas Phillips [1] *
Undergraduate

Author Name : Thomas Andrew [2]

Abstract Description : Sockeye salmon (Oncorhynchus nerka) spend 2 to 3 years as adults living and feeding in the open North Pacific before returning to their naitive river to spawn. The Fraser River, British Columbia, Sockeye return has approximately a 4 to 5 year cycle. It is one of the largest in North America and is of strong commercial value. Salmon are strongly affected by sea surface temperatures (SST) both as a signal for important life strategies and as an indicator of ocean conditions that influence the amount and quality of their food. Previous studies show that SST patterns correlate to salmon returns. Here we use annual sockeye return values from 1982 to 2016 acquired from the Canadian Pacific Salmon Commission, and concurrent satellite-measured SST patterns to investigate relationships between SST and the number of returning fish. Monthly averaged SST maps over the northeast Pacific were extracted from global fields acquired from the NOAA Earth System Research Laboratory and monthly anomaly maps were formed by subtracted monthly climatology. Sockeye return values from the strong-return years are compared to SST anomalies sampled at a series of 8 locations representative of the salmon habitat. The relative strength of strong-return years is then compared to SST anomaly patterns over the NE Pacific. Relationships between the salmon returns and SST anomaly patterns are discussed in relation to the two dominant modes of climate variability that control SST over the North Pacific, the Pacific Decadal Oscillation (PDO), and the El Niño Southern Oscillation (ENSO).

Abstract ID :
UMSS19356

Relay-Assisted Wireless Energy Transfer Scheduling with Dual Data-Energy Channel Models

Abstract Topic : Engineering & Information Sciences

Submission Type : Oral

Submission# : 258
Graduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Sonia Naderi [1] *
Graduate

Author Name : Ali Abedi [2]

Abstract Description : Battery charging and replacement in hard to reach areas and extreme environments is always a challenging part of wireless sensor network (WSN). Passive sensor technology can eliminate the need for battery, but it suffers from short communication range. Recently, wireless energy transfer (WET) for powering remote sensor nodes in a WSN has drawn considerable research attentions, since it can charge sensing circuits remotely and relieve the need for power cables and battery replacement. In this project, we consider a relay energy assisted communication scenario where the transmitter is powered by a energy source through both direct and relay links. We transmit energy and data randomly based on two separate stochastic models for data and energy channels and study various static, mobile, highly scattered without and with line of sight (LOS) and totally 27 possible channel models. Energy efficient scheduling method on outage probability of proposed system model is studied which is a method to determine when to transmit data based on the amount of stored energy in the sensor and the noise levels on the data channel. An analytical expression has been derived to approximate outage probability of system. Simulation results verify the effectiveness of energy relaying in reducing the outage probability of system and improving power efficiency.

Abstract ID :
UMSS1982

ReMo Gordonia Phage

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 335 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Remi Geohegan [1]
Undergraduate

Author Name : Gabrielle Spencer [2]

Author Name : Morgan Crapo [3]

Author Name : Jessica Hayden [4] *
Undergraduate

Author Name : Sarah Latario [5]
Undergraduate

Author Name : Sally Molloy [6]

Abstract Description : The bacteriophage (phage or viruses that infect bacteria) population is one of the most ubiquitous within the biosphere. With an estimated global population of 1031 phage particles, the study, characterization and utilization of bacteriophage genes represents untapped potential in the field of microbiology. However, there is still much unknown about diversity of bacteriophage genomes and the unique proteins they encode. A novel Gordonia terrae phage was isolated from a soil sample using enriched isolation and was characterized using electron microscopy, host range assays, and an immunity assay. Its genome was extracted, sequenced, annotated, compared to other sequenced phage genomes and assigned to a cluster of related phage, cluster A15 . ReMo is a temperate phage; it maintains its genome in the bacterial cell without lysing the cell. It demonstrates superinfection immunity to infection by itself and other cluster A15 phage. Unusually, the genome does not contain the typical integration gene, integrase, and instead encodes a parABS system to maintain its genome as a plasmid in the host cell. The genome is 52,601 bp in length with a GC content of 61.9% and encodes 98 putative genes and 4 tRNAs. ReMo encodes a VIP-2-like toxin, which is used by bacteria to target insects. This toxin suggests potential insecticidal applications for phage. ReMo is a unique phage with many uncharacterized genes that warrant future study. Acknowledgements: Research reported in this project was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103423

Abstract ID :
UMSS19331

Requiem, a sound installation about extinction

Abstract Topic : Art

Submission Type : Oral

Submission# : 713

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Steve Norton [1] *
Graduate

Author Name : Susan Smith [2]

Abstract Description : Requiem is sound installation by sound artist and musician Steve Norton. The work's topic is human-driven extinction. It is an electronic music composition whose sound materials are exclusively the sounds of bird and frog species which have gone extinct during the era of recorded sound, enabling us to hear them once again, ad aeternum. This is a unique moment in the history of life (and death) on earth, the beginning of a new era. Although Requiem's formal structure is perceptually indeterminate, mimicking the processes of nature, the reality it presents is fictional, juxtaposing species nearly all of whom never coexisted in time and space. This play of reality and irreality mirrors the nether state of the recently extinct, where, in many cases, humanity is unsure whether the species is actually gone for good or if a tiny population is holding out somewhere, undetected.

Abstract ID :
UMSS19144

Researching Sympathetic Nerve Plasticity in Adipose Tissue Using Electron Microscopy and Immunofluorescence

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 844

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Emma Garner [1] *
Undergraduate

Author Name : Kristy Townsend [2]

Abstract Description : Obesity, weight gain and the many metabolic disorders that can arise from being overweight are some of the most predominant health issues in America, including prominently in the State of Maine. The body's ability to balance energy intake and energy expenditure is what determines whether a person gains or loses body fat. Although there are many different factors that influence energy storage and expenditure, neural innervation of white and brown fat (or adipose) tissues is an important aspect of energy balance that is not well understood. The Townsend Lab focuses on brain-adipose communication and the role of adipose peripheral nerves in maintaining proper body weight and metabolic health. One of the major unanswered questions in the field is how the peripheral nervous system innervates individual adipocytes as well as cells in the stromal vascular fraction (SVF), or the immune and progenitor cells that reside adjacent to adipocytes in the adipose organ. Synapses were imaged in inguinal adipose tissue using transmission electron microscopy (TEM), which provides ultra-structural detail of synapses in adipose tissue. Although no synapses were found using EM in the current study, we were able to observe SVF immune cells and axonal cross-sections in the SVF. We are also imaging synapses in inguinal and axillary adipose tissue using immunofluorescence for synaptic markers at a magnification of 100X that will be a more appropriate scale for synaptic identification on specific cell types. This research was funded by the Maine Space Grant Consortium 2018 Summer Fellowship.

Abstract ID :
UMSS1981

Reuse & Resilience in Maine's Rural Communities: Policy impacts of second-hand economies

Abstract Topic : Social Sciences

Submission Type : Oral
Submission# : 162
Graduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Brieanne Berry [1] *
Graduate

Author Name : Cynthia Isenhour [2]

Abstract Description : Across the state of Maine the phenomenon of rapid, unplanned de-industrialization has left many communities struggling to envision sustainable economic futures. Pulp and paper mills, once the lynchpin of rural towns, have shuttered, leaving behind what some scholars term "depleted" communities, which seem to lack an "economic rationale as space" (Johnstone and Lionais 2004, 217). My research explores how reuse economies – the sale, swap, barter, repair, and exchange of previously owned items in their original form – contribute to the social, cultural, and economic life of rural communities. I argue that while these communities certainly do need support, there is significant and under-recognized potential in reuse economies to achieve social, environmental, and economic outcomes. While many scholars of sustainability point to the environmental potential of reuse to reduce the need for production, consumption, and disposal of natural resources associated with new manufacturing, my research also highlights other forms of value that are generated in reuse economies. Using mixed methods, including semi-structured interviews, participant observation, and data generated from statewide surveys of reuse businesses and household participants, I suggest how policies that support reuse might help achieve well-being in the face of economic and environmental uncertainty. As scholars, policymakers, and community leaders seek sustainable forms of development for post-industrial economies, my research directs attention to the overlooked value in Maine's consistently vibrant reuse economies. This research contributes to a broader understanding of resilience and well-being that has important implications for sustainable community development. Recognizing the multiple forms of value that are generated within reuse economies can help direct development strategies that improve not only economic measures, but also quality of life and social relationships.

Abstract ID :
UMSS19302

Risk Factors for Completed Suicides

Abstract Topic : Social Sciences

Submission Type : Exhibit
Submission# : 104
Graduate

Judge Time Slot : PM2 (2:30 - 3:30)

Author Name : Erica Batson [1] *
Graduate

Author Name : Dorine Wright [2]

Author Name : Georgia Howland [3]

Author Name : Andrea Steward [4]

Author Name : Elizabeth Armstrong [5]

Abstract Description : Abstract Summary Suicide was the second leading cause of death in Maine among adults aged 25-34 and the fourth leading cause of death among adults aged 35-54 from 2012-2014 (Maine DHHS, 2016). The state saw a 27% increase in suicide rates from 1999-2016, which pushed Maine rates above the national average (Mitchell, 2018). These sobering statistics have encouraged researchers to assess the risk factors of completed suicides. This project, completed in partnership with the Margaret Chase Smith Policy Center (MCSPC) uses data on completed suicides in Maine (2016-2018) from the National Violent Death Reporting System (NVDRS). This data shows individuals in fishing, labor, and health care industries are at the highest risk for completed suicides in Maine. The purpose of this project is to identify both common and unique risk factors across these three industries. We have hypothesized factors such as isolation, access to means, seasonality, mental health issues, burnout, and income security underlie the high rates of completed suicide in these industries. We will use univariate and bivariate analysis to identify similarities and differences in the risks associated with completed suicide for individuals in each of these three occupational groups. Identifying common risk factors may assist employers and policymakers in creating changes within their respective areas of power to lessen the number of completed suicides within our state, particularly in these high-risk industries.

Acknowledgments This research is supported by the Margaret Chase Smith Policy Center at the University of Maine.
References Maine DHHS. (2016). Maine Suicide Prevention Program. Retrieved from https://www.maine.gov/suicide/about/data/index.htm. Mitchell, J. (2018). CDC report: Maine’s suicide rate has climbed more than 27 percent. Retrieved from http://www.mainepublic.org/post/cdc-report-mainesuicide-rate-has-climbed-more-27-percent#stream/0

Abstract ID :
UMSS1958

Risk Perceptions of Moose-Winter tick interactions in Maine

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 332

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Asha DiMatteo-LePape [1] *
Undergraduate

Author Name : Sandra De Urioste-Stone [2]

Abstract Description : In order to answer the question of how people perceive the interactions between winter ticks and moose in Maine, interviews were conducted with three stakeholder groups: hunters, outfitters, and Wabanaki citizens. If stakeholders believe winter ticks are negatively impacting moose, they will see winter ticks as threatening recreation opportunities, cultural identity, and both wildlife and human health. Interviewees were determined through recruitment and subsequent snowball sampling techniques and a literature review was conducted on relevant publications. These interviews were analyzed using a case study methodology to gain an insight into how these stakeholders viewed the zoonotic disease risk associated with winter ticks and moose, as well as how winter tick-moose interactions could impact moose health, economic vitality, recreation opportunities, cultural identity, and human health in Maine. While there seemed to be a high level of awareness about ticks in general and the threat of Lyme disease, less was known about winter ticks as a separate species. It became clear that stakeholders knew winter ticks could negatively impact moose, and that moose play a huge role in Maine culture. Hunting and recreational opportunities, cultural identity, and tourism all rely in part on having a healthy moose population. From outfitters leading moose viewing tours to Wabanaki citizens who rely on moose for sustenance, winter ticks are a threat. These trends stress the need for continued research on the impacts of winter ticks on moose, and how these impacts could change the Maine we know.

Abstract ID :
UMSS19127

RogerDodger: Novel Gordonia Bacteriophage

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 847

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Victoria Mayers [1] *
Undergraduate

Author Name : Kaitlyn Jodoin [2]

Author Name : Marc Thibodeau [3]

Author Name : Matthew Seuch [4]

Author Name : Sally Molloy [5]

Abstract Description : RogerDodger: Novel Gordonia Bacteriophage Jodoin, K., Mayers, V., Seuch, M., Thibodeau, M., Molloy, S. Department of Molecular and Biomedical Sciences, College of Natural Sciences, Forestry, and Agriculture, University of Maine   Bacteriophage (phage) are viruses that attack bacteria and are the most numerous entity on Earth with an estimated 1031 phage in the biosphere. Actinobacteriophage are phage that infect Actinobacteria, including Gordonia bacteria. Gordonia is one of the many genera within the Actinobacteriophage group. Gordonia is a valuable species that degrades environmental pollutants, xenobiotics or other slowly biodegradable natural polymers. Studying the phage that infects Gordonia helps us better understand the physiology of this important genus of bacteria. These biological entities are isolated from a variety of sample sources and their genomes are sequenced in a lab. RogerDodger, a Gordonia specific bacteriophage, was isolated from soil and sequenced. RogerDodger is a temperate phage with a Siphoviridae particle morphology. This phage belongs to cluster DC and has a genome length of 59,122 base pairs, containing 97 putative genes and a GC content of 67.9%. RogerDodger encodes genes necessary for a temperate lifestyle including two distinct integrases, which is unusual. The genome itself is circularly permuted, meaning it has terminally redundant genome ends. Future research of RogerDodger includes further analysis of gene function and identifying regulatory sequences such as the phage attachment site, attP.

Abstract ID :
UMSS1951

Role of Arsenic and CFTR in Neurological Development and Regulation of Immune Processes

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 823 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : William Petterson [1] *
Undergraduate

Author Name : Ben Williams [2]
Undergraduate

Author Name : Christian Potts [3]

Author Name : Joshua Passarelli [4]
Undergraduate

Author Name : Sarah Latario [5]
Undergraduate

Author Name : Keith Hutchison [6]

Author Name : Benjamin King [7]

Abstract Description : Arsenic exposure has been shown to negatively impact neurological function and innate immunity. In parts of rural New England, 10% of private wells have arsenic levels that exceed the federal safety limit of 10 ppb. However, previous research indicates that levels of arsenic below this threshold have a substantial negative impact on innate immune functioning and neural cell development. Cystic Fibrosis Transmembrane Conductance Regulator (CFTR), a gene mutated in individuals with cystic fibrosis, has been linked to decreased innate immune function. Discovering differentially expressed genes in response to low-level arsenic exposure and the compounding effects of CFTR antisense morpholino knockdown will provide new hypotheses for future research in arsenic neurotoxicity and innate immunity. We analyzed an existing RNA sequencing dataset to discover such differentially expressed genes in 24 hpf zebrafish embryos. These data characterized zebrafish subjected to the experimental factors of low-level arsenic exposure, CFTR knockdown, and infection with the opportunistic pathogen Pseudomonas aeruginosa at 6, 12 and 18 hpi. Genes imperative for proper neurodevelopment, such as those that function in the notch signaling pathway and oligodendrocyte progenitor development, were down-regulated in zebrafish exposed to low-level arsenic. Also, CFTR knockdown affected various immune cell receptors and decreased expression of CXCR3.2, a protein vital for macrophage recruitment. These data reveal what are likely key factors in understanding how environmental stressors and genetic perturbations impact neurological function and innate immunity. Our study was funded by National Institutes of Health grant P20 GM103423 and the RNA-Seq study was funded by P20 GM103534.

Abstract ID :
UMSS19108

Role of IRS1 and IRS2 in skeletal development

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 810

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Victoria DeMambro [1] *
Graduate

Author Name : Anyonya Guntur [2]

Author Name : Cliff Rosen [3]

Abstract Description : IRS1 and IRS2 are critical adaptor proteins involved in Insulin/IGF1 signaling pathways. Global mouse gene KO's have indicated roles for IRS1 and IRS2 in bone homeostasis. To elucidate the cell autonomous effects of these proteins in skeletal development, we created conditional deletions in the appendicular skeleton utilizing the Prrx1-Cre transgenic strain crossed with floxed alleles of Irs1 (IRS1cko), Irs2 (IRS2cko) and Irs1/Irs2 (IRS1/2cko). DEXA analysis was performed at 8 and 16wks of age in the IRS1cko and IRS2cko mice and controls. Body weights and femur lengths were collected at 16wks of age. IRS1/2cko and controls were phenotyped at 8wks of age with histology, RNAscope and TUNEL staining being performed on newborn and 8wk old hindlimbs. At 8wks of age IRS1cko mice had decreased body weight ($p < 0.01$), while IRS2cko mice exhibited no change. IRS1/2cko mice, displayed a 50% reduction in body weight ($p < 0.0001$), 70% decreases in femur length and areal aBMD ($p < 0.0001$). At 16wks of age IRS1cko and IRS2cko mice had decreased femur lengths (15%, $p < 0.0001$; 4%, $p < 0.05$) and aBMD ($p < 0.0001$ and $p < 0.01$). Newborn IRS1/2cko bone sections displayed normal expression of Col1a1 and Col2a1, with decreases in Col10a1 and Sox9. Histology of 8wk old bones revealed the lack of formation of secondary ossifications centers with increased expression of Bnip3 and TUNEL staining. IRS1 and IRS2 are integral to longitudinal bone growth. Further studies are needed to determine if the lack of secondary ossification in the IRS1/2cko mice is attributable to established Insulin/IGF1 signaling or as of yet unknown pathways. This work is funded by NIH/NIAMS R03AR068095, NIH/NIGMS P20GM121301 and NIA/NIGMS U54GM115516.

Abstract ID :
UMSS19109

Role of the Accessory Domain on CpsA Function and Capsule Production

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 821

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Gina DiFederico [1] *
Undergraduate

Author Name : Melody Neely [2]

Abstract Description : Group B Streptococcus (GBS) can be found in the vaginal and gastrourinary tract of females, as well as the gastrourinary tract of males, where it behaves as a commensal organism. However, as an opportunistic pathogen, GBS has the capability to infect the immunocompromised, making it a major threat to neonates and fetuses. The pathogen can be passed from mother to baby either in utero or during birth. The capsule, which is a polysaccharide coating on the outside of the cell is considered the most important virulence factor in GBS. Expression of capsule plays a role in evasion of the host immune response to GBS infection. The presence of capsule on GBS depends on the CpsA protein, which is involved in the attachment of capsule to the cell wall. CpsA is a multi-functional protein containing an intracellular domain and two extracellular domains including the accessory and the LytR domains. Previous data demonstrates a small region within the accessory domain of CpsA that, when expressed separately, can have a negative effect on the amount of capsule on the cell. In this study, the deletion of the extracellular accessory domain of CpsA will help to determine the role of the domain on CpsA function and capsule production. Cell morphology analysis, capsule assays, and virulence studies will all be used to analyze results of a deletion of the accessory domain.

Abstract ID :
UMSS19136

Ruminating on Images Versus Words: The Impact on Negative Affect

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 131

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Hannah Lawrence [1] *
Graduate

Author Name : Rebecca Schwartz-Mette [2]

Abstract Description : Rumination, or perseveration on negative affect, increases risk for depression (e.g., Nolen-Hoeksema & Morrow, 1991). Although rumination was originally conceptualized as a verbal thought process, recent evidence finds that many individuals ruminate in the form of imagery (e.g., McLaughlin et al., 2007). The present study examined how imagery and verbal thought during rumination and distraction impacted affect. Imagery is found to amplify negative affect relative to verbal thought (e.g., Holmes & Mathews, 2005). Thus, it was expected that relative to verbal thought, imagery would result in greater maintenance of negative affect in response to rumination and greater relief from negative affect in response to distraction. Undergraduates (N= 117) with elevated depressive symptoms completed a rumination/distraction induction and rated the extent to which they experienced imagery and verbal thought during the induction. Individuals in the rumination condition reported less imagery [$t(115) = 8.96$, $p < .01$] and more verbal thought [$t(115) = 7.86$, $p < .01$] than individuals in the distraction condition. For individuals who experienced greater imagery during the induction, distraction improved affect more relative to rumination. For individuals who experienced less imagery, rumination and distraction similarly maintained negative affect. Results suggest that distracting cognition high in imagery may serve as a particularly effective intervention for reducing negative affect for depressed individuals. Acknowledgements: The lead author is supported by a Janet Waldron Doctoral Research Fellowship. References Holmes, E. A. & Mathews, A. (2005). Mental imagery and emotion: A special relationship?. Emotion, 5, 489-497. McLaughlin, K. A., Borkovec, T. D., & Sibrava, N. J. (2007). The effects of worry and rumination on affect states and cognitive activity. Behavior Therapy, 38, 23-38. Nolen-Hoeksema, S. & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. Journal of Personality and Social Psychology, 61, 115-121.

Abstract ID :
UMSS19214

Safety assessment of hydroponic lettuce

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 325

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Adwoa Dankwa [1] *
Graduate

Author Name : Robson Machado [2]

Author Name : Jennifer Perry [3]

Abstract Description : Introduction: Pathogenic organisms on fresh produce pose a serious risk of infection with devastating health consequences to humans. Hydroponic produce poses less risk of infection due to minimal contact with pathogens and soil. The commonest leafy vegetable produced by the hydroponic system is lettuce, which is consumed mostly in the raw state. Purpose: To assess primary populations and drivers of microbial populations in a commercial, recirculating hydroponic system. Methods: Samples (peat-moss substrate, lettuce leaves, roots) were obtained from an active, commercial hydroponic greenhouse. Water samples were collected from four sites across the recirculation system. Sampling was repeated four times. Samples were culturally enumerated for aerobic mesophiles, coliforms, and fungi. Identification of Listeria spp. was conducted by selective enrichment with isolation on MOX and PALCAM media. Data were subject to ANOVA and LSD test for mean separation. Results: At harvest, leaves had significantly lower bacterial levels compared to plugs, roots and water. However, counts increased significantly after packaging. Product inversion during manual packaging explains this finding. Fungi counts of up to 6.1 logCFU/g were recorded in the spent substrate, consisting of Trichoderma spp. applied as a biocontrol measure. The native peat substrate had the highest count for all enumerated populations, appearing to be the primary inoculant source in the recirculating system. Significance: Evidence suggests a high microbial load in the hydroponic system with microbes originating from the substrate to edible plant parts during packaging and distribution. Coliform presence across all samples indicates a potential hazard of hosting pathogenic Enterobacteria.

Abstract ID :
UMSS19196

Says Who? A Dam Decision Matrix Comparison Between Stakeholders and News Media

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 156 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Kaitlyn Raffier [1] *
Undergraduate

Author Name : Sharon Klein [2]

Abstract Description : Dam issues spark a lot of controversy, often facing criticism and media coverage. Yet, some amount of bias is always present in what is reported by the media. Using matrices to assess how often decision criteria and alternatives are mentioned together, can be very useful in showing what issues and bias exists between groups. My work explores bias and compares the media "voice" (e.g. what reporters are saying the public views as important in dam decisions) with what we are hearing from stakeholders. I use media discourse analysis (MDA), stakeholder (federal government, state government, community groups, NGOs, and owner/operators) interviews, and multi-criteria decision matrix modeling to compare multiple dam decision criteria and alternatives. Qualitative content analysis drives my comparison between the MDA and stakeholder interviews. Using NVivo, I run matrix queries to get frequencies of mentions of decision criteria and alternatives for different stakeholder groups. I use Microsoft Excel to create a multi-criteria decision matrix from the MDA. These matrices show the frequency with which decision criteria and alternatives were being mentioned together by interviewees and the media, respectively. We use this comparative analysis to interpret how the media represents the importance of different decision criteria and how that differs from stakeholders actually involved in real dam decisions. By comparing what decision criteria and alternatives appear in the media articles and what is being mentioned by stakeholders in interviews, we are able to see how the media is capturing (or not capturing) the complexities behind dam decision making.

Abstract ID :
UMSS19244

Scale-Up of Biodegradable Golf Balls Comprised of Lobster Shell

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 247 **Judge Time Slot :** AM1 (9:30 - 10:30)
Undergraduate

Author Name : Rosamond Hickey [1] *
Undergraduate

Author Name : David Neivandt [2]

Abstract Description : Scale-Up of Biodegradable Golf Balls Comprised of Lobster Shell Hickey,R.1, Carter,N.1, Neivandt,D.1, Beaupre,J2. 1Department of Chemical and Biomedical Engineering, University of Maine 2Department of Industrial Cooperation, University of Maine Golf Balls littering the ocean floor is becoming apparent as a source of marine plastic pollution. It has been estimated that around 300 million golf balls end up in the ocean from the United States alone. The solid core of most golf balls contains zinc oxide and zinc acrylate which is added to the rubber for flexibility and durability but are toxic in aqueous environments. When present they activate stress responses in sea life which can affect the ecosystem within the ocean. The coating found on the modern golf ball is made of a polyurethane elastomer which erodes into microplastic pieces that have the potential to be ingested by marine life. Clean up procedures have been put in place by coastal golf courses, but this is an expensive, inefficient solution. Alternative biodegradable golf balls such as Eco-Golf balls will degrade within 3-6 months of being in the ocean yet can be reused if retrieved. A downside is that they are smaller than normal golf balls. It is proposed that a golf ball composed of gelatin, lobster meal, and water may be a viable solution to creating an environmentally conscious golf ball. The current work is optimizing a process to scale up the production of the lobster golf balls that were first made successfully at the laboratory scale in 2011.

Abstract ID :
UMSS19270

Science Communication through Art and Neural Networks with Euglena

Abstract Topic : Interdisciplinary

Submission Type : Poster

Submission# : 620 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Brynn Yarbrough [1] *
Undergraduate

Author Name : Nishad Jayasundara [2]

Abstract Description : Project XENOLALIA is an art-science installation that intersects an artificial intelligence neural network and colonies of a single-celled freshwater photosynthetic algae Euglenas gracilis. This project focuses on bridging art, biology, and engineering to communicate fundamental principles of science to the public. The goal for this project is two-fold. First we determine the optimal growth conditions for E. gracilis to be used in this installation and to see if their rate of movement towards light can be increased. Subsequently, we capture the E. gracilis image an input into the neural network to process and identify that image. This newly derived image will then be projected onto the petri dish full of E. gracilis. They will then respond by mimicking the new image; which will then again be fed into the neural network creating an infinitely iterative process. This iterative loop can be then be perturbed by introduction of environmental variables. We intend to take advantage of this installation to educate the public about how living systems may respond to environmental change. During this project we have been able to determine the most optimal conditions to increase E. gracilis concentration under a light source and have developed the artificial intelligence network for image recognition and processing. Future research will focus on developing this as an educational tool based on an ongoing collaboration with James F. Doughty School in Bangor. This research was funded by the Center for Undergraduate Research.

Abstract ID :
UMSS19325

Screening for Borrelia spp. bacterial infections in moose and winter tick populations in Maine

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 378

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Jaycob Bowker [1] *
Undergraduate

Author Name : James Elliott [2]

Author Name : Ann Bryant [3]

Author Name : Pauline Kamath [4]

Abstract Description : Abstract Lyme disease is an emerging infectious disease (EID) in Maine, primarily caused by the spirochete bacteria, Borrelia burgdorferi. The ecology of the Lyme pathogen has been well-studied, with several classified hosts that are known to increase the risk of human infection, such as the white-footed mouse. However, considering the economic, cultural, and ecological value of the Eastern moose (Alces alces americana), little is known about the species' role in the ecology and transmission dynamics of the Borrelia pathogen. We used a PCR-based approach to identify the presence of the Borrelia spp. in winter ticks (n = 274) , a primary tick parasite of moose in North America. Furthermore, we performed a small pilot study to screen for Borrelia infections in moose, using liver (n = 5) and ear (n = 9) tissues. We detected the Borrelia bacteria in a single moose ear sample, but the winter tick from the same moose did not carry this bacteria. The low prevalence of Borrelia in winter tick suggests that they are likely not a primary, but an incidental vector of Borrelia spp., and that an alternative vector may be the source of Borrelia infections in moose. These results highlight the need for further research to understand the prevalence, distribution and potential health impacts of Borrelia in moose. Acknowledgements We would like to thank Lee Kantar (Maine Department of Inland Fisheries and Wildlife), Anne Lichtenwalner (UMaine Veterinary Diagnostic Laboratory), Griffin Dill (UMaine Diagnostic and Research Laboratory, Tick Lab) and Chuck Lubelczyk (Maine Medical Center Research Institute) for providing the samples included in this study. This research was funded by a Center for Undergraduate Research 2018-19 Academic Year Fellowship, a University of Maine Interdisciplinary Undergraduate Research Collaboratives grant, and the USDA-National Institute of Food and Agriculture Hatch grant project No. ME021908.

Abstract ID :
UMSS1998

Sensitivity of Phytophthora erythroseptica to oxathiapiprolin

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 338

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Alice Chesley [1] *

Undergraduate

Abstract Description : Title: Sensitivity of Phytophthora erythroseptica to oxathiapiprolin Applicant: Alice Chesley Advisor: Dr. Jianjun Hao, Associate Professor Phytophthora erythroseptica causes pink rot of potato, and has resulted in significant yield losses to potato production in the north region, including Maine. The newly developed fungicide oxathiapiprolin is effective to control pink rot. However, P. erythroseptica could evolve to overcome the fungicide and become a resistant population, which would result in the loss of control efficacy of the fungicide. Laboratory experiments were conducted, with the aim to evaluate the risk of resistance development in P. erythroseptica. To conduct this work, 33 isolates of P. erythroseptica were obtained from potato tubers showing pink rot. Each isolate was transferred onto a Petri plate containing V8 juice agar amended with various concentrations of oxathiapiprolin, and incubated at 22C for a 96 hours in the dark. Effective concentration for 50% mycelial growth inhibition (EC50) was established regression. Baseline sensitivity was established, based on the resultant EC50s. Results showed that EC50 ranged from 0.00063 ug/mL to 0.0033 ug/mL, with median value of 0.0015 ug/mL. The EC50s showed a normal distribution, indicating no mutant population was found from the isolates collected. Given the results, potato growers will have new information for combating Phytophthora erythroseptica using oxathiapiprolin, in addition to furthering the scientific community's knowledge about the invasive oomycete. Acknowledgements This project was made possible through UMaine's Plant Pathology lab, UMaine' Work Study program, and funding from USDA-NIFA Special Research Grants Potato Breeding and Maine Potato Board. References Lu, X H, et al. "Wild Type Sensitivity and Mutation Analysis for Resistance Risk to Fluopicolide in Phytophthora Capsici." Current Neurology and Neuroscience Reports., U.S. Library of Medicine, Dec. 2011. Miao, et al. "Resistance Assessment for Oxathiapiprolin in Phytophthora Capsici and the Detection of a Point Mutation (G769W) in PcORP1 That Confers Resistance." Frontiers, Frontiers, 14 Apr. 2016.

Abstract ID :
UMSS19349

Sensory Innervation in Adipose Tissue

Abstract Topic : Biomedical Sciences

Submission Type : Exhibit

Submission# : 807

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Emma Paradie [1] *
Undergraduate

Author Name : Cory Johnson [2]

Author Name : Magdalena Blaszkiewicz [3]

Author Name : Kristy Townsend [4]

Abstract Description : Obesity and its comorbidities have reached pandemic levels resulting in an increased prevalence of diabetes. Diabetes is accompanied by diabetic neuropathy, or nerve damage that most often begins in the extremities leading to pain and loss of sensation. While the brain is responsible for coordinating the balance between energy intake and energy expenditure, peripheral nerves are responsible for communicating between the brain and peripheral tissues, including adipose. One method of brain-adipose communication is through sensory nerves, which are known to express transient reception potential (TRP) channels that modulate sensory signaling through calcium uptake. TRPs are known to be sensitive to lipids, as well as other stimuli and are currently unexplored in adipose tissue. Nerve function may also be impacted by the local extracellular matrix. We have demonstrated that inhibiting a collagenase, known as matrix metalloproteinase 13 (MMP-13) may play a role in diabetic peripheral neuropathy of mice. In addition, several of the peripheral nerves in adipose are myelinated and appear to be surrounded by specialized glia called Schwann cells, which regulate axonal myelination. Schwann cells are known to work with macrophages in lesioned peripheral nerves to clear myelin debris – vital for axonal regeneration. The activation of Schwann cells (and other supporting glia) could be critical in sensory nerve health and may contribute to adipose tissue dysfunction in obesity and diabetes.

Abstract ID :
UMSS19232

Sex Education: Giving Youth Skills for Lifelong Sexual Health

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 160

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Julia Haberstick [1] *
Undergraduate

Author Name : Susan Gardner [2]

Abstract Description : Sex education in America has always been highly debated. There is no national policy or law that mandates sex education. States create their own policy, and each school district has the autonomy to decide the content of the curriculum. Due to this, there is great variability in the content of sex education, leaving some students with little to no knowledge on the functions of their bodies and sexuality as a whole. Sex is a healthy part of an adult's life, and sex education should teach individuals the skills and knowledge to go through life with confidence and happiness. In this I study, I analyze the current state of comprehensive sex education and abstinence-only education nationally, with a focus on the state of Maine. I've collected curriculum from 16 secondary schools throughout the state. Using this information as well as the available literature on sexual health outcomes in the U.S, I created my own sex education curriculum in the hopes of improving the lives of teens and young adults. This research will not only add to the current academia surrounding sex education, but will highlight it's benefits, and its necessity. It can also improve the lives of millions of young people who are in need of developing the skills to build happy, healthy relationships.

Abstract ID :
UMSS19357

Shear Connectors for Hybrid Composite FRP-Concrete Bridge Girders

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit
Submission# : 207
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Dante Guzzi [1] *
Graduate

Author Name : William Davids [2]

Abstract Description : In the fiber-reinforced polymer (FRP)-concrete bridge girder system developed at UMaine, composite action between the concrete deck and FRP is necessary for the section to work efficiently. The degree to which the two materials act compositely is heavily reliant on the effectiveness of the shear connectors that positively connect them. The connection systems must be able to withstand the maximum shear flows developed between the girder and deck while permitting little or no relative slip, but also have sufficient fatigue capacity to remain effective over the life-span of a bridge. In a conventional steel and concrete super structure, the steel is attached to the concrete deck through shear studs welded to the top flange of each girder. These studs enable the concrete deck and steel girder to act compositely, and have been extensively tested for both strength capacity and fatigue resistance. With a FRP girder welded studs are not an option and a new type of shear connection system is necessary. This research was conducted in two phases. Initially experimental testing of different shear connection systems was carried out to determine their viability for bridge applications. Strength, stiffness and fatigue resistance properties were all assessed. Work then shifted towards numerical modeling, where the effectiveness of the shear connectors was assessed based on the stiffness values collected during the testing process. This modeling gave insight into the maximum spacing of the shear studs that could be used while retaining full composite action, and the effect of partial composite action on girder response. Acknowledgements: This project was funded by the US Army Corps of Engineers: Engineer Research and Development Center (ERDC). Research was conducted at the Advanced Structures and Composites Center.

Abstract ID :
UMSS19373

Simulating UAV Flight for Designing an Extended Kalman Filter

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 206

Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : John Goulet [1] *

Graduate

Author Name : Samuel Hess [2]

Author Name : Charles Hess [3]

Abstract Description : Unmanned aerial vehicle (UAV) popularity has taken off given many of the the applications they can serve to the public. Many applications require the constant use of GPS for navigation. This limits UAV missions to a space where GPS coverage is reliable. In an effort to increase the available mission space for UAVs, functioning flight algorithms within GPS denied regions are a topic of serious research.Under the direction of Dr. C.T. Hess, Dr. Samuel Hess, and Dr. Rubenstein, a simulation was developed in MATLAB and Simulink for testing in the development of an Extended Kalman Filter for onboard UAV guidance, navigation, and control. Quadcopter control is done via user inputs or by predesignated control inputs. Simulation outputs include all parameters needed for state estimation using the Kalman Filter. The state being estimated is as follows: UAV position, UAV velocity, UAV attitude, obstacle position (for avoidance), and "source of interest" direction. In the state vector, the source of interest direction guides the UAV towards points of interest using onboard UAV sensors. This includes radiation hot spots, areas of high gas concentration, or regions with a low temperature gradient. The Extended Kalman Filter estimates the state of the UAV using only knowledge of the previous state and current measurements. The low computational requirement for such a filter enables its use in low budget missions or experiments. The completion of this simulation allows for further progress to be made on the Kalman Filter.

Abstract ID :
UMSS19252

SLEEVE: Combining medical simulation technology into a low-cost, wearable device for the training of nursing students

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 217
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Austin Steward [1]
Undergraduate

Author Name : Anna Webber [2] *
Undergraduate

Author Name : Dan Lesko [3]

Author Name : Caitlin Howell [4]
Undergraduate

Abstract Description : The demand for nurses is increasing at a rate that nursing programs cannot sustain. This is partially due to limited resources of educational facilities, especially in rural regions. To address this, we have developed a wearable sleeve that can be used to train nursing students on how to perform a general patient assessments. The design consists of three basic subsystems that mimic normal and pathological conditions of capillary refill of the fingernail bed, administration of medication through an IV port, and radial pulse. For capillary refill, blanching is simulated with an LED triggered by a force sensor. Cycle times are based on normal and pathological data, with force calibrations from nursing professionals used to facilitate a more accurate assessment. For the IV port, a pigtail catheter is embedded into the [CLH1] device and designed with a collection bag for administering medications. For radial pulse, a heart rate is simulated using a closed fluidic system under physiological pressures. These pressures were validated with energy balance models. The subsystems are individually embedded into layers of silicone on a cotton sleeve and can be worn by an actor portraying a patient, allowing them to present with pathological vitals. Specific consideration was taken to ensure the most realistic presentation of anatomy and pathology for optimized interaction of nursing students with the device. This low-cost, high-fidelity solution will enhance existing educational facilities and begin to address the nursing shortage by making nursing programs more accessible and realistic.

Abstract ID :
UMSS19404

Social and ecological factors influencing the sustainability of intertidal clam aquaculture

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 129

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Molly Miller [1] *
Graduate

Author Name : Teresa Johnson [2]

Abstract Description : Intertidal clam aquaculture has the potential to diversify and sustain a declining wild fishery that is important to the economies and culture of coastal communities. However, this emerging strategy for aquaculture raises new questions regarding ownership, management authority, and access to resources in the intertidal. Clam aquaculture falls within an existing fisheries co-management structure, which is an additional layer of complexity to intertidal aquaculture management strategies. While many municipalities utilize conservation measures similar to aquaculture, individual clam farms are slow to develop. Little scholarly work has been done to explore the important human dimensions of this intertidal resource or the complex interactions of the coupled human and natural system in which it is embedded. This ethnographic study of the soft-shell clam fishery and aquaculture in Maine aims to understand the social-ecological variables important to the development of sustainable intertidal clam aquaculture. This research also examines how intertidal clam farming intersects with the commercial clam fishery. Semi-structured interviews with wild clam harvesters, state regulators and other key stakeholders provide understanding of the important opportunities and challenges associated with the development of intertidal clam aquaculture as well as the role of communities in moving this sector forward.

Abstract ID :
UMSS19342

Social Media: Is it harming your relationship?

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 114

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Monica Pallin [1] *
Undergraduate

Author Name : Claire Sullivan [2]

Abstract Description : The purpose of my study is to understand the negative effect social media platforms such as Instagram, Facebook and Snapchat have on romantic relationships in young adults. My research focuses on the impact social media may have on relational suvelliance. Researchers found that jealousy and monitoring online activity are key themes in this work. Another key theme in this body of work were excessive media use and how younger generations are more vulnerable to social media addiction.Recent studies have have indicated that social media influences levels of depression, anxiety and stress and this in turn can affect one's romantic relationships. Mental health is important in relational satisfaction and social media has taken a toll on many people's mental health. One's self esteem has been impacted by social media use and social media related drama. I plan to learn more about why and how social media affects individuals and their relationships. This study will be conducted using an online anonymous survey in Qualtrics to gather data about the effects social media has on romantic relationships. The survey will include opinions and experience with social media in current or past relationships. Demographic questions, use of social media and the Survelliance Instrument will be used to collect data. Data will be analyzed to look for differences realted to gender, level of social media use, and relational status. Implications of this study will also be addressed.

Abstract ID :
UMSS19151

Sonication of cetylpyridinium chloride for mast cell toxicology experiments

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 848 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Bailey West [1] *
Undergraduate

Author Name : Julie Gosse [2]

Abstract Description : Cetylpyridinium chloride (CPC) is an antimicrobial agent used at high concentrations in personal care products such as mouthwashes, as an alternative to triclosan (TCS). Current literature searches indicate that the effects of CPC on eukaryotic cells are largely unknown. Research on the toxicology of CPC is pertinent to consumer safety. We have developed a protocol for the dissolution of CPC into Tyrode's buffer at physiological pH 7.4 and 37 ℃by using a 20-minute sonication, which has proven to be an effective and efficient method for producing a solution of CPC at a desired concentration. The molar extinction coefficient of CPC was confirmedusing UV-vis spectroscopy, so the concentration of CPC solutions can be accurately determined. The next step is to investigate the effects of CPC, in various doses relevant to human exposure, on signal transduction in the ubiquitous mammalian cell type mast cells and to determine CPC cytotoxicity. The Gosse lab discovered that TCS inhibits mast cell function by collapsing plasma membrane potential (PMP); we will utilize the genetically encoded voltage indicator ArcLight A242 to test whether CPC also affects PMP. Understanding how CPC affects mast cells, which share signaling molecules and processes with numerous other eukaryotic cell types, will provide a basis for predicting CPC effects in other cell types.

Abstract ID :
UMSS19204

Spatial & Temporal Dynamics of 5-HT2 Receptor Subtypes in JCPyV Infection Using Super-Resolution Localization Microscopy

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 857

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Kashif Mehmood [1] *
Graduate

Author Name : Jeanne DuShane [2]
Graduate

Author Name : Matthew Parent [3]

Author Name : Samuel Hess [4]

Author Name : Melissa Maginnis [5]

Abstract Description : JC polyomavirus (JCPyV) is human-specific virus that infects most of the adult population. In healthy individuals, JCPyV causes an asymptomatic persistent infection while in immunocompromised individuals, it causes a devastating demyelinating disease called progressive multifocal leukoencephalopathy (PML). To understand disease pathogenesis, it is critical to elucidate the first steps of the viral infectious cycle: attachment to and entry into host cells. Attachment of JCPyV to host cells is mediated through α2,6-linked sialic acid receptors whereas entry of JCPyV into cell is regulated by 5-hydroxytryptamine 2 (5-HT2) receptor subtypes. However, the mechanisms by which JCPyV interacts with 5-HT2 receptors is not well understood due to limitations of resolution in conventional fluorescence microscopy techniques. The goal of this project is to characterize the spatial and temporal dynamics of 5-HT2 receptors during JCPyV interaction utilizing a super-resolution based advanced microscopy technique. This technique, fluorescence photoactivatable localization microscopy (FPALM), resolves images beyond the diffraction limit of conventional microscopy techniques. Our preliminary data shows JCPyV localizes with 5-HT2 receptor subtypes expressed in photoactivatable Dendra2 constructs. Further, our data indicates that viral colocalization varies between 5-HT2 receptor subtypes. Using FPALM super-resolution microscopy we will be able to define how the 5-HT2 receptors mediate JCPyV entry. Knowledge generated from this study will elucidate new findings on viral attachment and invasion of the host cell, allowing us to identify new targets for potential antiviral therapies

Abstract ID :
UMSS19122

Stay out of my stash: deer mouse and southern red-backed vole seed cache management

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 340 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Bobby Brittingham [1] *
Undergraduate

Author Name : Alessio Mortelliti [2]

Abstract Description : Abstract: Deer Mice (Peromyscus maniculatus) and southern red-backed voles (Myodes gapperi)are efficient seed predators,obtaining up to 95% of available seeds in their surroundings. There are two options these animals take once they have a seed, immediate consumption or storing the seed for future use in a cache site. There is a gap in knowledge about how individual deer mice and red backed voles manage their caches, as well as how their cache management varies with different personalitiesof individuals. Personality is defined as a behavioral tendency that varies consistently among individuals and across environmental contexts. I propose to address this knowledge gap by monitoring cache sites of previously tagged deer mice and southern red-backed vole individuals. From the data I plan to collect, I will test variables of cache usage with linear regression models fitted through software R.

Abstract ID :
UMSS19297

Steric stabilization of phycobiliprotein loaded liposome through Polyethylene glycol and cellulose nanocrystals and their impact on gastrointestinal tract.

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 361 **Judge Time Slot :** AM1 (9:30 - 10:30)

Graduate

Author Name : Avinash Singh Patel [1] *
Graduate

Author Name : Balunkeswar Nayak [2]

Abstract Description : The present study was undertaken to understand the simulated gastrointestinal tract (GIT) phase dependent behavior of phycobiliprotein (PBP) loaded liposomes which were stabilized through polyethylene glycol (PEG) adsorbed cellulose nanocrystals (CNCs). Adsorption of PEG with different molecular weights (MW) of 400, 600, 1000, 1500 and 4000 gmol-1 onto the CNCs displayed a significant re-dispersion of desulfated CNCs (DCs) in an aqueous medium. Consequently, PEG adsorbed CNCs displayed a significant ($p< 0.05$) effect onto the stability of liposomes in GIT phase. The effect of GIT phase onto the quality characteristics of samples such as average particle size distribution, average zeta potential, PEG-CNCs desorption behavior, coalescence of liposomes, liposome digestion and PBP release kinetics was recorded on zeta-sizer, Fourier-transform infrared spectroscopy, confocal laser scanning microscopy and spectrofluoroscopy. Findings revealed that the simulated gastric juice phase of GIT displayed significant effects on desorption of PEG from DCs surface and subsequently, coalescence of liposomes. Results also showed that the liposomes stabilized through higher MW of PEG such as DPCs-4000 followed by DPCs-1500 and DPCs-1000 displayed a higher degree of anti-coalescence behavior even after desorption as compared to lower MW of PEG (DPCs-600 and DPCs-400). However, liposomes stabilized through DCs displayed insignificant effect on the stability of liposomes.

Abstract ID :
UMSS19155

Surface acoustic wave platform for hydrogen gas detection at temperatures above 200°C

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 236

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Armando Ayes [1] *
Graduate

Author Name : Nicholas Aiken [2]
Undergraduate

Author Name : Mauicio Pereira Da Cunha [3]

Abstract Description : The detection of H2 at high-temperatures is significant for military, aerospace and power generation applications. Silicon-based solutions are incapable of functioning properly at temperatures above 200°C. In this work, a surface acoustic wave (SAW) platform was explored as sensors for H2 at temperatures ranging from 200°C to 400°C. In previous work, crystallographic orientations on the commercially available plane of Langasite (LGS) described by Euler angles {0°,138.5°,Φ°} with desirable coupling coefficients (K2) and Temperature Coefficients of Delay (TCD) were identified and SAW resonators to be used as sensors were designed, fabricated and tested. Four of these orientations on the commercial plane of LGS characterized by Euler angles {0°,138.5°,Φ°} fabricated at the University of Maine facilities, both bare and with a sensing layer of yttria stabilized zirconia (YSZ), and exposed to high-temperature gas cycling tests to investigate the platform response to H2 at high-temperatures. The results indicate increasing resonant frequency shift magnitude due to H2 exposure as temperature increases up to 400°C, and the results also indicate differences in resonant frequency magnitudes due to due to H2 exposure amongst the selected orientations. These differences in resonant frequency, coupled with incresed responsiveness to H2 with increasing temperatures, could potentially be exploited to have a multisensor array capable of determining the temperature of a system as well as the presence of H2 at higher temperatures.

Abstract ID :
UMSS19128

Sustainable Plant Growth in Space: Exploration of Micro-satellites

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 209

Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Shayla Rose Kleisinger [1] *
Undergraduate

Author Name : Summer Keim [2]

Author Name : Peter Robinson [3]

Author Name : Stephanie Burnett [4]

Author Name : Caitlin Howell [5]
Undergraduate

Author Name : Lisa Weeks [6]

Abstract Description : This research highlights the use of micro-satellite technology, known as CubeSats, for studying the effects of a space environment on plant growth. Originally developed in 1999 by California Polytechnic State University and Stanford University; the technology became an area of study for NASA through the CubeSat Program. Current NASA expeditions do include explorations of plant growth on-board the International Space Station (ISS), however, these must be partially-maintained by crew-members.The work conducted for this project illustrates the potential for a completely self-sustained plant growth system that fits within a volume of 3 L and has a mass of less than 4 kg. Microgreens were studied due to their high nutrient density, their ability to be grown outside of soil, and their ideal growth height being 5.08 cm, which comfortably fits within the size limits. The model includes the use of plant-growing unit designs for space travel, known as plant pillows, that have been adapted to ensure the containment of growth-media particulates and for efficient delivery of nutrients without occupying a significant amount of space within the satellite. Sensor systems to monitor parameters such as physical growth, carbon dioxide concentration, pressure, temperature, humidity, and plant-media moisture were used in the CubeSat. Utilizing CubeSat satellite technology for plant-growth experiments will allow for future exploration of the effects of the environmental differences between the earth and space, including the effects of radiation, microgravity, and thermal conditions.

Abstract ID :
UMSS19184

Synergistic effect of co-inoculation with Dickeya dianthicola and Pectobacterium parmentieri on potato

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 323

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Tongling Ge [1] *
Graduate

Abstract Description : Blackleg and soft rot of potato can be caused by Dickeya spp. and Pectobacterium spp. It was observed that among the potato samples with blackleg and soft rot symptoms, collected from Northeastern U.S. region, around a third of them were co-infected by both Dickeya dianthicola and Pectobacterium parmentieri. To determine the role of these two bacterial species on disease expression, a field trial was conducted in Maine. Seed tubers of potato varieties 'Shepody', 'Lamoka', and 'Atlantic' were inoculated with D. dianthicola, P. parmentieri, or both species using a vacuum infiltration method. The tubers were air-dried and stored in a 4°C cold room until use. Inoculated and non-inoculated (control) potatoes were planted in a randomized block designed field trial. Blackleg symptoms appeared 70 days post planting. Potato inoculated with D. dianthicola had higher disease incidence which was 14.0 %, than that with P. parmentieri which was 10.2%. Potato plants inoculated with both bacteria showed the highest disease incidence, which was 20.5% . This trend was consistent across all three potato varieties, although 'Shepody' was the most tolerant and 'Lamoka' was the most susceptible of the three varieties. These results indicate that D. dianthicola cause more disease than P. parmentieri, but also that the co-infection of both species promotes the disease epidemic at a higher level.

Abstract ID :
UMSS19323

Synthesis and Application of Cellulose Based Hydrogels for Anti-Biofouling in Marine Environments

Abstract Topic : Natural Sciences

Submission Type : Oral
Submission# : 370
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : David Rondeau [1] *
Undergraduate

Author Name : William Gramlich [2]

Abstract Description : Biofouling is the natural accumulation of organisms on a substrate. This process is detrimental to marine based industries such as shipping, fishing and aquaculture creating a need for antibiofouling materials. While antibiofouling agents do exist, they most commonly contain biocides which are harmful to non target species and the local environment. For this reason, the development of a material capable of anti-biofouling that is environmentally inert is highly desirable. Ultimately, the goal of this research is to develop a hydrogel which can prevent biofouling in marine environments. Hydrogels are a group of materials defined by their ability to retain relatively large quantities of water yet are water insoluble. The hydrogels being used in this research contain a norbornene functionalized cellulose based back bone and can be crosslinked by various dithiol molecules at the norbornene sites. As they are based on cellulose, these hydrogels should not have any unwanted ecological consequences. Thus far, rheology has demonstrated that the physical properties of hydrogels can be tuned by controlling their thiol to norbornene ratio. Decreasing the thiol to norbornene ratio of certain hydrogels results in faster degradation rates of the gels, which should lead to faster release of organisms. These hydrogels can adhere to solid surfaces and remain on them for extended periods of time while in a marine environment. Ongoing work is being done to determine if the degradation rate of a hydrogel affects its anti-biofouling abilities. Hydrogels with greater degradation rates are hypothesized to have improved anti-biofouling abilities. Acknowledgements: This activity is supported by National Science Foundation award #IIA-1355457 to Maine EPSCoR at the University of Maine. This research was funded by the Center for Undergraduate Research 2018-19 Academic Year Fellowship.

Abstract ID :
UMSS19266

Synthesis and Characterization of Piezoelectric AlN Thin Films Using Plasma-Assisted Electron-Beam Evaporation

Abstract Topic : Physical Sciences

Submission Type : Poster

Submission# : 908

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Morton Greenslit [1] *
Graduate

Author Name : Robert Lad [2]

Abstract Description : Reliable sensors that operate in harsh high temperature environments up to 1000oC are key for improving the maintenance, efficiency, and safety of large-scale industrial power plants. Surface acoustic wave (SAW) sensors are very attractive for these applications since they can operate wirelessly, can be attached to hard-to-access harsh environment locations, and have a self-powered low-profile design. Typical SAW sensors are fabricated using a piezoelectric single crystal such as langasite (La3Ga5SiO14), but these single crystals limit the sensor attachment methods and exhibit significant acoustic loss at frequencies between 300 MHz - 2.4 GHz. In this work, aluminum nitride (AlN) thin films with thicknesses in the range 100-500 nm are being investigated as a potential alternative to single crystal piezoelectrics. The AlN films are being grown using electron-beam evaporation of an Al source in the presence of a N2plasma on c-sapphire substrates in an attempt to improve film quality over the traditional growth method of magnetron sputtering. Film compositions measured using x-ray photoelectron spectroscopy (XPS) indicate that the AlN stoichiometry has minimal variation as deposition parameters are changed. Film crystallinity and grain formation are being probed by x-ray diffraction to determine if the goal of having highly preferred (0002) epitaxial grain orientation and high piezoelectric coupling is achieved. A photolithographic mask was developed with several types of SAW device configurations to extract the piezoelectric coupling coefficients for these AlN films in comparison to more conventional piezoelectric single crystals.

Abstract ID :
UMSS19339

Synthesis and use of photoswitchable ligands for CRAC channel inhibition

Abstract Topic : Physical Sciences

Submission Type : Oral

Submission# : 914

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Anwesha Sil [1] *
Graduate

Author Name : Michael Kienzler [2]

Abstract Description : The Calcium ion (Ca+2) is an all-round intracellular messenger which serves as a key factor in controlling different cellular functions that include gene expression, proliferation, neurotransmitter release, motility and cell death. Store operated calcium entry through calcium release activated calcium (CRAC) channels replenishes intracellular calcium stores and sustains calcium signaling. The proteins, Stromal Interaction Molecules (STIM) 1 and 2, detect the depletion of Ca+2 from the endoplasmic reticulum. Serious immunodeficiency and auto immunity diseases are associated with defects in CRAC channels and therefore pharmacological modulators are necessary for regulating their activities. The importance of these channels in cellular functions calls for a potent and specific inhibitor to enhance its subfunction in native cells. The most widely investigated CRAC channel inhibitor 2-APB (2-Aminoethoxydiphenyl Borate), has either a potentiating or inhibitory effect on the activity of the CRAC channels, depending on the concentration used. Thus, it could not be considered as a very reliable drug. One of the key ways to control the specificity of a drug is by photopharmacology. Azobenzene-containing photochromic ligands undergo reversible photoisomerization and can be switched on and off by using light and therefore can be used to make light controlled ligands for CRAC channels. Our research aims to synthesize azobenzene based ligands and then characterize their photoswitchable properties and in order to determine their functionalities as CRAC channel inhibitors. Refernces: 1.Tian, C.; Du, L.; Zhou, Y.; Li, M. Future Medicinal Chemistry 2016, 8, 817-832 2. 2. Broichhagen, J.; Frank, J.; Trauner, D. Accounts of Chemical Research 2015, 48, 1947-1960 3. 3. Hou, X.; Pedi, L.; Diver, M.; Long, S. Science 2012, 338, 1308-1313

Abstract ID :
UMSS19262

Synthesis of Cellulose Nanofibril-Silver Nanowire Conductive Films

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster
Submission# : 251
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : David Flewelling [1] *
Undergraduate

Author Name : Muhammad Hossen [2]
Graduate

Abstract Description : Cellulose Nanofibrils (CNF) are a plant-based material with a number of useful applications and unique properties. When chemically treated with TEMPO, CNF can be dried in layers to form transparent and flexible films. Silver Nanowires (AgNW) are a class of silver nanoparticles. In addition to having a number of unique and valuable optical properties, AgNW are also highly conductive. By integrating these two materials together, it may possible to create a flexible, optically transparent, and conductive CNF-based film. If this was possible, it would have a number of significant applications, including as an alternative to conventional methods of creating flexible electronic devices. This poster presents several methods of producing a CNF-AgNW film and their results, some of which support that it is possible to create a conductive, flexible, and transparent film from these materials.

Abstract ID :
UMSS19420

Synthesize and characterization of biological grade Hydroxyapatite using Hydrothermal method

Abstract Topic : Interdisciplinary

Submission Type : Oral

Submission# : 629

Judge Time Slot : PM2 (2:30-3:30)

Graduate

Author Name : Sahar Roozbahani [1] *

Abstract Description :

Abstract ID :
UMSS19283

Synthesizing Amphiphilic Bottlebrush Block Copolymers for Anti-Marine Fouling

Abstract Topic : Physical Sciences

Submission Type : Poster

Submission# : 907

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Hathaithep Senkum [1] *
Graduate

Abstract Description : Adhesion of marine fouling on surfaces such as ship hulls, pipelines, and fishing nets causes higher fuel consumption and maintenance costs. Microorganism settlement on medical equipment also causes infection to patients. To overcome these problems, amphiphilic polymers containing a quaternary ammonium moiety are widely used to prevent settlement. Linear polymers with flexible structures can have different morphologies while dry versus when wet, likely changing their anti-fouling ability. Bottlebrush polymers with dense branches off the polymer backbone are less flexible and help stabilize the structure when they are used under water, potentially improving their anti-biofouling nature. In this research, cationic bottlebrush homopolymerization, which has not been reported in literature, was demonstrated and studied in detail. Then, amphiphilic bottlebrush block copolymers of cationic polymers and polystyrene (PS) were created via ring opening metathesis polymerization (ROMP). Prior to this synthesis via ROMP, the tertiary amine macromonomers of poly(dimethylamino ethyl acrylate) (PDMAEA) were made via reversible addition-fragmentation chain transfer (RAFT) polymerization to generate polymers with a polymerizable norbornene end group (macromonomer). The PDMAEA macromonomers were quaternized with hexyl bromide and dodecyl bromide to obtain quaternary ammonium macromonomers with different quaternary ammonium substituents. The cationic bottlebrush polymer containing hexyl substituents was successfully synthesized with targeted molecular weights, but the polymer with bulkier dodecyl substituents slowed ROMP due to steric hindrance. Amphiphilic bottlebrush block copolymerization was accomplished by polymerizing PS macromonomers and cationic macromonomers with hexyl substituents. Block copolymers with a variety of block compositions were synthesized with desired molecular weights with low dispersity.

Abstract ID :
UMSS19113

Systematic Assessment of a Novel Marker for Adult Neural Stem Cells in Male and Female Mice

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 843

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Trevor Morin [1] *
Undergraduate

Author Name : Kristy Townsend [2]

Abstract Description : Mouse Telomerase Reverse Transcriptase (mTERT) is an enzyme that lengthens the ends of chromosome during cell division and has been shown to be a distinct marker for slow-cycling intestinal stem cells. Previous studies have reported high levels of telomerase gene expression during neuronal development but have also shown limited expression in adult mouse brains in known neurogenic brain regions such as the hippocampus, olfactory bulb, and lateral ventricles. During development a decrease in telomerase activity of neuronal progenitors was associated with a loss of self-renewal capability, and neuronal stem cells also lose telomerase activity upon differentiating into astrocytes. These findings, as well as our own preliminary data, have led us to the hypothesis that mTERT is a novel and specific marker for quiescent adult neural stem cells (qANSCs) in the adult mouse brain. Identifying mTERT as a unique marker would aid research in all brain related pathologies which could lead to understanding mechanisms behind numerous neurological diseases. To explore this further, we are systematically assessing basal levels of mTERT in 12-week old male and female brains from mice with a GFP direct reporter for mTERT. These data will provide insight into the specific niches where mTERT+ cells most commonly reside, as well as identify any less common niches. We can also quantify cell density in these niches and co-stain with known markers of ANSCs. This research will also begin to elucidate any sex related dimorphisms in the basal levels of mTERT expression in the young adult mouse brain, as well as with aging, possibly uncovering a more specific and individualized approach to understanding neurological disease.

Abstract ID :
UMSS19173

Talking Trash: Creating a Circular Food System in Maine

Abstract Topic : Interdisciplinary

Submission Type : Oral

Submission# : 624 **Judge Time Slot :** PM2 (2:30 - 3:30)

Undergraduate

Author Name : Skyler Horton [1] *

Undergraduate

Author Name : Shayla Rose Kleisinger [2]

Undergraduate

Author Name : Hannah Nadeau [3]

Undergraduate

Author Name : Andrew Flynn [4]

Undergraduate

Author Name : Taylor Patterson [5]

Undergraduate

Author Name : Cynthia Isenhour [6]

Abstract Description : This work highlights the benefits of approaching food waste management from an interdisciplinary perspective. As the leading type of waste in Maine, there have been many efforts to combat unused organics but many of these efforts have not produced substantial long-term improvements. Contributors in the group come from several different backgrounds in order to create a multi-perspective solution for the issue of food waste within the state of Maine and potentially at larger scales. The group is composed of five undergraduate students, advised by a graduate student and faculty mentors. When looking at a large-scale problem with a single-disciplined group, there is a tendency to narrow the focus of study, causing important social, economical, and/or ecological factors to be forgotten. By having contributions from Nursing, Anthropology, Economics, Biomedical and Civil Engineering majors, solutions can be presented that offer the most complete analysis of outcomes. Through these disciplines multiple ideas were explored that could manage food waste including: composting, anaerobic digestion, alternate biodegradable packaging, and data collection of food waste management practices of hospitals. Each case study allowed for the different parts of the circular food system to be examined in relation to Maine, this showed the similar issues created and how each affect a different part of the cycle. This interdisciplinary team acts as a model for future groups interested in finding long term answers to problems that require complex understanding and analysis.

Abstract ID :
UMSS19392

Temporal and Spatial Variation of Aquatic Invertebrate Communities Within Riverine Rock Pools in Maine

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 362

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Chase Gagne [1] *
Graduate

Author Name : Hamish Greig [2]

Abstract Description : Naturally occurring rock pools are a common sight along the banks of many Maine rivers. These rock pools are usually formed by water collecting in depressions or cracks on the surface of rock outcrops, and the unique aquatic insect communities that inhabit them have been little studied in Maine. This lack of knowledge is problematic, as climate change may alter rainfall and seasonal flooding of adjacent rivers that control pool filling and drying. These changes may impact potentially unique and specialized species and make the insect communities within rock pools more susceptible to invasion by insects that transmit disease, such as the Asian bush mosquito (Aedes japonicus). My research focuses on exploring and describing the diversity and abundance of aquatic insect species within riverine rock pools. This is important for determining whether rock pools house rare or unique species and to provide a baseline for future research to track changes in species presence and abundance as climate change continues to alter water availability in these pools. Currently, very little is known about which species inhabit rock pools throughout Maine. Additionally, it is largely unknown which environmental factors, such as pool filling and drying, are the main factors influencing species presence and abundance. My research addressed these knowledge gaps by surveying aquatic insects inhabiting rock pools at four sites along the Penobscot River over the course of the summer and fall while sampling environmental characteristics of the pools. The University of Maine Graduate Student Government provided financial support for this project.

Abstract ID :
UMSS19226

Temporal Pressure Response in Porous Structures

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster
Submission# : 249
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Michael Orne [1] *
Undergraduate

Author Name : Wilhelm Friess [2]

Abstract Description : When porous structures are exposed to winds, there is a tendency for unwanted airflow to be introduced into a system. Wind gusts generate temporal pressure variations on buildings, and the internal pressure response is hypothesized to be related to the envelope porosity. At the University of Maine's Crosby Hall Wind Tunnel Laboratory, an experiment to investigate pressure-time response associated with such infiltration phenomena using a custom gust generator and test enclosure is currently underway. The test enclosure will be designed to allow simultaneous measurement of internal and external pressures to observe the time lag between the pressure readings. The 20x20x20 centimeter, 3D printed test box has been designed to easily fit within the confines of the wind tunnel's 75x75 centimeter test section. The box is also equipped with internal and external pressure transducers used for data acquisition. In order to test multiple porosities, the enclosure will have interchangeable lids that are also printed using the campus' 3D print lab. Further, the box can be oriented within 45 degrees of rotation to test the effects that varying angles may have on the pressure-time delay. Air-tightness of the box is necessary to avoid any unwanted fluctuation in internal pressure that may arise resulting from areas of infiltration other than those designed for. To prevent this, several measures such as epoxy coating and specific lid-gaskets were developed and implemented to ensure an adequate seal. The box is currently undergoing first tests in the wind tunnel.

Abstract ID :
UMSS19318

Tessellation

Abstract Topic : Art

Submission Type : Exhibit

Submission# : 704

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Reed Hayden [1] *
Graduate

Author Name : Susan Smith [2]

Abstract Description : I will be displaying a sculptural piece.

Abstract ID :
UMSS19288

The Archive: A Virtual Catalog of Machine-Learning Art

Abstract Topic : Interdisciplinary

Submission Type : Exhibit

Submission# : 605

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Eliza Bennett [1] *
Undergraduate

Author Name : Sofian Audry [2]

Abstract Description : Since the 1950s, a range of artists have used artificial agents in their work, in parallel with scientific research in artificial intelligence (ML). With the advent of machine learning (ML) technologies in the past decade, an increasing number of artists have been work with adaptive computational agents and machine learning systems. Yet art history and new media art theory have not caught up with the new artistic approaches enabled by ML, which are extensively and rapidly flourishing in the recent years. With this project, we have built a database of ML-based artworks and exhibitions involved with AI within the field of new media art. This database will be made available publicly on an immersive, interactive website representing a global network of international researchers and artists who are interested in such works.

Abstract ID :
UMSS1966

The Association of Late-Life Depression, Cognitive Functioning, and Sleep Disorder in Aging

Abstract Topic : Biomedical Sciences

Submission Type : Exhibit

Submission# : 800

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Jessica Aronis [1] *
Graduate

Author Name : Ali Abedi [2]

Author Name : Cliff Singer [3]

Author Name : Thane Fremouw [4]

Author Name : Marta Herzog [5]
Undergraduate

Author Name : Ariel Bouchard [6]

Author Name : Taylor Delp [7]

Author Name : Chris Gilbert [8]

Author Name : Ahmed Almghasilah [9]

Author Name : Katrina Daigle [10]

Author Name : Marie Hayes [11]

Abstract Description : Introduction. Late-life depression is common and has strong association with cognitive impairment and neurodegenerative diseases including Alzheimer's Disease (AD). In this ongoing study, we hypothesized that participants with depression or depressive symptoms would exhibit sleep disorder and fragmentation when compared to aged-matched participants without depression. Methods. Independently living older adults, age 65-85 (M=72.76, SD=6.56), were recruited from a geriatric psychiatry clinic and the community. Participants who endorsed current depression in interview were considered positive. Sleep was examined in the home with standard wrist actigraphy for 7 nights. Self-report sleep questionnaires (e.g. Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Stanford Sleepiness Scale (SSS)) were used to identify subjective sleep quality, daytime sleepiness, and sleep efficiency. Overnight memory consolidation (ONMC) was tested before sleep and after wake with a brief procedural memory task. At one-month follow-up, a neurocognitive assessment battery was administered. Preliminary Results. 44.44% of 18 participants in this pilot study were positive for mild cognitive impairment (MCI). Results from actigraphy reveal that self-reported depression was associated with longer sleep latency ($p=0.004$) and poorer sleep efficiency ($p< 0.001$). PSQI scores reveal that depression status predicted longer sleep latency ($p=0.043$) and a trend toward lower sleep efficiency ($p=0.055$). No significant associations were found between depression and

subjective sleepiness, as measured by the SSS and ESS. No significant associations were found between depression status and neurocognitive measures, including overnight memory consolidation and 30 day, follow-up neurocognitive assessment.

Abstract ID :
UMSS19121

THE CARBONATE CARRYING CAPACITY OF AN INTENSIVE OYSTER AQUACULTURE AREA

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 352 **Judge Time Slot :** AM1 (9:30 - 10:30)

Graduate

Author Name : Kate Liberti [1] *
Graduate

Author Name : Damian Brady [2]

Abstract Description : Increasing atmospheric and oceanic carbon dioxide levels are reducing the amount of free carbonate ions available in surface waters globally, threatening many calcifying organisms that rely on calcium carbonate to build their protective shells. In coastal waters, this process is confounded by elevated production and respiration, freshwater run off, and eutrophication, all of which can change the buffering capacity of the receiving waters and lead to significant fluctuations in carbonate ion availability. Many studies have shown the detrimental effects that ocean and coastal acidification can have on various shellfish life stages, but few have considered the impact that shellfish cultured in high densities can have on the surrounding carbonate chemistry via calcification and respiration. We developed a model to explore the carbonate carrying capacity(CCC) of the Damariscotta River estuary, which produces the majority of cultured Eastern Oysters in Maine. Growth rates of Damariscotta River oysters were used to calculate calcium carbonate uptake and calcite saturation during the growing season for various industry sizes, residence times, and future climate conditions. The multi-dimensional model sheds light on the role of these three variables and their interactions on the calcite and aragonite saturation states in the Damariscotta River. This new perspective and tool may be important for understanding the capacity for and future of bivalve aquaculture expansion in areas of inherently low saturation states.

Abstract ID :
UMSS19259

The Components of Rapidly Deployable Structures Made out of Reinforced Thermoplastic Sandwich Panels

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 200
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Adam Letourneau [1] *
Graduate

Author Name : Roberto Lopez-Anido [2]

Abstract Description : The Components of Rapidly Deployable Structures Made out of Reinforced Thermoplastic Sandwich Panels The goal of this research is to develop component that lower the time needed to fabricate rapidly deployable shelters made out of reinforced thermoplastic structural sandwich panels and to minimize the weight of these shelters. The selection of material, manufacturing method, and the parameters of manufacturing were researched and selected. From their different panel prototypes were manufactured. The prototype of focus is of a living hinge for these rapidly deployable structures. With wanting a hinge that could be manufactured during the forming process of the sandwich panels, living hinges were the topic of research. A living hinge is a hinge that is made out of the same material as the two things that it is connecting. Some examples include DVD cases and Tic-Tac containers. Different types of living hinges were tested and it was decided to focus on living hinges similar to the DVD cases but with fibers running through them for increased strength and to help with fatigue issues. The hinges were analyzed at ply orientations of 0 and 90 and a carpet plot of the bending stiffness of these laminates were developed. These carpet plots were used to find the optimal laminate make-up. This material is based upon work supported by the US Army Natick Soldier Research and Development & Engineering Center (NSRDEC) under Contract No. W15QKN-13-9-0001. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the NSRDEC. Approved for Public Release - CCDC-PC PAO#: U19-986

Abstract ID :
UMSS19292

The Effect of Public-Place Smoking Ban on Drinking Behavior Among Different Ethnicities in the United States

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 103

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Muntasir Rahman [1] *
Graduate

Author Name : Angela Daley [2]

Abstract Description : There is a small body of literature on the effect of public-place smoking bans on alcohol consumption, given the complementarity between smoking and drinking. We extend this literature by considering differences across ethnic subgroups. Specifically, we estimate the effect public-place smoking ban on alcohol consumption in the United States (i.e. intensity of drinking and binge drinking and the likelihood of drunk driving) by testing for heterogeneity across those who identify as American Indian, Pacific Islander, Asian, Black, and Hispanic, respectively. Our data comes from the Behavioral Risk Factor Surveillance System (2002-2014), which is a nationally representative survey of adults in the United States. Our sample consists of 453,898 individuals living in the 36 states covered by public-place bans. We use a difference-in-differences model to exploit variation in the timing of the bans across states. Results are presented separately by gender. We find a reduction in the quantity of alcohol consumed among Black men (by 22.9 percent), as well as a reduction in binge drinking among Black men (by 19.2 percent) and women (by 27.7 percent). Our estimates show an increase in alcohol consumption among women on average (by 9.0 percent). We also find a small but statistically significant reduction in the likelihood of drunk driving, perhaps driven by Hispanic men. We conclude that, although the average effect of public-place smoking bans on alcohol consumption is negligible, there are important differences across ethnic subgroups that are relevant to targeted policymaking in the United States.

Abstract ID :
UMSS19263

The Effects of Activated Galpha on the Localization of Septin and MAP Kinase

Abstract Topic : Biomedical Sciences

Submission Type : Poster
Submission# : 812
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Andrew Hart [1] *
Graduate

Author Name : Joshua Kelley [2]

Abstract Description : The G-protein coupled receptors (GPCR) in humans are used for cell signaling, detection of pathogens, and cancer metastasis. While GPCR in yeast cells are used to detect their mating partner and nutrients. The yeast mating pathway starts with the binding of pheromone to the GPCR resulting in the G protein alpha (Galpha) and beta-gamma (Gbeta-gamma) subunits leaving the GPCR. This starts the alpha and beta-gamma pathways. The beta-gamma pathway has been shown to induce cytoskeleton remodeling and gene regulation, resulting in the yeast growing toward the directionally towards the pheromone [1]. Until recently the purpose of the Galpha pathway was for the Galpha to bind back with Gbeta-gamma, stopping the yeast's response to pheromone [1]. Recently we have seen that the Galpha pathway remodels the yeast's cytoskeleton as well [2]. Two important factors in the yeast's cytoskeleton formation are septins, a part of the cytoskeleton, and MAP kinase. MAP kinase binds to Galpha and binds and activates formin that in turn nucleate actin. We have seen that if Galpha is unable to bind back with Gbeta-gamma there is a change in septin and MAP kinase localization in the cell and a loss of orientation towards the pheromone. However with a deletion of a Rho GTP activating protein (RhoGAP) used in cytoskeleton remodeling we have seen partial septin formation and recovery of orientation. We are currently trying to identify how this deletion of a RhoGAP is able to affect the orientation and localization of septins and MAP kinase in the yeast.

Abstract ID :
UMSS19147

The effects of climate on Ixodes scapularis overwintering survival and geographic distribution in Maine

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 357

Judge Time Slot : AM1 (9:30 - 10:30)

Graduate

Author Name : Michelle Volk [1] *
Graduate

Author Name : Allison Gardner [2]

Abstract Description : Abstract Blacklegged ticks (Ixodes scapularis) are the primary vector for Borrelia burgdorferi, the bacteria that causes Lyme disease. Since the first cases in Maine were reported in 1986, Lyme disease has increased in range from southern to northern Maine as the blacklegged tick's optimal habitat shifts northward with increasing temperature and snowfall due to climate change. Understanding the significance of climate and other ecological drivers to blacklegged tick survival will aid in predicting future distributions of blacklegged tick populations and identifying areas in Maine that pose a risk of Lyme disease to humans. To determine the effects of climate on blacklegged tick survival, I tested tick overwintering survival across climate gradients in Maine and assessed factors contributing to winter mortality both in locations where blacklegged tick populations are currently established and where the blacklegged tick remains undetected. During the summer and fall, I will search for blacklegged ticks across Maine to determine the abundance and distribution of established tick populations across state-wide climate gradients. The results of this study will aid in understanding what climate factors contribute to blacklegged tick overwintering survival, which has important implications for tick abundance and distribution during the summer and fall, as well as provide insights on the current range of blacklegged ticks as compared to their potential habitable range in Maine. With this information I will be able to determine the geographic distribution of Lyme disease in Maine, which will serve to better inform the public and public-health initiatives in Maine about tick-borne disease risk. Acknowledgements This research was funded by the University of Maine Research Reinvestment Fund and the Maine Outdoor Heritage Fund.

Abstract ID :
UMSS1929

The effects of diverse aged enrollment on community school literacy rates in rural Zambia: Case study on Impact Network International schools, Eastern Province Zambia

Abstract Topic : Education

Submission Type : Oral

Submission# : 506

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Naomi Caywood [1] *
Graduate

Author Name : Kristin Vekasi [2]

Abstract Description : Developing literacy is essential to promoting education, growth, and economic success for individuals. Yet, providing students with quality literacy education continues to be a challenge in many underdeveloped and remote regions. Over the last 70 years, improving literacy education has been an important topic to local, national, and international communities throughout the world. Recent programs, such as Teach at the Right Level from the NGOs Pratham, have been designed to help aid the literacy education process in impoverished regions. However, the multi-level and diverse age classrooms common in these areas may affect the success of these programs. This research asks the question: How do classrooms with diverse age ranges affect literacy levels during and throughout primary education? This project utilizes qualitative and quantitative data collected by Impact Network International on 40 schools in five regions of Eastern Province, Zambia. Through a case study of the NGO sponsored community schools in this paper uses statistical analysis to find correlation between age distribution of students in the classroom and performance on literacy assessments. Through the analysis of qualitative surveys, this project will also consider factors such as language of instruction, gender, student travel distance to school, and community location. In its conclusion, this project is an exploratory study resulting in an academic paper designed to further research on literacy in the development context, and a report of recommendations for Impact Network International to further their agenda to provide direct support for improving literacy education programs in this region. Innovation for Poverty Action. (2017). Catch Up Pilot using Teaching at the Right Level methodology: Process Monitoring Report. Zambia.

Abstract ID :
UMSS1961

The Effects of Dysphagia on the Psychological Well-being of Both Patients and Their Caregivers

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 419

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Madison Burt [1] *
Undergraduate

Author Name : Amy Samson [2]

Author Name : Olivia Rancourt [3]

Author Name : Mairead Clonan [4]

Author Name : Paige Lane [5]

Abstract Description : Amy Samson Maddy Burt Olivia Rancourt Mairead Clonan Dysphagia Abstract Dysphagia is the difficulty in swallowing foods and liquids. It occurs when there is a disruption in the moving of substances through the mouth, down the esophagus, and into the stomach. There are two causes of dysphagia: neurological and structural. Some neurological factors include stroke, Parkinson's Disease, Multiple Sclerosis and Dementia. Structural causes of dysphagia are less common but they include narrowing, tumors and nerve or muscle damage. It is estimated that over 6 million Americans over the age of 60 have dysphagia. In intensive care units, 32% of patients struggle with this disorder specifically (Boyle, 2002). Dysphagia poses a lot of negative consequences if left untreated, including dehydration, weight loss, malnutrition, pneumonia, and sometimes even death. The variety and intensity of symptoms associated with dysphagia, as well as the stressful impact of the different treatment options, can lead to increased anxiety and psychological problems for both caregivers and patients with the disorder.

This paper recognizes the lack of data regarding the effects of dysphagia on the psychological well-being of patients and their caregivers. It analyzes the problems that are caused from an increase of stress and anxiety in caregivers and patients with dysphagia. The paper also looks at the possible treatment options for patients with dysphagia. There is a lack of data on the effects of treatments on both patients and caregivers well-being. We proposed a study that will explore how different treatment options can affect well-being specifically. It will measure the impact on psychological well-being while comparing the effectiveness of two different dysphagia treatments.

Abstract ID :
UMSS19307

The Effects of European Fire Ants on Blacklegged Ticks in Acadia National Park

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 308 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Lucy Guarnieri [1] *
Undergraduate

Author Name : Sara McBride [2]
Graduate

Author Name : Allison Gardner [3]

Abstract Description : The blacklegged tick (Ixodes scapularis) and the European fire ant (Myrmica rubra) are notable invasive pests in Maine, especially across coastal and southern regions. I. scapularis is the primary vector of the bacterium Borrelia burgdorferi, which is the causative agent of Lyme disease, and Maine currently has the highest Lyme disease incidence rate of any state. Ticks have many natural predators, including ants, that impact I. scapularis their transmission of pathogens. This study investigates the effects of M. rubra on I. scapularis abundance and pathogen infection prevalence in Acadia National Park (ANP). We collected ticks by drag-sampling at eight ant-infested (treatment) sites and eight uninfested (control) sites in ANP. We hypothesized that I. scapularis abundance would be lower at treatment sites, due to predation by M. rubra, but found no significant difference. In addition, we conducted laboratory bioassays to measure M. rubra aggression against different life stages of I. scapularis. We found that M. rubra behaves more aggressively towards I. scapularis adults than towards nymphs and larvae. Finally, we extracted DNA from a subset of collected nymphs and tested the samples for B. burgdorferi to determine nymphal infection prevalence (NIP) at control and treatment sites. We hypothesized a decreased NIP at treatment sites due to altered behavior and reduced host-encounter frequency of the small mammal reservoir hosts of B. burgdorferi, and again found no significant difference between control and treatment sites. Acknowledgements This research was funded by the Center for Undergraduate Research 2018-2019 Academic Year Fellowship, as well as the Senator George J. Mitchell Center for Sustainability Solutions.

Abstract ID :
UMSS19280

The Effects of Image Saturation on Multifractal Statistics

Abstract Topic : Biomedical Sciences

Submission Type : Oral

Submission# : 861

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Jeremy Juybari [1] *
Graduate

Author Name : Andre Khalil [2]

Abstract Description : Mammography plays a vital role in diagnosing breast cancer. However, the radiological interpretation of mammograms is a difficult task, especially since the mammographic appearance of normal tissue is highly variable. Mammograms are typically read by two expert radiologists or a combination of a radiologist and a computer-aided detection/diagnostic (CAD) method. However, the existence of imaging artifacts (deodorant, hair, and pectoral muscle) can cause problems for the computational analysis of mammograms, and for images in general. The Wavelet Transform Modulus Maxima (WTMM) method is a multiscale multifractal formalism suited for the analysis of self-affine rough surfaces. This is done by characterizing density fluctuations and spatial correlations within these surfaces. The WTMM method is widely utilized in signal and image processing across many disciplines. The CompuMAINE lab has developed a patent pending computational cancer detection method utilizing the WTMM to help predict disrupted, tumor-associated breast tissue. The goal of this particular project was to explore the effects of image saturation (a type of distortion) on the resulting multifractal statistics from the WTMM method. Groups of (monofractal) fractional Brownian motion surfaces were generated with known Hurst exponents and saturated at the 0.01%, 0.10%, 1%, 5%, and 10% levels. We found that image saturation can lead to a potential artificial multifractal signature although the underlying image is monofractal. Determining parameter thresholds, that can be objectively set to automatically reject or flag images having an unacceptable saturation level, will be key to performing an automated mammography analysis when screening for breast cancer.

Abstract ID :
UMSS1946

The Effects of Mirror Therapy on Limb Function in Stroke Patients

Abstract Topic : Allied Health

Submission Type : Exhibit
Submission# : 401
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Madison O'Rourke [1] *
Undergraduate

Author Name : Jennifer Goulding [2]

Author Name : Emily Stevens [3]

Author Name : Kasha Sereyko [4]

Author Name : Valerie Herbert [5]

Abstract Description : Abstract Background: Cerebrovascular accidents (CVAs), commonly known as strokes, occur when there is a lack of oxygenated blood supplying the brain. Those suffering from a stroke often have debilitating sequelae such as hemiparesis - paralysis of one side of the body as a result of injury to the brain tissue. Mirror therapy is a new and innovative treatment modality that may help stroke patients reduce pain and increase functional abilities in the affected side (Cantero-Téllez, Naughton, Algar, & Valdes, 2018). Mirror therapy is a form of visual therapy in which the patient places the affected limb behind a mirror which is situated perpendicularly in the midsagittal plane. The mirror provides visuo-proprioceptive inputs to the brain so that the patient perceives the visual image of the affected limb as normally functioning. Method: A review of the literature analyzed ten experimental studies that implemented mirror therapy practices in addition to general rehabilitation for different lengths of time. Outcome: All 10 studies yielded results of varying reliability in support of mirror therapy in the upper limb, lower limb, or both in the improvement of function, movement, pain, visuospatial accuracy and/or the ability to perform activities of daily living independently.

References Cantero-Téllez, R., Naughton, N., Algar, L., & Valdes, K. (2018). Outcome measurement of hand function following mirror therapy for stroke rehabilitation: A systematic review. Journal of Hand Therapy. doi:10.1016/j.jht.2018.01.009

Abstract ID :
UMSS1984

The effects of prophage BPs on intrinsic macrolide and aminoglycoside antibiotic resistance in Mycobacterium chelonae.

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 826 **Judge Time Slot :** AM1 (9:30 - 10:30)

Undergraduate

Author Name : Anna Schumann [1]

Author Name : Ben Williams [2] *

Undergraduate

Author Name : Sally Molloy [3]

Abstract Description : Multidrug resistant tuberculosis is a global health concern because treatment is dangerous, expensive, and often ineffective. Bacteriophage play a key role in the virulence of most bacterial pathogens. In fact, all pathogenic strains of Mycobacterium tuberculosis are lysogens, bacterial cells which act as hosts for integrated viral genomes, or prophage. Mycobacterial prophages are hypothesized to increase host fitness. Elucidating how mycobacteriophage BPs contributes to intrinsic antibiotic resistance in non-tuberculosis pathogenic M.chelonaeis a critical step to find new drugs and therapies for mycobacterial diseases. Previous studies in the Molloy laboratory indicate that prophage induce differential gene expression of 7.8% to 24.1% of the mycobacterial genome. RNAseq data on pathogenic strains of M. chelonae, which possess prophage BPs, indicates an upregulation of whib7, eisand taporthologs which are members of the whib7 regulon. The whib7regulon expresses genes involved in antibiotic efflux, ribosomal protection, and other defense mechanisms. Minimum Inhibitory Concentration assay protocols were optimized for M.chelonaeto determine intrinsic sensitivity to different macrolides and aminoglycosides. BPs M. chelonaeyielded higher antibiotic resistance than WT strains suggesting that the presence of prophage increase host fitness. These results implied that M.chelonaeis very sensitive to macrolides, likely due to its lack of the ermoperon which promotes macrolide resistance. Future research could help identify the mechanisms by which BPs increases the transcription of whib7.

Abstract ID :
UMSS1971

The Effects of Sediment Acidification and Temperature on the Immune Capacity of the Atlantic Jackknife Clam (Ensis leei)

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 316

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Brian Preziosi [1] *
Graduate

Author Name : Timothy Bowden [2]

Abstract Description : Ensis leei has been identified as a species with potential for use in aquaculture operations. The grow-out phase for E. leei requires that the animals be planted outside the hatchery in their natural environment to keep algae-growing costs for the operation down. During this phase the clams are constrained to their holding containers and must cope with a variety of environmental factors, such as sediment acidification. The surface sediment pH can vary greatly from site to site, making it crucial for growers to understand the sensitivity of their species to pH before selecting a location. To this end we tested the impact of acidified surface sediment (~0.8 pH unit lower than control) on the internal immune capacity of adult E. leei at 10.2°C and 20.1°C. Hemocytes (circulating blood cells) are responsible for carrying out immune functions in bivalves and were thus the target for our immune capacity assays. Hemocyte parameters measured included cell viability, total cell counts, differential cell counts, and phagocytic capacity. A condition index was also calculated using the wet flesh weight and dry shell weight to assess the physiological condition of the animals. A 30-day exposure period to the acidified sediment had no significant impact on any of these parameters. In addition, all the clams buried into the sediments of their respective treatments within an hour of being placed there. These results indicate that E. leei adults have the capacity to cope with low pH surface sediments for at least 30 days.

Abstract ID :
UMSS19235

The Emergent Risks of Food Waste Recovery: Characterizing the Contaminants in MSW Organics from Different Sources

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 230

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Astha Thakali [1] *
Graduate

Author Name : Jean Macrae [2]

Abstract Description : A more sustainable food system is needed to prevent food waste, address food insecurity, and ensure nutrients are recycled back into the soil. In such a system, nutrients from waste would be returned to agricultural soil to produce more food. But there is a possibility of unforeseen risks arising from a mixed waste stream. Contaminants may enter the food supply chain at various points from pesticides applied during production, to contamination from packaging materials, to poor separation from non-food wastes in homes and institutions. The fate of some biological contaminants is unknown. The purpose of this study is to determine if there is greater risk associated with mandatory separation of food scraps versus voluntary participation in food waste diversion. The goal is to identify the emergent risks associated with more cyclical food systems and to identify appropriate management procedures, policies and programs to reduce risks. Food waste was collected from three states (MA, ME and VT) from five different sources during summer. Visible contaminants were removed and documented, then food scraps were processed to a uniform consistency using a food processor and tested for heavy metals and halogenated organics (EOX). DNA was also extracted for pathogen and antibiotic resistance gene (ARGs) analysis. Samples from regulated states (MA, VT) had more visible/plastic contamination than the ones from Maine (non-regulated). None of the samples exceeded regulatory limits on heavy metals or EOX. Our results show that voluntary diversion yields fewer contaminants than when participation is required, however the number of samples is small, and the risk from toxic contaminants appears to be low.

Abstract ID :
UMSS19282

The End of The Three Amigos: Trump’s Impact On The Canadian-Mexican Partnership

Abstract Topic : Social Sciences

Submission Type : Oral

Submission# : 164

Judge Time Slot : PM2 (2:30 -3:30)

Undergraduate

Author Name : Ruben Torres [1] *
Undergraduate

Abstract Description : Abstract While sharing similar histories Canada, Mexico, and the United States have managed to develop an economic and political alliance that has strengthen the continent. From the first independent diplomatic meeting in 1959, Canada and Mexico have only sought to strengthen their alliance. Through the theory of economic integration, the attraction of the North American Trade Agreement (NAFTA) in creating a flow of resources between the signatories showed the economic agendas pushing the countries closer together. The relationship peaked when President Obama, President Peña-Nieto, and Prime Minister Trudeau were in office and worked together to prosper the North American continent. Currently the relationship is weakening with the realist strategies of President Trump. Through this study the political and economic attraction of a free trade agreement will be analyzed showing why the countries proceeded to establish NAFTA. In looking at pre-United States-Mexico-Canada Agreement (USMCA), it will be shown why the current administration's behavior towards our neighbors show cause for concern in weakening our alliances with Canada and Mexico; furthermore, how it will only lead to a stronger economic and political alliance between Canada and Mexico that will pose a challenge for President Trump's and America’s goals in the future.

Abstract ID :
UMSS19209

The Fire Bobble: A Vital Sign Monitor to Predict Cardiac Events in Firefighters

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 211
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Tyler Hine [1] *
Undergraduate

Author Name : Sean Morris [2]

Author Name : Brad Butler [3]
Undergraduate

Author Name : Andre Khalil [4]

Abstract Description : Heart attacks are the leading cause of firefighter death in the United States, attributing to 58% of total annual on-duty deaths. 1 Last year, 34% of cardiac arrest fatalities occurred up to several hours after responding to an alarm, deaths which could have been avoided if there was an early detection system in place. 1 One of the greatest challenges in tackling this issue is the lack of vital sign data preceding cardiac incidents. Without data to analyze and assess the physiological changes associated with these cardiac events it is difficult to predict a firefighter's risk of heart attack. Our product - The Fire Bobble - is designed to monitor heart rate, core temperature, and relative hydration throughout a firefighter's day while uploading the data, via Bluetooth, to a server in real-time. Implementation of this monitoring system will allow on-scene medics to assess the physiological state of each individual during an alarm so that they can be pulled out when they begin exerting themselves to dangerous levels. Perhaps, more importantly, by establishing a baseline of their vitals pre-alarm and continuing to monitor vitals post alarm, the gap in pre-incident data will be filled. Using statistical analysis and machine learning, this data can be used to identify physiological trends leading up to a cardiac event so that future iterations of this product will be predictive rather than reactive. Acknowledgements ● Thank you to the Chemical and Biomedical Engineering Department, as well as NASA, for providing the funding for this project. References [1] U.S. Fire Administration, "Firefighter Fatalities in the United States," 2018

Abstract ID :
UMSS19179

The Hidden Illness community

Abstract Topic : Interdisciplinary

Submission Type : Exhibit
Submission# : 611 **Judge Time Slot :** PM1 (1:00 -2:00)
Undergraduate

Author Name : Paige Bourassa [1] *
Undergraduate

Author Name : Jon Ippolito [2]

Abstract Description : For my Capstone in New Media I am spreading awareness of invisible illness through the use of digital media on social media platforms. The purpose of this capstone is to uncover the real and raw truths of what it is like to live with an illness that you cannot see. My social media currently holds around 150 total followers on both instagram and twitter. I have successfully engaged and interacted with my audience at New Media open house night with the use of physical drawings to represent their invisible illness. Invisible illness are found in our friends, family, colleagues and peers, it is my hope to help them uncover their unhealthy truth.

Abstract ID :
UMSS19371

The Impact of Nurse Residency Programs

Abstract Topic : Allied Health

Submission Type : Exhibit

Submission# : 400 **Judge Time Slot :** AM2 (11:00 - 12:00)

Graduate

Author Name : Michelle Harding [1] *
Graduate

Author Name : Patricia Poirier [2]

Abstract Description : Abstract The Institute of Medicine (IOM) issued a report that addressed the concern of the gap that exists between academia and nursing practice. One of the recommendations that was made to bridge this gap is the implementation of nurse residency programs (NRP) (Institute of Medicine, 2010). The purpose of this study is to determine if there is an effect on readiness to practice, professional satisfaction, and retention rates following the implementation of a NRP. The education department with the support of hospital leadership implemented a nurse residency program at St. Joseph Hospital in Bangor, Maine. Fifteen newly graduated nurses were hired between January and June of 2018. These nurses were the participants for this study. The Casey-Fink Graduate Nurse Experience Survey (2006) was used to evaluate the readiness to practice, role satisfaction, and self-identified areas of needed education. The Casey-Fink New Graduate Experience Survey (2006) was completed by the newly graduated nurses after six months of participating in the NRP. Results from the survey showed that the new nurses did report having benefited from the NRP. Results from the survey also showed that new nurses reported improved communication skills, an increased confidence, and improved ability to identify needed resources. New nurses reported feeling uncomfortable caring for patients with chest tubes, placing intravenous catheters, and identifying and responding to rapid response situations independently. Retention rates remain unchanged with the implementation of the NRP. Multiple factors independent of the NRP identified as having influence on retention rates. Fink, R., Krugman, M., Casey, K., & Goode, C. (2008). The graduate nurse experience: Qualitative residnecy program outcomes. Journal of Nursing Administraion, 38(7/8), 341-348. doi:10.1097/01.NNA.0000323943.82016.48 Institute of Medicine (2010). The Future of Nursing Leadership: Leading Change, Advancing Health. Washington DC: National Academy Press.

Abstract ID :
UMSS19273

The Impact of Student Employment at the Advanced Manufacturing Center on Perceptions on Education and Employment Prospects

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 133

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Mariya Pominova [1] *
Graduate

Author Name : Megan Bailey [2]

Abstract Description : The Advanced Manufacturing Center (AMC) is part of the University of Maine's College of Engineering. The mission of the AMC is to link the traditional University of Maine activities of education and research with the University's active industrial support and economic development programs. The AMC's business model is heavily centered on providing educational opportunities for the interns here, many of whom are students at the University of Maine. Since 2008, the AMC has employed over 80 student interns for over 71,000 hours. This work aims to answer two research questions. Does a student-intern's involvement with the AMC supplement their education? And does a student-intern's experience at the AMC prepare them for future employment by providing them with marketable qualifications and/or the necessary skillset to succeed in their future employment? In order to answer these questions, an online survey is distributed to all AMC employees and alumni to identify whether there is a perceived impact on student intern education and job prospects. The research hypothesis is that student interns will perceive that their involvement at the AMC as supplementary to their education and helpful in preparing them as competitive job candidates and skilled workers. The survey results show that, on average, respondents perceived their experience at the AMC to be very impactful on their education, ability to find a job, and success at their job.

Abstract ID :
UMSS1954

The Impact of Television on Children Aged Birth to Four Language and Communication Skills

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 418

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Abigail Glidden [1] *
Undergraduate

Author Name : Courtney Daly [2]
Undergraduate

Author Name : Ashley Houp [3]
Undergraduate

Author Name : Olivia Hamm [4]
Undergraduate

Author Name : Jenna Hope [5]
Undergraduate

Author Name : Paige Lane [6]

Abstract Description : Growing exposure to television over the past few years has led to television watching becoming an essential part of a child's day. Increasing exposure to television may have adverse effects on childhood development such as poor verbal and memory skills, emotional difficulties, and attention deficits. This paper reviews research on television and examines its effects on language development among children ages birth to four. Areas within the research include the positive and negative effects on both language development and communication skills. The results of the literature review determine that there is not enough research to reach a firm conclusion. A comparative study is proposed to further investigate the impact of television on children ages three to five. Language will be recorded, transcribed, and analyzed to assess differences between number of words spoken and mean length of utterance during segments of television watching and play time in an effort to examine the effects of television on language development.

Abstract ID :
UMSS19177

The possible role of melanopsin signaling in mediating the effects of environmental lighting on voluntary alcohol intake

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 846

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Rachel Brooks [1] *

Undergraduate

Author Name : Meghan Royle [2]

Author Name : Alan Rosenwasser [3]

Undergraduate

Abstract Description : Intrinsically photosensitive retinal ganglion cells (ipRGCs) comprise a small subset of photoreceptors found in the eye containing the novel photopigment, melanopsin (2). ipRGCs project directly to the suprachiasmatic nucleus (SCN), the central "pacemaker" underlying the generation and entrainment of circadian rhythms (1). Photic stimuli detected by ipRGCs are transmitted to the suprachiasmatic nucleus (SCN), mediating the entrainment of the SCN pacemaker (1). These pathways may also contribute to seasonal changes seen in humans, such as seasonal affect disorder (3,5,6). Our lab has recently found that changes in the laboratory lighting environment can alter voluntary alcohol intake in mice, possibly relating to seasonal variation in human alcohol use (4). In this study, we examined the possible role of melanopsin signaling in mediating the effects of photoperiod on alcohol intake. Male and female melanopsin knockout (Opn4 -/-) and wild-type control mice of the same genetic background were housed individually in running-wheel cages and initially kept on a 12:12 light-dark (LD) cycle, followed by constant light (LL) or constant darkness (DD), then LD 12:12, each lasting 3 weeks. Animals had access to running wheels, plain water, and 10% ethanol solution throughout the experiment. Wheel turns were monitored by software and ethanol and water intake were recorded at weekly intervals. While Opn4 -/- mice showed the expected differences in circadian light sensitivity from controls, the two genotypes displayed identical reductions in ethanol intake under LL and DD. Thus, melanopsin-based photoreception is not necessary for light-induced changes in alcohol preference drinking in mice.

Abstract ID :
UMSS19381

The Relationship between Resilience and Coping on Adverse Health Effects within the LGBTQ Community

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 116 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Sophie Hubbert-Severance [1] *
Undergraduate

Author Name : Susan Gardner [2]

Abstract Description : There are stressors in our life everyday that can cause adverse health effects to our physical, mental, and emotional state. Research has found that resilience and coping are main players in combating the negative effects of stress. However, the most mainstream scholarly articles do not give a intersectional view to this connection or explore a more diverse populous to see how they react. The purpose of this in-depth literature review is to bring to light the LGBTQ view of this issue and the intersectional issues that cause many of the stressors within the community. By shedding more light on the subject we hope to learn more about resilience and coping and their key roles in the fight against negative health effects.

Abstract ID :
UMSS1938

The Relationships Between Income and Education on Cognitive Function

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 140

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Amanda Laverdiere [1 *]
Undergraduate

Author Name : Angel Boeve [2]

Author Name : Rebecca Macaulay [3]

Abstract Description : Objective: Previous studies have shown education positively associates with cognitive reserve and a lowered risk of dementia. However, income status may be an influencing factor of the relationship between cognition and education. We thus investigated the relationships between current income and education attainment on cognitive function in older adults. Methods: A community-based participatory research design recruited lower (n =26) and middle income (n=16) community dwelling older adults. The North American Adult Reading Test (NAART) measured verbal intellectual ability/education quality and the National Alzheimer's Disease Coordinating Center's (NACC) neuropsychological test battery evaluated cognitive function. Results: Chi-square tests found no significant associations between income with cardiovascular disease, cerebrovascular events, hypercholesterolemia, or depression; however, low income older adults were marginally more likely to have hypertension than middle income older adults. No statistically significant group differences in age or NAART scores by income level were found. Age, education and income were unique predictors of NAART scores, accounting for 46.6% of the total variance. Correlational analyses indicated that income and age but not education positively associated with measures of verbal fluency, global cognition, executive function, and episodic memory. Conclusion: This study found that income but not education associated with cognitive function. These results suggest socioeconomic status (SES) is a multifaceted construct with complex effects on cognition that cannot be understood by educational attainment alone. Future research is necessary to improve understanding of underlying mechanisms involved in the relationship(s) between economic security and cognitive function.

Acknowledgements This work was funded by support provided to Dr. MacAulay (PI) from the University of Maine MEIF. I would also like to acknowledge and thank the CLAS Undergraduate Research and Creative Activity Fellowship and the Mitchell Institute Fellowship for providing funding for conference travel and research stipends.

Abstract ID :
UMSS1991

The role of MyD88 in macrophage recruitment to C. albicans infection in the zebrafish swimbladder

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 839

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Drew Brooks [1] *
Undergraduate

Author Name : Robert Wheeler [2]

Abstract Description : Candida albicansis a commensal fungus that resides in healthy individuals, but can cause severe mucosal candidiasis in immunocompromised hosts. Infection of mucosal membranes can compromise epithelial integrity and eventually lead to disseminated candidemia, the fourth most common bloodstream infection in ICUs with mortality as high as 40%. The innate immune system, particularly epithelial barriers and phagocytic immune cells such as neutrophils and macrophages, constitutes the first line of defense against candidiasis and is a key factor in preventing disseminated infection. Myeloid differentiation factor (MyD88) is an important adaptor protein that functions downstream of toll-like receptors (TLR's) and the interleukin-1 receptor, which ultimately regulate immune cell recruitment during infection. Published work has shown that MyD88 is important in upregulating the expression of chemoattractants that recruit neutrophils and macrophages to fight bacterial infections in zebrafish. Similar to bacterial infections, MyD88 may have a role in recruiting macrophages to zebrafish swimbladder epithelia during fungal infection. Mutant fish lacking MyD88 function and possessing the mpeg1.1:dTomato transgene, were infected with fluorescent C. albicans (WT-GFP). Via confocal microscopy, images of fluorescent C. albicans and macrophages were taken in transparent zebrafish swimbladders. Macrophage recruitment/retention and fungal burden between wild type fish and homozygous mutant fish were then compared. Preliminary experimental data has indicated that there is no significant difference between the two groups. In contrast, research with MyD88-deficient mice has shown that fungal burden is greater, and fewer immune cells are recruited, compared to wild type mice.

Abstract ID :
UMSS19330

The Speciation and Prevalence of Intestinal Parasites in Farmed and Wild Deer in Maine

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 375

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Kyle Alamo [1] *
Undergraduate

Author Name : Anne Lichtenwalner [2]

Abstract Description : The deer farming industry is growing, since it not only offers an alternative to traditional meat products but also requires low initial investments based on the natural adaptations of the species and the utilization of rural landscapes. (2) The Red Deer (Cervus elaphus) serves as a multipurpose meat- producing animal in both the game and agricultural industry. However, modern farming of the Red Deer dates back to the 1970s, when New Zealand was the first country to legalize deer farming. (1) Since then, New Zealand, Australia, China, and Canada are countries well known for deer farming and breeding systems, with growing interest in the USA. (1) The first study of deer parasites dates back to the 1970s. (3) The presence of native parasites can be a key indicator of the overall health and trophic interactions of the populations they inhabit. Parasite interactions between farmed and wildlife populations of cervids may influence the overall health of all ecosystems involved. So, by analyzing host-parasite biodiversity, we can further understand the relationship between the two coexisting populations. The overall objective of this study is to investigate and compare the prevalence and identity of internal parasites in farmed and wild deer. Doing so, we can provide baseline data for further investigation. As well, informing producers of their deer's parasite loads can assist them with management (fencing, feeding practices, deworming needs) and provide comparative data for future health practices on their operations.

Abstract ID :
UMSS19327

The Thermogenics of Bornean Treeshrews

Abstract Topic : Natural Sciences

Submission Type : Exhibit

Submission# : 310

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Emily Gagne [1] *
Undergraduate

Author Name : Danielle Levesque [2]

Abstract Description : Many thermoregulatory functions of mammals are related to the fact that they are endotherms. There are several morphological and physiological adaptations that mammals have developed over time to allow them to maintain internal heat, even in cold climates. Many mammals use UCP1, a protein that facilities non-shivering thermogenesis to generate heat (1). Recent work has shown that despite UCP1's importance for non-shivering thermogenesis, inactivating mutations have occurred in at least 8 or 18 placental orders (2). Despite this gene loss over time, many modern mammals actively use UCP1 and non-shivering thermogenesis to maintain heat. An example includes the northern treeshrew, Tupaia belangeri, which uses UCP1 during times of cold exposure (1). This study focuses on three species of Bornean treeshrews: Tupaia tana, Tupaia montana, and Tupaia minor (Order: Scandentia). This research aims to confirm whether or not the three tropical treeshrews from Borneo show evidence of UCP1. Polymerase chain reaction (PCR) and a designed degenerate primer are used to analyze the tissues of Tupaia montana and Tupaia minor to determine if either show evidence of UCP1. The genome of Tupaia tana is searched using the computer software, BLAST, to develop the potential protein sequence for UCP1. This study will show whether or not any of the tropical treeshrew species have undergone an inactivating mutation of UCP1. The data will be used to predict the methods of thermogenesis for each treeshrew species and draw comparisons across other mammalian taxa.
References: 1. Wan-Long Zhu, Chun-Mei Huang, LIN Zhang, Jin-Hong Cai & Zheng-Kun Wang (2012) Changes of energy metabolism, thermogenesis and body mass in the tree shrew (Tupaia belangeri chinensisTupaiidae, Scandebtia) during cold exposure, Italian Journal of Zoology. 2. Gaudry, Jastrock, Treberg, Hofreiter, Pajimanas (2017). Inactivation of thermogenic UCP1 as a historical contingency in multiple placental mammal clades. Science Advances.

Abstract ID :
UMSS19391

Themes in Political Rhetoric Regarding Reproductive Rights in Maine

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 101

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Hilary Thibodeau [1] *
Graduate

Author Name : Elizabeth Depoy [2]

Abstract Description : This research explores the use of various types of rhetoric and imagery by groups, on both extremes of the political discussion on reproductive and abortion rights in the state of Maine. Past research indicates that the political conversation on abortion has morphed throughout history. The role of party affiliation in shaping positions on abortion however, has only recently been integrated as an important factor not only in rhetoric but in its concomitant role in influencing policy and practice. In an effort to advance an understanding of the role of party affiliation and political conservatism or progressivism in abortion policy and availability in Maine, four state websites and social media sites that self-describe as either conservative or liberal were analyzed for themes in their content regarding reproductive rights. Findings indicate trends in specific rhetoric and/or imagery used by each political identity. Potential implications of this specific rhetoric are discussed and the intention of its use is speculated.

Abstract ID :
UMSS19300

Theoretical study and design of a catalytic reaction using density functional theory: Acetic acid decarboxylation in the gas phase and on Mg(OH)2 nanosurfaces

Abstract Topic : Physical Sciences

Submission Type : Oral

Submission# : 912

Judge Time Slot : PM1 (1:00 -2:00)

Graduate

Author Name : Duwage Perera [1] *
Graduate

Author Name : Jayendran Rasaiah [2]

Abstract Description : Theoretical analysis of the detailed mechanism of an uncatalyzed reaction can provide useful clues to the selection of a better catalyst, in preference to choosing one from many after costly and lengthy experiments. Here we discuss the energetics and mechanism of the decarboxylation of acetic acid ($CH_3COOH \rightarrow CO_2 + CH_4$) in the presence of magnesium hydroxide $[Mg(OH)_2]_n$ (n=1 to 9) nanocatalysts using density functional theory at the B3LYP/6-31G(d,p) level. Acetic acid is most strongly absorbed on the n=5 nanocluster which was chosen for further theoretical study. The transition states were located using The Synchronous Transit-Guided Quasi-Newton method, and the detailed analysis of the reaction mechanisms were elucidated using the Atoms in Molecules and ChelpG methods. Decarboxylation proceeds through a single transition state from the acid absorbed on the $[Mg(OH)_2]_5$ nanocluster, in contrast to one or more distinct intervening intermediate states that are present between two transition states in the gas phase reaction or when acetic acid is absorbed on $(MgO)_4$. Inspection of the absorbed acid on the $[Mg(OH)_2]_n$ surfaces shows that it is only when n=5, and possibly n=8, that the acid is favorable spatial orientated on the nanosurface to bypass the intermediates observed in the gas phase or with the $(MgO)_4$ catalyst, and permit direct decarboxylation to occur via a single activated state. Our observation suggests that a similar stratergy could be used for the decarboxylation of propionic acid and more generally in designing catalysts for similar decomposition reactions.

Abstract ID :
UMSS19409

There's a meme for that: Understanding the role of memes in daily communication

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 120

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Christian Powell [1] *
Undergraduate

Author Name : Judith Rosenbaum [2]

Abstract Description : There's a meme for that: Understanding the role of memes in daily communication   If a picture is worth a thousand words, what is a meme worth? In a society where technology and ways of communicating are constantly evolving, memes offer a new form of communication that is changing the way humans interact with one another. People commonly use memes to convey messages to each other via text message or social media platforms. The swift availability, coupled with the increased popularity of memes raises questions about what layers of meaning these memes add to our communication. This research project examined how people use memes in their daily communication, and how memes impact their daily communication. Semi-structured group interviews revealed the intricate co-dependent relationship between memes and communication.

Abstract ID :
UMSS19256

Tick-borne Disease Exposure Risk in Acadia National Park

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 328

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Sara McBride [1] *
Graduate

Author Name : Lucy Guarnieri [2]
Undergraduate

Author Name : Allison Gardner [3]

Abstract Description : In coastal Maine, Acadia National Park (ANP) has experienced a dramatic rise in blacklegged tick abundance over the past 30 years. There are over 3 million visitors to the park annually, the majority visiting during the summer and fall, placing themselves at risk of exposure to Lyme disease. The goal of this study is to assess entomological risk of exposure to Lyme disease across habitat gradients in ANP. First, to investigate the current distribution of the blacklegged tick (Ixodes scapularis), 437 off-host nymphal ticks were collected at 68 sites throughout the park (present at 46 sites). In general, more ticks were detected in mixed and deciduous than in coniferous forests. A subset of blacklegged nymphal ticks will be tested for the Lyme disease causing bacteria (Borrelia burgdorferi) using RT-PCR. Linear mixed models will be used to determine which habitat features (e.g., forest type, elevation) are the strongest predictors of density of nymphs and nymphal infection prevalence. These data will ultimately be used to develop a blacklegged tick distribution map. Second, to understand the casual ecological mechanisms underlying these patterns, we conducted fine-scale sampling at 19 sites. At these sites, off-host tick collections were supplemented with small mammal trapping (to quantify Borrelia burgdorferi reservoir host abundance) and vegetation characterization. The results of this study will illustrate the patterns and mechanisms of entomological risk of exposure to Lyme disease in ANP.

Abstract ID :
UMSS19368

Towards an improved topographic wetness index for watershed storage characterization

Abstract Topic : Engineering & Information Sciences

Submission Type : Exhibit

Submission# : 204

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Prashanta Bajracharya [1] *
Graduate

Author Name : Sean Smith [2]

Author Name : Daniel Coker [3]

Author Name : Shaleen Jain [4]

Abstract Description : Wetlands are critical components of the natural infrastructure, affording ecosystem services ranging such as flood control, wildlife habitat, and nutrient processing. The general role of wetlands in modulating the watershed hydrologic budgets is well-known, but remains poorly quantified in most places. Adaptive watershed management can substantially benefit from the quantification of wetland functions related to surface hydrology, specifically water storage, in related modeling and analysis. Analyses of storage dynamics can support decisions related to public safety, infrastructure design, and nonpoint source pollution control. In this study, we investigate the nature, location and types of wetlands in northeastern United States using topography as the main indicator to estimate the effects of water storage by wetlands in river corridors draining to the Gulf of Maine. Preliminary analysis of the watershed-scale controls is done using the Topographic Wetness Index. The index is examined and improved upon to account for complexities in the terrain of the upstream drainage area. The area-slope scaling relationship is examined with a view to understand the relative variations in contributing drainage area. Preliminary estimates of wetland storage and water budget for the upper Sheepscot River watershed in Maine are presented.

Abstract ID :
UMSS19350

Trans Women, Non-Binary Persons, and Motherhood

Abstract Topic : Social Sciences

Submission Type : Exhibit

Submission# : 115

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Juliet Williams [1] *
Undergraduate

Abstract Description : My qualitative research seeks to examine, through ethnographic study, the experiences of transgender women and female-sexed non-binary people as they navigate motherhood. A paucity of such research informs my effort to glean from participants their stigma reduction strategies and identity management processes as they navigate the twin pressures of popular misogyny, which devalues assumed motherhood (adoption), and trans-misogyny, which devalues assumed womanhood (or lack thereof, as non-binary people transition away from embodied femaleness). As a trans woman myself, my own social location provides me an experiential lens through which to personally and academically understand participants' perspectives, as well as to establish mutual vulnerability and a dynamic of shared power in addressing the needs of our marginalized community. My goal is to collect evidence that complements the emergent conversation about the nature and utility of trans experiences within the field of women's, gender, and sexuality studies, while also holding the field accountable for potential feminist shortcomings that interfere with trans and non-binary mothers' expressions of agency. The goal is to decolonize transness, to empower participants to share their experiences in a way that challenges academic and popular feminism to better understand and to meet the complex needs of trans and non-binary people who fulfil the maternal roles which Western culture violently forbids us to assume.

Abstract ID :
UMSS19274

Transmitter Retention Study

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 341

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Jacob Stanton [1] *
Undergraduate

Author Name : Erik Blomberg [2]

Abstract Description : Rump-mounted transmitters allow individual birds to be tracked and monitored using VHF radio, satellite, and GPS technology. Many types of attachment methods exist for small and medium sized birds; however little research has focused on how various attachment methods impact transmitter retention through time. Many attachment methods are assumed to be permanent yet it is well documented that not all tags are retained for the duration of most studies. Dropped transmitters and imperfect tag retention may result in misleading or lost data, by imitating mortality or not being recovered. To better understand how attachment method impacts retention, we fit 3D printed non-functional tags with four different transmitter attachment methods on three local, highly visible bird species. To date we have outfitted 131 Rock Pigeons, 19 European Starlings, and 80 House Sparrows with a unique combination of plastic colored leg bands and a rump mounted tag 3D printed replicates of transmitters used to track birds. All birds involved in the study were captured at the Whitter Farm. 1,010 pigeon, 147 starling and 444 sparrow encounters were recorded during two re-sight trips per week May 2018 -March 2019. Individuals were identified by colored leg bands, presence or absence of tags was confirmed visually. Preliminary results indicate that tag retention was imperfect, with some individuals dropping their tags since deployment while other individuals still have tags attached after 9 months. We report results of mark-recapture models to evaluate the probability of tag retention through time for each species and tag attachment method.

Abstract ID :
UMSS1990

Triclosan Disrupts Mast Cell Plasma Membrane Electrochemical Potential

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 838

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Alan Baez [1] *
Undergraduate

Author Name : Suraj Sangroula [2]

Author Name : Juyoung Shim [3]

Author Name : Grace Bagley [4]

Author Name : Julie Gosse [5]

Abstract Description : Triclosan (TCS) is a popular wide-spectrum antimicrobial agent. While TCS was recently banned from several consumer products such as hand soaps, it remains in a top-selling toothpaste and other household items. TCS inhibits the function of both mast cells and mitochondria. Mast cells are found in most human tissues and play important roles in a wide variety of biological processes and diseases. Through investigating the mechanisms by which TCS disrupts mitochondrial and mast cell signaling, the Gosse lab found that TCS depolarizes the mitochondrial membrane and disrupts cellular Ca2+dynamics. However, triclosan's effects on mast cells and mitochondria disappear when its ionizable hydroxyl group is not present. These findings suggest TCS to be a proton ionophore capable of not only uncoupling mitochondria, but also possibly capable of disrupting the plasma membrane electrochemical potential (PMP). In this study, we have utilized a fluorescent, genetically-encoded voltage indicator named ArcLight A242 to measure TCS effects the PMP of mast cells. Utilizing this method for the first time, in mast cells, we have observed plasma membrane depolarization in the presence of gramicidin, using confocal microscopy coupled with image analysis. Using these newly-developed methods we have observed an inhibitory TCS effect on mast cell PMP. TCS disruption of PMP could provide a mechanistic explanation of triclosan's disruption of Ca2+influx, mast cell function, and a host of other cellular processes dependent on PMP.

Abstract ID :
UMSS19394

Tweets, trust & pixie dust: understanding credibility in the age of social media

Abstract Topic : Social Sciences

Submission Type : Exhibit
Submission# : 117
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Olivia Reese [1] *
Undergraduate

Author Name : Judith Rosenbaum [2]

Abstract Description : Twitter has quickly become the go-to source for information, especially for young adults. The credibility and authenticity of the news disseminated through Twitter, however, has long been questioned. Twitter has attempted to alleviate the lack of trust by introducing the verification mark. Using an online experiment (N= 136), this study investigated the impact this verification mark has on the perceived credibility of accounts with such a mark. Preliminary results point to the complexities surrounding the online assessment of credibility and the role played by the various visual cues that make up an online profile.

Abstract ID :
UMSS19193

UMaine Sociology Alumni: Careers, Reflections, and Advice

Abstract Topic : Social Sciences

Submission Type : Poster
Submission# : 149
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Amy Blackstone [1] *
Undergraduate

Author Name : Vince Camp [2]

Author Name : Angelo Dawson [3]

Author Name : Amanda DeBaker [4]

Author Name : Vincent Eze [5]

Author Name : Lilah Gagnon [6]

Author Name : Adam Jarosz [7]

Author Name : Alexis Johnson [8]

Author Name : Lauren Lang [9]

Author Name : Kate Leavitt [10]

Author Name : Joseph MacDonald [11]

Author Name : Kaitlyn McClurken [12]

Author Name : Emma McKearney [13]

Author Name : Joshua Moran [14]

Author Name : Ella Mosky [15]

Author Name : Briana Murphy [16]

Author Name : Jonah Paris [17]

Author Name : Bradley Seeglitz [18]

Author Name : Caroline Shepard [19]

Author Name : Emily Szotkowski [20]

Author Name : Jason Tkacs [21]

Author Name : Drisanna Watson [22]

Abstract Description : UMaine sociology alumni follow a variety of career and life paths. To understand how UMaine sociology alumni fare after they graduate and what their career trajectories look like, the Sociology Senior Capstone course conducted interview and survey research with department alumni. Surveys were sent to 498 alumni; 112 responded (22.5 percent response rate). In addition, 18 alumni were interviewed by students in the course. Findings show that there is no “one right way” to pursue meaning or a career after graduating with a degree in sociology. All but two interview participants received further education after receiving their BA, as did 69 percent of survey respondents. Alumni report careers in business, human services, education, the arts, health care, and other industries. Though most interview respondents report that are happy with the paths they’ve pursued, and 97 percent of survey respondents report being financially stable, some interviewees said they struggled early on to find their place professionally and to articulate their goals. Alumni suggested that better support for internships and other hands-on experiences in the community may have eased early concerns about finding employment and other meaningful paths in life. Alumni also said that they would have benefitted from more research and data analysis experience while students at UMaine. Alumni recommend that the UMaine Sociology Department integrate more career planning and preparation into the curriculum. Many respondents reported that their sociology background opened their eyes to new ways of thinking and helped them understand others’ circumstances and perspectives.

Abstract ID :
UMSS1918

Undergraduate Nursing Students' Perspectives and Attitudes Caring for Elderly Patients at End of Life

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 404

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Karen Chase [1] *
Graduate

Author Name : Patricia Poirier [2]

Abstract Description : Aim: To research the attitudes and perspectives of senior undergraduate nursing students enrolled in NUR 435, nursing care for the patient/family at end of life, toward caring for elderly patients at end of life. Review of Literature: The literature concluded that nursing students' attitudes and perspectives toward caring for both end of life and elderly patients varied due to personal belief systems, age and experiences. Nursing students feel that their undergraduate nursing education has left them unprepared and lacking self-confidence when it comes to applying their knowledge about end of life care in practice. Methodology: A quasi-experimental design was established to determine if the use of an end of life care for the elderly module administered in NUR 435 would change nursing students' attitudes and perspectives caring for elderly patients at end of life. Additionally, the study examined if receiving elderly end of life care education eased anxieties and fears and helped students feel more prepared regarding caring for elderly patients at end of life. A pre and post-test was created, administered and then completed by all 38 undergraduate nursing students in NUR 435 before and after administration of the elderly end of life module. Summary of Outcomes: There were several positive results from the study. Overall, the results demonstrated that the end of life care for the elderly module decreased anxieties and fears and changed nursing students' attitudes and perspectives about caring for elderly patients at end of life in a positive manner.

Abstract ID :
UMSS19231

Understanding Factors Influencing Broadband Adoption in Maine

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 137

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Briana Littlefield [1] *
Graduate

Author Name : Megan Bailey [2]

Abstract Description : Broadband internet access has clear implications for those who are able to use it. Having a faster connection means that data transmission can operate at a higher capacity, but its benefits notably effect the end-users in other ways. Broadband internet opens up opportunities for business development, education, and communication which otherwise may be limited. In the State of Maine, broadband speeds are some of the lowest in the country and the user adoption rate is among the slowest growing (Andersen, 2014). With communities across Maine searching for funding to develop broadband infrastructure, it is important to recognize the factors that influence the adoption of this technology by consumers; availability of broadband is just the first piece of the puzzle (Glasmeier et al 2008). Our aim is to identify the factors which affect the broadband penetration rate in Maine. Here, we present initial spatial analyses of demographic factors which may influence preference toward technology adoption (such as: age, educational attainment, and income) relative to broadband adoption rates. We also investigate whether there is an inherent linkage between preferences for broadband technology adoption and preference or rural dwelling. A better understanding of consumer preferences for broadband internet usage will help inform policymakers seeking to increase the broadband availability and access in Maine. References: Andersen,C. "Maine broadband service ranks 49th out of 50 states". Portland Press Herald. January 8, 2014. https://www.pressherald.com/2014/01/08/maine_broadband_going_nowhere_fast__service_ranks_49th_out_of_50_states_/ Glasmeier, A., Benner, C., Ohdedar, C., & Carpenter, L. (2008). Broadband internet use in rural Pennsylvania. Center for Rural Pennsylvania.

Abstract ID :
UMSS1993

Understanding the role of CpsA in Streptococcal infection

Abstract Topic : Biomedical Sciences

Submission Type : Poster

Submission# : 840

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Benjamin Tero [1] *
Undergraduate

Author Name : Melody Neely [2]

Abstract Description : Group B Streptococcal (GBS) infections pose a great threat to mortality in neonates. Neonates are often exposed to GBS both before, during and after delivery, which can cause a range of health problems including meningitis, sepsis, or even stillbirth. One of the major virulence factors that contributes to the infectivity of the pathogen is the bacterial capsule. The capsule is a polysaccharide matrix surrounding the cell which helps in the evasion of host defenses, and penetration deeper into normally sterile sites like the bloodstream. The highly conserved GBS protein CpsA has been shown to regulate expression of the capsule [1]. The objective of this study is to identify protein-protein interactions with CpsA, as well as truncated versions of CpsA, using co-immunoprecipitation protocols to pulldown CpsA binding partners. Research has previously shown that deletion of the LytR domain, which is an extracellular domain following three membrane-spanning domains and an accessory domain, has a negative impact on capsule production, therefore indicating an extracellular binding occurrence in this domain [1]. Further evidence shows that a portion of the extracellular domain potentially binds at the septum of the cell, however the specifics of this interaction remain unknown. By demonstrating an interaction with other proteins, further targets could be identified for treatment of GBS infections.

Abstract ID :
UMSS19105

Unexpected reproductive traits of Grateloupia turuturu revealed by its resistance to bleachbased biosecurity protocols

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 313 **Judge Time Slot :** PM2 (2:30 - 3:30)

Graduate

Author Name : Kyle Capistrant-Fossa [1] *
Graduate

Author Name : Susan Brawley [2]

Abstract Description : A non-indigenous alga, Grateloupia turuturu (Halymeniales, Rhodophyta), was discovered in the Damariscotta Estuary in 2017, over 200 km north of its last reported location. Because of the presence of coastal facilities (aquaculture, marine laboratories) among potential vectors, we evaluated a mandated biosecurity protocol, namely, seawater treated with bleach at 50 ppm free chlorine for ≥2 h and measured, using test strips, for lethality against G. turuturu and several native algae. We report unexpected resilience to bleach-treatment (Mastocarpus > Grateloupia > Palmaria). Holdfasts of G. turuturu and Mastocarpus stellatus survived 50 and 1000 ppm free chlorine, respectively. Cystocarps on cultured blades of G. turuturu were particularly resistant to bleach-treatment; they produced outgrowths on fragmenting blades that became fertile tetrasporophytes in culture, suggesting reproductive adaptations of cystocarps to stressful conditions that may have broader evolutionary significance. Juvenile, microscopic crusts of G. turuturu were also bleachresistant if covered by diatoms, and developed upright axes. Free chlorine test strips were inaccurate in seawater, and their use could increase the risk of failed biosecurity as a vector for invasion. This activity is supported by National Science Foundation award #IIA-1355457 to Maine EPSCoR at the University of Maine.

Abstract ID :
UMSS19343

Unique Roles for Subpopulations of Nociceptive Fibers in Cancer-induced Bone Pain

Abstract Topic : Biomedical Sciences

Submission Type : Exhibit

Submission# : 803

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Joshua Havelin [1] *
Graduate

Author Name : Tamara King [2]

Abstract Description : Cancer-induced bone pain is reported to be one of the most detrimental aspects of the disease broadly categorized into two separate phenomena. Patients experience a dull achy persistent background pain that worsens as disease progresses and is treated with around the clock mu opioid receptor (MOR) agonists. In addition, patients often report transient episodes of severe pain that is sometimes spontaneous but often triggered by movement and that “breaks through” around the clock medication. Breakthrough pain is treated with additional rapid onset MOR agonists that are limited by dose- limiting side effects and often miss an effective window of treatment for the patient. We examined the hypothesis that ongoing pain and breakthrough pain are initiated by different populations of sensory afferents. Previous observations in a rat model of cancer-induced bone pain demonstrate IB4-binding fibers play a critical role in transducing breakthrough pain whereas TRPV1 expressing fibers do not. We are characterizing cancer-induced ongoing and breakthrough bone pain in a mouse model. Lewis lung carcinoma (LLC) cells are injected and sealed into the femur of C57bl/6 mice allowing us to use techniques to assess subpopulations of sensory fibers in initiation and maintenance of ongoing and breakthrough pain. Movement-triggered increases in guarding and limb use persist in the presence of morphine indicating breakthrough pain. Pharmacological characterization of cancer-induced ongoing pain demonstrates that the peptidergic MOR agonist DAMGO induces CPP whereas the peptidergic DOR agonist Deltorphin does not. Preliminary data indicate that Deltorphin blocks movement-induced breakthrough pain. We are exploring the ability of optogenetic silencing of Nav1.8 compared to MrgD expressing fibers in mediating ongoing and breakthrough pain in the mouse.

Abstract ID :
UMSS19210

United States and Canadian Film Industry: A Comparison

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 138

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Dominic Guimond [1] *
Undergraduate

Author Name : Stefano Tijerina [2]

Abstract Description : For my research I am studying the relationship between the United States and Canada's film industry and examining why Canada struggles in the global market. The United States has been the dominant nation in the film industry since its conception, yet Canada has one of the weakest industries. With its close proximity to the United States, Canada has always been overshadowed by the nation to the south and many of their problems stem from this relationship. Reasons for this include: brain drain, struggles with distribution, the "American Monopoly," and lack of distinction between American and Canadian films. The reasoning behind this research is because I think this information is applicable to the state of Maine. Maine has a very underdeveloped film industry, having produced a few star actors, actresses, and directors. However, most of these professionals have since moved away to Hollywood, a pattern that closely follows Canada. Film can also be a highly profitable sector. It employs workers of all different type: carpenters, seamstresses, catering, electricians, etc. With Maine being a state that has a population problem, I think this could be an important industry for the state in retaining its younger generation.

Abstract ID :
UMSS19230

Use of Social Modeling Moderates the Association Between Depressive Symptoms and Co-Rumination

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 130

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Eliot Fearey [1] *
Graduate

Author Name : Hannah Lawrence [2]
Graduate

Author Name : Rebecca Schwartz-Mette [3]

Abstract Description : Co-rumination, perseverative problem-talk between two people that focuses on negative experiences and feelings, occurs among those with depressive symptoms (Rose, 2002). The current study sought to determine whether looking to others to manage one's emotions (i.e., interpersonal emotion regulation; e.g., Hofmann, Carpenter, & Curtiss, 2016) impacts the likelihood of co-rumination among those with depressive symptoms. Specifically, we hypothesized that looking to others for modeling of how to cope would moderate the association between depressive symptoms and co-rumination. College students (N = 274; M age = 19.33; 66% female) reported on depressive symptoms (CES-D; Radloff, 1977), interpersonal emotion regulation (IERQ; Hofmann, Carpenter, & Curtiss, 2016), and co-rumination (Co-rumination Questionnaire; Rose, 2002). Co-rumination was significantly correlated with depressive symptoms ($r = .127$, $p < .05$) and all subscales of the IERQ, including looking to others for: enhancing positive affect ($r = .33$, $p < .01$), perspective taking ($r = .27$, $p < .01$), soothing ($r = .34$, $p < .01$), and social modeling ($r = .26$, $p < .01$). Moderated regression results indicated a significant interaction between depressive symptoms and reliance on social modeling ($b = .05$, $p < .05$), such that increased depressive symptoms predicted increased co-rumination at high levels of social modeling ($b = .53$, $p < .01$), but not at low levels of social modeling ($b = .09$, $p = .52$). Data suggest that those with depressive symptoms and who look to others to model coping behaviors are more likely to engage in co-rumination. Implications of findings for psychological intervention will be discussed.

Abstract ID :
UMSS19168

Using Concept Maps to assess student understanding about marine primary production across core courses in the Marine Sciences undergraduate curriculum

Abstract Topic : Education

Submission Type : Poster

Submission# : 505 **Judge Time Slot :** PM1 (1:00 -2:00)

Undergraduate

Author Name : Madison Decker [1] *
Undergraduate

Author Name : Sara Lindsay [2]

Abstract Description : Madison Decker1 and Sara Lindsay1,2 1School of Marine Sciences, 2Center for Research in STEM Education (RiSE Center) University of Maine At the University of Maine, undergraduates majoring in Marine Sciences learn, integrate and apply knowledge from multiple disciplines including biology, chemistry, geology, oceanography, physics, policy and mathematics. For example, marine primary productivity (i.e., the process by which microscopic phytoplankton convert the sun's energy into organic carbon that provides food for other marine organisms) is controlled by numerous factors including depth, light, ocean circulation, grazing, and nutrients. Perhaps due to these complexities, undergraduates in the School of Marine Sciences (SMS) often have misunderstandings about ocean primary productivity, and helping students build correct understanding is a challenge for instructors. We investigated how SMS students' conceptual understanding of marine primary productivity changed from a first-year course (SMS 201) to upper-level oceanography classes (SMS 302/303), and if instruction that included computer modeling of this complex topic changed students' understanding. SMS 302/303 students constructed concept maps describing factors influencing marine primary productivity before and after instruction; pre-instruction maps were compared to concept maps created by the same students in SMS 201. We surveyed students about their experience with, and opinion of concept maps as learning tools; most saw concept maps as a useful tool for organizing knowledge about primary productivity. Students also reported that building concept maps helped them identify what they did and did not know about marine primary productivity. Post-instruction concept maps were more complex than those created pre-instruction or in SMS 201. These results contribute to a growing body of research suggesting metacognitive activities like concept mapping improve student learning. Acknowledgements: This project was judged as exempt from review by the UM IRB (Application# 2018-17-09).

Abstract ID :
UMSS19253

Using Green Crab to Produce Nutritious Dog Treats

Abstract Topic : Natural Sciences

Submission Type : Poster
Submission# : 348
Undergraduate

Judge Time Slot : PM1 (1:00 -2:00)

Author Name : Anna Smestad [1] *
Undergraduate

Author Name : Angela Myracle [2]

Abstract Description : Green crabs (Carcinus meanus) are an invasive species to the Gulf of Maine that cause significant ecological harm. They feed on crustaceans and shellfish which threatens important industries in Maine. The green crab is underutilized because of it's small size and it doesn't provide a substantial amount of meat. However, they do contain many nutrients in both their meat and their shell (carapace). The chitin located in the carapace of the crab and the calcium content are the main focus for this project. The chitin, a functional fiber, and the calcium can be utilized in novel ways such as making nutrient rich pet treats. The objective of this project is to identify cooking methods (pressure cooking and acidification) to soften and demineralize the crab shell to produce a crab meal. The meal will be incorporated into a treat (canine) and tested for nutrition parameters. This project will identify a way to utilize the whole green crab and to help create a market for products using the crab meal. The results from this project may be beneficial to promote the trapping of the green crab for profit and to help alleviate the invasive issues due to the uncontrolled population.

Abstract ID :
UMSS19115

Using Hydroacoustics to Monitor Changes in Estuary Fish Populations, Penobscot River, Maine

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 317

Judge Time Slot : PM2 (2:30 - 3:30)

Graduate

Author Name : Justin Stevens [1] *

Graduate

Author Name : Damian Brady [2]

Abstract Description : Diadromous fish require both freshwater and marine habitat to complete their life cycle. Dams restrict the movement between these habitats and as a result, many populations are historically low across their range. The Penobscot River is the second largest river in Maine and once had large populations of diadromous fish but only recently has been the focus of dam removal and dam passage improvements to restore those populations. Since 2012, NOAA Fisheries has conducted hydroacoustic surveys of the Penobscot Estuary using mobile, multi-frequency echosounders (SIMRAD EK60 split-beam 38 and 120 kHz) combined with mid-water trawl surveys to assess this large-scale restoration. We used trawl data to characterize the size and mixed pelagic species (Clupeid and Osmerid) assemblage. We used single target detection and echo tracking algorithms to isolate TS values from individual fish. We developed an empirical formula from TS and fish length and used these parameters to develop estimates biomass from 2012 to 2017 a period spanning pre-restoration (2012-2014) and post-restoration (2015-2017). During pre-restoration, fish density was high in relatively small areas of the estuary, fish were smaller and biomass was low when compared to post-restoration. From pre-restoration, mean biomass increased from 14,000 kg to 60,000 kg in spring, 34,000 kg to 82,000 kg in summer, and 13,000 kg to 48,000 kg in fall. These analyses demonstrates the utility of hydroacoustics in monitoring large-system restoration by describing multiple metrics in a complex ecosystem. The results demonstrate the ecological changes to the estuary as a result of river restoration. ACKNOWLEDGEMENTS This research was supported, in part, by the National Oceanic and Atmospheric Administration (NOAA) through the Cooperative Institute for the North Atlantic Region (CINAR) under Cooperative Agreement NA14OAR4320158.

Abstract ID :
UMSS1920

Using Structure from Motion and 3D Printing as a Method for Preserving the Petroglyphs of Machias Bay, Maine

Abstract Topic : Interdisciplinary

Submission Type : Poster

Submission# : 612

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Kendra Bird [1] *
Graduate

Author Name : Lisa Neuman [2]

Abstract Description : Machias Bay, located in eastern Maine, is home to the largest concentration of petroglyphs (rock art) on the eastern coast of North America. As they are under constant threat of damage from factors such as erosion and vandalism, efforts have been made to document and preserve these images for posterity. Many of the methods used in the past have, despite being well-intentioned, risked acceleration of erosion; charcoal rubbings and casting and molding are both very intrusive approaches. Within the last decade, documentation efforts at the University of Maine included attempts to capture the three-dimensional morphology of the petroglyphs in a minimally-intrusive manner using a laser scanner. Use of the scanner was cumbersome and time-consuming, and the resulting models from the initial experiments were less than satisfactory. In 2017, I decided to pick this project up again from a new perspective, using a simple point-and-shoot camera, structure-from-motion (SfM) technology, and an open-source workflow to generate three-dimensional models of two Machias Bay petroglyphs, and create physical reproductions of them using a 3D printer. The results of this testing exceeded expectations, and strongly support SfM as an ideal method to thoroughly document the petroglyphs' appearance and morphology before they fall victim to erosional processes and other damage.

Abstract ID :
UMSS19188

Utilization of quantitative PCR for evaluating parasitemia in avian species

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 383

Judge Time Slot : AM1 (9:30 - 10:30)

Graduate

Author Name : Oliva Choi [1] *
Graduate

Author Name : Pauline Kamath [2]

Abstract Description : Accurate detection and quantification of parasite infections is essential for understanding host-parasite ecology and evolution. Avian haemosporidians are a diverse group of parasites (Haemoproteus, Leucocytozoon, and Plasmodium spp.) found globally that infect bird blood cells. Although symptoms are commonly mild, Plasmodium spp. have been attributed to populations declines (e.g., Hawaiian honeycreepers). Standard screening methods for avian haemosporidians include microscopy and molecular techniques, and Ishtiaq et al. (2017) found that diagnostic sensitivity varied across these methods. In this study, we further validate the relationships between quantitative PCR (qPCR) and microscopy for screening avian haemosporidians. The Ishtiaq et al. study focused on birds captured in Sweden and India (Eastern Hemisphere) and here we expand that range to include species captured in Israel and Western Hemisphere species captured in Maine. Blood samples were collected from two species (steppe buzzard, mallard duck) in Israel, and seven species (American black duck, American green-winged teal, house sparrow, mallard duck, rock pigeon, wild turkeys, wood duck) in Maine. We used both blood smears and qPCR for detection and quantification of parasite load, contrasting results across methods. We expect to find a predictable relationship between qPCR cycle threshold values and parasite load as estimated using microscopy. We also expect qPCR to show improved detection of parasites compared to microscopy. The results from this study will improve avian haemosporidian detection methods. Furthermore, as microscopy is time-consuming, validation of the accuracy of qPCR will provide a more efficient approach for evaluating parasitemia in birds. Acknowledgements: This project was supported by the USDA-National Institute of Food and Agriculture Hatch Project No. ME021908, the NSF-EEID grant #1617982, and the J. Franklin Witter Undergraduate Research Endowment Fund. We thank Alexander Fish, Stephanie Shea, Matthew Gonnerman, the Hebrew University's Movement Ecology lab, and Maine IFW for helping sample birds. Reference: Ishtiaq et al. 2017. Parasites and Vectors 10: 127.

Abstract ID :
UMSS19181

Utilizing accelerated solvent extraction to investigate the antioxidant characteristics of Saccharina latissima

Abstract Topic : Natural Sciences

Submission Type : Poster

Submission# : 318

Graduate

Judge Time Slot : PM2 (2:30 - 3:30)

Author Name : Abigail Wiegand [1] *

Graduate

Author Name : Angela Myracle [2]

Abstract Description : Brown seaweeds are a source of polyphenols, a class of compounds that are known to scavenge free radicals. This antioxidant effect can help reduce cellular damage from oxidative stress. Accelerated solvent extraction (ASE) uses high pressure to obtain aqueous extracts rich in target chemicals. This study focuses on the optimization of extraction temperature for freeze-dried seaweed using a Dionex ASE 200. Sugar kelp (Saccharina latissima) grown in Maine waters is the seaweed of interest. Total phenolic content (TPC) and radical scavenging capacity will be quantified by the Folin-Ciocalteau method and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay respectively. This study is one of the first to investigate the properties of Maine sugar kelp, and it is a contemporary investigation of the use of ASE in seaweed extraction. The results of this study will provide information to researchers utilizing ASE, as well as to consumers and farmers of Maine sugar kelp.

Abstract ID :
UMSS19146

VHF Near Field Antenna Design for Wireless Sensing Applications in Harsh Environments

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 241
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Nicholas Aiken [1] *
Undergraduate

Author Name : Mauicio Pereira Da Cunha [2]

Abstract Description : Application in defense, aerospace, energy exploration, and power are in high demand for high-temperature sensors which can operate up to 1000°C or beyond. Wired sensors pose difficulties for high-temperature operation, such as reliability, installation cost, maintenance, and reduction of operational safety. Therefore, the wireless operation provides valuable functionality for operation in harsh environments. In addition, the battery-free operation is often a requirement, since semiconductor electronics are unable to operate beyond a few hundred degrees Celsius. The UMaine Microwave Acoustics Laboratory (MAL) group has developed Surface Acoustic Wave (SAW) devices which can communicate wirelessly in high-temperature environments and without power supplies (passive), using sensing and interrogating antennas. Field coupling wireless interrogation technology is attractive due to the reduced size of the antennas required. However, current antennas in use allow operation up to tens of millimeters, when attenuation of the two-way communication can reach 50 to 70 dB. The current research approach targets a better understanding of the limitations, and investigation of possible improvements regarding power transfer to the sensor and transmission of the signal back to the interrogation unit. This refinement of the technology should be achieved through the adjustments of the antenna and impedance matching circuit design, for currently available devices operating in the 194 MHz to 337 MHz range. The work entails radio frequency (RF) circuitry software simulation, fabrication, test, and adjustments for the field coupling antennas. The results of this work have the potential to affect current and future high-temperature harsh-environment wireless SAW sensor communications links.

Abstract ID :
UMSS19264

Voice Modification Therapy and the Quality of Life in Transgender Male-to-Female Adolescents

Abstract Topic : Allied Health

Submission Type : Poster
Submission# : 414
Undergraduate

Judge Time Slot : AM1 (9:30 - 10:30)

Author Name : Kayla Nason [1] *
Undergraduate

Author Name : Cierra Farrington [2]

Author Name : Amanda Peterson [3]
Undergraduate

Author Name : Kassidy Robidoux [4]

Author Name : Paige Lane [5]

Abstract Description : Voice modification therapy (VMT) for transgender individuals has been proven to be effective in transgender adult's quality of life (QoL). Despite this, there is still a lack of research currently available to prove that VMT has a positive effect on transgender adolescent's QoL. This literature explores the transition process and research regarding the QoL for adults and adolescents who have successfully undergone VMT based not only on their own perceptions but also on other's perceptions. A study is proposed to expand research regarding how VMT has a positive correlation to a transgender adolescent's QoL. This study would be conducted by looking at and comparing the results of transgender young adults aged 18-25 with the Transexual Voice Questionnaire Male-to-Female (TVQMTF), in conjunction with voice modification therapy pre, mid, post, and post-post therapy. To conduct this study, the transgender male-to-female and typical female speakers would evaluate their own voice and correlating QoL pre, mid, post, and 6 months post-post therapy. They would then record a 30 second - 1 minute speech sample while speaking on any given topic. After this, the listeners (male and female 18-25 year olds with normal hearing) would use a sliding scale to rate aspects of femininity of the speaker's voices, including pitch. Finally, the speakers would have a chance to review the listener's feedback and could report how this would also affect their QoL. Results would be presented via line graph to show changes over the course of therapy sessions.

Abstract ID :
UMSS19269

Warming Eggs: Thermal Stress Response of Mitochondria in Developing Zebrafish Embryos:

Abstract Topic : Natural Sciences

Submission Type : Oral

Submission# : 377

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Brynn Yarbrough [1] *
Undergraduate

Author Name : Nishad Jayasundara [2]

Abstract Description : Aquatic organisms, including fish are often exposed to temperature changes in their environment. Exposure to fluctuations in temperature affects organismal metabolic rates and macromolecule integrity, and an adequate thermal response is necessary to maintain cellular homeostasis. Early life stages of organisms are likely to be particularly vulnerable to changes in temperature. However, very little is known about thermal stress responses during fish embryonic development. Considering the critical role for mitochondria during development as the energy powerhouse of the cell as well as a key signaling organelle, here we examined mitochondrial function during embryonic development under different thermal regimes. We exposed embryos to 28˚C, 32˚C and 36˚C at different stages of development. and quantified their mitochondrial function based on a high-throughput assay. Post-stress heart rates and hatching rates were also quantified. Data showed little differences in heart rates and hatching rates across treatment groups. However, mitochondrial function was significantly compromised depending on the magnitude and duration of the thermal stress. Discordant with thermodynamic effects on biochemical reaction rates, mitochondrial function was conserved at 28˚C, and 32˚C, and suppressed at 36˚C. These intriguing findings warrant further studies into mitochondrial dynamics during development, including examining their persistent effects into later life. This work was funded by School of Marine Sciences Startup Funds to the Jayasundara Laboratory.

Abstract ID :
UMSS19159

Water Resources System Design and Performance Under Changing Hydroclimatic Conditions: A Case Study of Feather River Basin, California

Abstract Topic : Engineering & Information Sciences

Submission Type : Poster

Submission# : 232
Graduate

Judge Time Slot : AM2 (11:00 - 12:00)

Author Name : Ali Aljoda [1] *
Graduate

Author Name : Shaleen Jain [2]

Abstract Description : Uncertainties and risk associated with increasing water demand and hydroclimatic variations add challenges to the task of management and planning of the regional water resources systems. This study demonstrates the key role of climate variations in changing the hydrologic regime of a river basin, and the impacts of the flow variability on the water resources decision variables (i.e., system's design and performance). The impacts of temporal variation and nonstationarity encoded in streamflow records are studied in the context of water resources systems planning and management by using the applications of reservoir storage requirement and performance metrics (Reliability, Resiliency, Vulnerability). A case study of Feather River inflow into the Oroville Dam with a single hypothetical reservoir is presented. Changes in hydrologic regime over the observed and historical records revealed the uncertainties and risk in the decision variables due to the nonstationarity in the streamflow which significantly altered the reservoir capacity and performance. The wavelet and coherence analysis allow assessment of the time-varying climate-streamflow relationships and their impact on reservoir's storages, reliability, resilience, and vulnerability over variety of time-scales.

Abstract ID :
UMSS1965

What strategies can be implemented to increase workplace satisfaction and decrease emotional exhaustion thus decrease nurse turnover rates?

Abstract Topic : Allied Health

Submission Type : Poster

Submission# : 420

Judge Time Slot : AM1 (9:30 - 10:30)

Undergraduate

Author Name : Tessa Lindsley [1] *
Undergraduate

Author Name : Samantha King [2]
Undergraduate

Author Name : Kathleen Thibodeau [3]

Author Name : Taylor Durepo [4]

Author Name : Patricia Poirier [5]

Abstract Description : Background: The nursing workforce shortage is defined by the high rate of new graduate nurse turnover while simultaneously a large number of nurses are reaching the age for retirement. Evidence suggests increased nurse turnover results in decreased patient safety, quality of care, and access to care, leading to poor patient outcomes. Nurses who remain working are exposed to increased workload and job demand, which leads to higher amounts of stress, burnout, and subsequently, to more nurse turnover (Mazurenko, Gupte, & Shan, 2015). Methods: A review of the literature was conducted to identify strategies that are effective in lowering turnover rates amongst new graduate nurses. Findings: One effective solution is to implement nurse residency programs. These programs can be achieved through improving working conditions and protocols, which would help encourage new nurses to continue their career remaining within one program the entire time. A second solution is to remodel the nurses' working conditions through providing supportive working environments. Supportive working conditions entails eliminating cynicism and emotional exhaustion, which could then promote a healthy workplace environment as well as ensure a low sensitivity to workplace burnout for new nurses—therefore, lowering turnover rates.

Abstract ID :
UMSS19224

Women's Centers on Campus

Abstract Topic : Education

Submission Type : Poster

Submission# : 503

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Ashlee Atchinson [1] *
Undergraduate

Author Name : Susan Gardner [2]

Abstract Description : Women's Centers on U.S. college and university campuses were first established in the 70s in response to national calls for women's and gender equity in the second wave of feminism (Eisenmann 474). The Women's Resource Center at UMaine Orono, first established in 1991 and then again in 2016, has a complicated and long history spanning nearly 30 years. This paper will look at the importance of Women's Centers on U.S. campuses as a whole, as well as documenting the history of the Women's Resource Center at the University of Maine in a comprehensive paper. In addition to a history this paper will also provide an outline for how to operate a Women's Center. References: Eisenmann, L. (1998). Historical Dictionary of Women's Education in the United States. Westort, CT: Greenwood Publishing Group.

Abstract ID :
UMSS19172

Working Towards Creating a Circular Nutrient System

Abstract Topic : Social Sciences

Submission Type : Poster

Submission# : 146

Judge Time Slot : PM1 (1:00 -2:00)

Undergraduate

Author Name : Skyler Horton [1] *
Undergraduate

Author Name : Cynthia Isenhour [2]

Abstract Description : Currently most food waste is either landfilled or incinerated; but it could be used to feed hungry people or to cycle nutrients back into productive soils. While it is best to redistribute excess food to those in need, not all discarded food is edible, and transportation is a major barrier. Composting and anaerobic digestion provide an alternative to land filling and can recover nutrients from food waste for other agricultural purposes. But, these industries, if not managed sustainably, also have the potential to produce new risks. Contamination of feedstocks is one of the biggest problems facing operators; feedstocks come from a variety of businesses, meaning that the quality of the inputs is highly variable. The research presented aims to understand how nutrient cycling facilities perceive and respond to these risks. Understanding risk perceptions is key to creating a circular nutrient system because these perceptions influence how facilities respond to potential risks, the safety of their product and ultimately, whether or not soil amendments are safe. A survey was developed and sent out to food processing facilities across the New England region to understand operators risk perceptions involved with their businesses and gain insight into how the facilities operate. These risk perceptions are important to identify and address so that mitigation strategies can be developed, and operators can run a more sustainable business that contributes to waste reduction and more sustainable local food systems.

Abstract ID :
UMSS19250

Yttria-Stabilized Zirconia Thin Films on Langasite Substrates for Harsh Environment Gas Sensor Applications

Abstract Topic : Physical Sciences

Submission Type : Poster

Submission# : 905

Judge Time Slot : AM2 (11:00 - 12:00)

Graduate

Author Name : Firas Mahyob [1] *
Graduate

Author Name : Robert Lad [2]

Abstract Description : Yttria-Stabilized Zirconia Thin Films on Langasite Substrates for Harsh Environment Gas Sensor Applications Firas Mahyob (PhD Candidate) Department of Physics & Astronomy Frontier Institute for Research in Sensor Technologies (FIRST) Yttria-stabilized zirconia (YSZ) is widely used as a bulk ceramic material in solid oxide fuel cells (SOFC) and for high temperature oxygen sensing applications due to its high ionic conductivity, chemical inertness, and thermal stability at temperatures up to at least 1500oC. In thin film form, YSZ is attractive as a component for miniaturized harsh environment sensors used to detect gases such as H2 in industrial environments. In this work, radio-frequency (RF) magnetron sputter deposition is being used to synthesize YSZ (8%Y2O3-92%ZrO2) thin films with thicknesses from 15nm to 200nm on langasite (La3Ga5SiO14) substrates. Electron beam evaporation of Pt is used to decorate the YSZ surfaces with small (~10 nm) Pt nanoparticles to influence gas-surface interactions and enhance the gas sensing mechanism. The YSZ film crystal structure is being probed by x-ray diffraction (XRD) and the surface composition is being investigated by x-ray photoelectron spectroscopy (XPS) before and after high temperature treatments up to 1200oC in an atmosphere-controlled furnace. Film impedance experiments are being carried out to characterize the high temperature surface reactivity of the Pt/YSZ thin films upon exposure to 4%H2+96%N2 in the range 4000-6000C. The results of this project will further our understanding of H2 interactions with Pt/YSZ thin materials and help to develop improved strategies for gas sensing.