
Projects

Don Hickey continues to serve as series editor for John Hopkins Books on the War of 1812 and on the editorial board for the Journal of the War of 1812 and the War of 1812 Magazine.

Don Hickey also has worked on two PBS films that will air this fall, has done consulting work for Fort McHenry National Monument and the U.S.S. Constitution Museum, and continues to serve as a consultant on a Teaching of American History grant.

Adams, F. D. & Lawrence, G. J. Bullying victims: The Effects Last into College (in press) in the American Secondary Education journal.

The American Association of University Professors has accepted Dr. Dalager's proposal to present a paper on the impact of policy initiatives in higher education on academic freedom at the 2011 Annual Conference on the State of Higher Education scheduled for June 8th – 11th in Washington, D.C.

Wayne State
College



**Natural and
Social Sciences
Research**

**Date: 05/04/11
2010-2011**

Undergraduate Presentations

Research Projects ~ 2010

Research Paper published in: The Journal of Strength and Conditioning Research 24(3): 711-716, 2010.

Authors: Zachary D. Molacek, Dr. Donovan Conley, Dr. Tammy Evetovich, Dr. Kris Hinnerichs

Title: EFFECTS OF LOW AND HIGH VOLUME STRETCHING ON BENCH PRESS PERFORMANCE IN COLLEGIATE FOOTBALL PLAYERS

Abstract: The purpose of this study was to determine the effects of acute low and high volume static and proprioceptive neuromuscular facilitation (PNF) stretching on one-repetition maximum (1RM) bench press. Fifteen healthy male National Collegiate Athletic Association Division II football players (age, 19.9 ± 1.1 years; weight, 98.89 ± 13.39 kg; height, 184.2 ± 5.7 cm; body composition, 14.6 ± 7.4 %; 1RM bench press, 129.7 ± 3.3 kg) volunteered to participate in the study. Subjects completed 5 different stretching protocols integrated with a 1RM dynamic warm-up routine followed by 1RM testing in randomly assigned order. The protocols included: 1) non-stretching (NS), 2) low volume PNF stretching (LVPNFS), 3) high volume PNF stretching (HVPNFS), 4) low volume static stretching (LVSS) and, 5) high volume static stretching (HVSS). Two and 5 sets of stretching were completed for the low and high volume protocols respectively. The stretching protocols targeted triceps and chest/shoulder muscle groups using two separate exercises. There were no significant differences in 1RM bench press performance ($p > 0.05$) among any of the stretching protocols NS (129.7 ± 3.3 kg), LVPNFS (128.9 ± 3.8 kg), HVPNFS (128.3 ± 3.7 kg), LVSS (129.7 ± 3.7 kg) and HVSS (128.2 ± 3.7 kg). We conclude that low and high volume PNF and static stretching has no significant acute effect on 1RM bench press in resistance trained collegiate football players. This suggests that resistance trained athletes can include either: 1) a dynamic warm-up with no stretching or 2) a dynamic warm-up in concert with low or high volume static or PNF flexibility exercises prior to maximal upper body isotonic resistance training lifts, if adequate rest is allowed prior to performance.

Advisor: Dr. Donovan Conley

Presentations

Dr. Barbara Hayford

Joint Annual Meeting of the North America Benthological Society and the American Society of Limnology and Oceanography~ Santa Fe, NM

Title: Long-term changes in Chironomidae Communities of Lake Tahoe with a Comparison to other large lake Ecosystems (Crater Lake and Lake Hovsgol)

Abstract: We compared past (1960s) and contemporary chironomid assemblages in Lake Tahoe (USA) to determine how chironomid communities have changed with alterations to the physical and biological character of the lake. We also compared Lake Tahoe chironomid assemblages to those of two other oligotrophic lakes that have been relatively undeveloped (Crater Lake, USA and Lake Hovsgol, Mongolia). Although lakewide-weighted chironomid density in Lake Tahoe has declined 65% since the 1960s, genera richness has tripled. Among lakes, present-day genera richness was greatest in Lake Tahoe, followed by Lake Hovsgol and Crater Lake (61, 33, and 19 genera, respectively). Present-day dominant genera in Lake Tahoe were *Paratendipes* and *Chironomus*. In Crater Lake, dominants were *Heterotrissocladius* and *Orthocladius*, and in Lake Hovsgol, dominant genera were *Micropsectra* and *Polypedilum*. Overall, chironomid assemblage structure in Lake Tahoe indicates a shift from ultra-oligotrophic taxa to oligotrophic and mesotrophic taxa over the past 50 years, which is substantiated by the increase in cultural eutrophication that has been well documented in the lake during this time. Potential effects of introduced species in the lakes are also discussed.

Presentations

Dr. Barbara Hayford

Joint Annual Meeting of the North America Benthological Society and the American Society of Limnology and Oceanography~ Santa Fe, NM

Title: Stream Response to Climate Changes and Grazing by Domesticated Herbivores along the Eastern Shore of Lake Hovsgol, Mongolia

Abstract: Increased temperature and weather intensity, already documented for northern Mongolia, may be exacerbated by an increase in overgrazing by domesticated herbivores. The International Long Term Ecological research station at Lake Hovsgol, located in northern Mongolia includes a north/south grazing gradient along the east shore of the lake which we used to study the impact of grazing on stream condition. Forty-eight samples from eighteen sites and six watersheds collected during summer months over three years were analyzed using non-metric multidimensional scaling (NMMDS) to detect pattern in the sites based on macroinvertebrate and water quality data. The NMMDS ordination showed a clear gradient in sites along the north/south grazing gradient. Variation in conductivity and salinity, water quality variables which typically increase in the presence of overgrazing, contributed most to the pattern in the sites. Macroinvertebrates did not contribute to pattern in the sites, indicating that water quality has been impacted by the grazing but that the impact has not yet impaired the macroinvertebrate community.

National ACSM Meeting ~ Bemidji, MN October 2010

Wayne State College students from the Department of Health, Human Performance, and Sport won the Northland Chapter American College of Sports Medicine (NACSM) Student Bowl held at the 35th annual Fall NACSM meeting at Bemidji State University in Bemidji, Minnesota on October 7-8, 2010. The team competed in a Jeopardy style contest against 10 other teams from the NACSM region (Minnesota, Nebraska, North Dakota and South Dakota) and were awarded 2 first place trophies (one permanent and one traveling). Austin Bright, Tyler Jensen, and Matt Stander will represent the Northland Chapter ACSM in the national Student Bowl competition to be held at the 58th annual national ACSM meeting in Denver, Colorado May 31-June 4, 2011.

Advisors: Dr. Donovan Conley and Dr. Barbara Engebretsen

American Chemical Society Meeting ~ Wichita, KS October 2010

Kassandra Connell

Title: Understanding Antibiotic Resistance

Abstract: The mechanism of β -lactam antibiotic resistance is studied using ampicillin resistant bacteria. One known mechanism of resistance for microbes to penicillin is the inactivation of penicillin by lactamase (which hydrolysis of the amide bond in penicillin). Deactivation of lactamase has been shown to occur with the use of sulbactam, which is similar in structure to ampicillin, by irreversibly binds to the lactamase. A series of plant extracts and synthetic compounds were studied to see if the effects of sulbactam can be duplicated. Antibiotic resistant bacteria (*E. coli*), ampicillin, sulbactam, and extracts were screened for possible inhibition of antibiotic resistance. Compounds synthesized, based on the active components of the extracts and the structure of sulbactam, and their effects of the growth of the *E. coli* will be presented.

Advisors: David Peitz and Doug Christensen

Life Sciences Senior Presentation ~ Wayne, NE Fall 2010

Adam Kauth

Title: Genetic diversity and gene flow within a population of deer mice (*Peromyscus maniculatus*) in northeast Nebraska.

Michelle Meuret

Title: Arthropod Biodiversity Found in the North Central Plains of Nebraska

Advisor: Dr. Ron Loggins

Laura Johnson

Title: Cerec Dental Restorations

Britni Korth

Title: Water Fluoridation: Dental Caries & Fluorosis

Ashley M. Thies

Title: Alzheimer's Disease and Alcohol Consumption

Wyley Wondercheck

Title: Odontogenesis: Engineering a Fully Functional Tooth

Andrea Drieling

Title: Thiazide-Type Diuretics and The Use of Academic Detailing

Advisor: Dr. Shawn Pearcy

Presentations

Dr. David Peitz

American Chemical Society Meeting ~Wichita, KS October 2010

Title: Chemistry Assessment at Wayne State College

Abstract: With increasing pressures on programs to document success, it is becoming important to not only assess our courses but to assess the entire program and ensure we are in fact meeting our program Mission and Goals, a difficult proposition. Course assessments, such as ACS exams, often do not meet the criteria of program assessment, so other holistic approaches need to be developed, without overburdening ourselves. A software program was developed to collect and analyze data for assessment of our chemistry program. The assessment was developed directly around the Mission and Goals of our program, which can be seen at <http://www.wsc.edu/schools/nss/pscm/chemistry/index.php>, and includes both faculty and student inputs. Samples of data input, analysis and reports will be discussed.

Dr. Barbara Hayford

Nebraska Wildlife Society Meeting ~ Hastings, NE February 2011

The Midge that Roared: Conservation of Freshwater Invertebrates in Nebraska

Dr. Jon Dalager

Dr. Jon Dalager, Dean of the School of Natural and Social Sciences, presented a series of workshops for deans and department chairs in Saudi Arabia on March 5-9, 2011 at the request of the Academic Leadership Center of the Kingdom of Saudi Arabia's Ministry of Higher Education. Each workshop dealt with some component of academic leadership, including "The Foundations of Academic Leadership," "Leading Change," "Time Management and the Academic Leader," and "Coping With the Stress of Academic Leadership." Dr. Dalager presented workshops to academic leaders from Najran University, the University of Tabouk, King Khaled University, the Northern Borders University, and Al-Jouf University.

Poster Presentations

Dr. Barbara Hayford

Joint Annual Meeting of the North America Benthological Society and the American Society of Limnology and Oceanography ~ Santa Fe, NM

Title: Relationship Between the Variation of Adult Aquatic Insects to Stream Condition in Streams From Mongolia

Abstract: The Mongolian Aquatic Insect Survey sampled streams during July, 2003-2006, and 2008. On-site, family-level identifications of adult aquatic insects were made at each site. Study sites were restricted to those sites in which only stream habitat was present to reduce the possibility of including non-riverine insects in the analysis. Culling the data resulted in the 53 sites used in multiple regression analysis to test whether family level taxonomic metrics varied in relation to variation in dissolved oxygen, gravel substrate, total dissolved solids, nitrate, pH, and percent forbs. The analyses produced three statistically significant models; one for percent Ephemeroptera richness, one for percent Plecoptera richness, and one for percent Diptera richness. Dissolved oxygen, TDS, and pH were the strongest contributors to variation of percent Ephemeroptera richness. Percent forbs was the only significant contributor to variation in Plecoptera richness. Dissolved oxygen and pH were significant contributors to variation in percent Diptera richness. We concluded that estimates of family-level diversity of aquatic insects varied in response to stream condition.

Title: Patterns in Emergence of Chironomidae from Cold Springs in Outer Mongolia

Abstract: Chironomidae pupal exuviae from 19 cold springs in Outer Mongolia were sampled to describe patterns in diversity of chironomids from cold spring habitats at risk from decreased surface water and groundwater permanence due to climate change. Sites were designated as limnocrenes, rheocrenes, or spring brooks and were located in the Hentii Mountains and Altai Mountains. Patterns in sites and the dominant chironomid taxa were examined using a double dendrogram based on hierarchical cluster analysis. Four distinct community assemblages were identified, three of which were dominated by cold stenotherm taxa and one which was dominated by crenophilic taxa. The cold spring habitats also formed distinct clusters, grouped within the two mountain ranges. For example, five limnocrene and limnocrene/rheocrene sites located in the southern Altai Mountains clustered based on the presence of emerging *Pseudodiamesa nivosa* and three spring brook/rheocrene sites from the northern Altai Mountains clustered based on emerging *Trichotanytus*, *Corynoneura*, and *Tokunagaia*. Our results indicate that different types of cold spring habitats nestled within different regions in Mongolia support distinct chironomid communities.

Fall 2010 Honors Colloquium ~ Wayne State College

Amy Doerr

Title: Characteristics of An Effective Math Teacher

Instructor: Dr. Jeffery Bauer

Emily Gardner

Title: Impacts of Parent Behaviors and Beliefs on Student Mathematics Achievement and Effort

Instructor: Dr. Jeffery Bauer

Joshua Gustafson

Title: Jedediah Smith: The Original Pathfinder

Instructor: Dr. Randy Bertolas

Becky Hafer

Title: An Analysis of Bridge Infrastructure in the Central U.S.

Instructor: Dr. Randy Bertolas

Samantha Myers

Title: One Step Forward, One Step Back: The Importance of Gender Socialization on Women's Educational and Career Choices

Instructor: Dr. Monica Snowden

Jessica Wimmer

Title: Response of Mongolian Streams to Grazing Measured by a Riparian Range Health Protocol

Instructor: Dr. Barbara Hayford

**Midwest Model United Nations
~Chicago, IL November 2010**

The following students represented the Republic of Bulgaria:

Michael Lafleur

Gregg Mock

Zachary Kalina

Both W. Dat

Alec Nielsen

Matthew Wuebben

Benjamin Edwin Schulz

Brady Baker

Michael Gardner

Lucas Nelsen

Ben Polacek

Advisor: Dr. Joe Blankenau

Presentations for 2011

Research Projects ~ 2011

Kathryn Burford

Title: Impact of an ACL Prevention Program in NAIA Women's Soccer Players

Advisor: Dr. Kris Hinnerichs

Poster Presentations

Dr. Barbara Hayford

**Joint Annual Meeting of the North America Benthological Society and
the American Society of Limnology and Oceanography~ Santa Fe, NM**

Title: Response of Mongolian Streams to Grazing as Measured by a Riparian
Range Health Protocol

Abstract: Overgrazing by domesticated herbivores can exacerbate the impact of climate change on Mongolian streams. Thus it is important to directly measure the impact of grazing on range health along streams. To this end, we developed a riparian range health protocol, which we tested on 34 streams in the Southern Altai region of Mongolia. We hypothesized that turbidity, which measures the amount of particles in water, would increase in streams which showed evidence of overgrazing. Multiple regression analysis was used to model the response of turbidity to predictor variables generated by the riparian range health protocol as well as landscape, reach- and microhabitat-scale variables. The model was significant at $p = 0.004$ and it accounted for 60% of variation in turbidity in the study sites. Percent of bare ground measured 30 meters from the stream channel was by far the strongest contributor to variation in turbidity followed by stream order, elevation, geographic position, percent bare ground nearer the stream, and percent forbs. We concluded that the riparian range health protocol was an effective tool in modeling stream response to grazing.

Dr. Jon Dalager

**Annual Meeting of the Midwest Political Science Association
~ Chicago, IL March 2011**

Dr. Dalager presented his paper "Institutional Academic Freedom and the Threat of Higher Education Reform," and chaired a panel on "Achievement in Education" featuring five research presentations.

Poster Presentations

Dr. Jean Karlen

Midwest Sociological Society Meeting ~ St. Louis, MO March 2011

Title: A Course Transformed: Enhancing Students' Critical Thinking Skills in a Family Class

Abstract : Students in my Family class have always been expected to complete a "research" assignment. The syllabus stated the assignment would provide students with opportunities to further develop their research, writing, and critical thinking skills. For years, this assignment was the standard 10-15 page research paper. The specific requirements regarding length and sources changed frequently in an effort to improve student work. Class presentations and rewrite options were added. Special "how to" sessions were offered. Office hours were increased; special appointments encouraged. Student feedback and suggestions were collected. Assignment adjustments were made. Student work improved. However, the critical thinking components of analysis, evaluation, and improvement were consistently underrepresented in student papers. What to do? Change the course to more deliberately include critical thinking components.

Over time, the entire course has been redesigned (the course schedule, exams, materials...) and my approach to working with students dramatically adjusted.

Key course changes will be discussed: 1) the shift away from a research paper to a class presentation, 2) mandated faculty-student consultations including a presentation preview 3) a comparative essay on the sources used with a reflection component. Student comments and reflections which reinforced the value of the revisions, particularly as they relate to critical thinking will be summarized. Instructor rationales for the adjustments that occurred over time and their outcomes will be presented. The message? We cannot expect students to develop as critical thinkers/learners if we, as teachers, are not willing to critically examine and adjust how we teach to achieve these desired student outcomes.

Nebraska Chapter of the Wildlife Society ~ Hastings, NE February 2011

William E. Mausbach

Title: New Distributional Records for Fairy Shrimp (Crustacea: Anostraca) and Tadpole Shrimp (Crustacea: Notostraca) in Nebraska with Notes on Conservation of Large Branchiopods in the Nebraska Sandhills

Abstract: Specimens of tadpole and fairy shrimp were collected in a small pond in Holt County, Nebraska resulting in a new distributional record and potential new species. Goals were to document and review new and old distributional records for *Eubrachipus bundyi* in Nebraska; to review the occurrences of other large branchiopods throughout Nebraska; and to address the importance of conserving aquatic habitat to support diverse communities of macroinvertebrates, including large branchiopods in the Nebraska Sandhills. The specimens were collected by dip-netting throughout a seasonal pond in Holt County, Nebraska. Specimens were identified to the lowest level possible. Literature pertaining to Nebraskan large branchiopods was collected and reviewed to assess previous distributions in Nebraska. Records show a patchy distribution across Nebraska, which may be the result of variations in aquatic habitat in terms of permanence, alkalinity, and fish presence or may be due to the lack of a comprehensive survey for large branchiopods in Nebraska. One endemic species of fairy shrimp, *Branchinecta potassa* has been documented in two small ponds in the Sandhills, which were high in potassium. With few surveys for large branchiopods there is a chance that more endemic/new species await discovery. The extension of crop-based agriculture into the Sandhills poses a potential threat to this endemic species and other documented and yet to be documented species of large branchiopods in Nebraska.

Advisor: Dr. Barbara Hayford

**Nebraska Chapter of the Wildlife Society
~ Hastings, NE February 2011**

Adam Kauth

Title: Genetic diversity and gene flow within a population of deer mice (*Peromyscus maniculatus*) in northeast Nebraska.

Abstract: We compared the genetic diversity of deer mice (*Peromyscus maniculatus*) at 4 sites in Knox County Nebraska by looking at a portion of the control region in mitochondrial DNA (mtDNA) in 16 individual mice. We analyzed the genetic sequence using MEGA 4.1 to determine the phylogenetic relationship among individuals and a Tajima's D statistic to distinguish if this region of DNA has been evolving randomly. Genetic diversity was recognized among the individuals in the population we evaluated. This suggests that whatever geographic barriers that may exist, gene flow is not, or has not been significantly impacted.

Advisor: Ron Loggins

**Great Plains Student Psychology Convention
~ Topeka, KS March 2011**

Kayla Bradley and Alysa Gradert

Title: The Effects of Stereotypes on Eyewitness Recall

Advisor: Dr. Karen Walker

Faculty Presentations

Published Papers

“The Relation Between Grazing, Erosion and Adult Aquatic Insects in Streams in Mongolia” *Mongolian Journal of Biological Sciences* 2010 Vol. 8(1):27-39

“High gamma diversity and low beta diversity of non-biting midges (Diptera: Chironomidae) in streams of the Gorkhi Terelj National Park Outer Mongolia”

Proceedings of the Academy of Natural Sciences of Philadelphia 159: 16-184 October 2010

Dr. Barbara Hayford

In January of 2011, Dr. Dalager's article, “Legal Issues in Faculty Evaluation: Avoiding Problems” was published in *The Department Chair: A Resource for Academic Administrators*, 21, No. 3 (Winter 2011): 9. A second article in the two-part series, “Legal Issues in Faculty Evaluation: When Evaluations Go Bad” was published in the April edition of *The Department Chair: A Resource for Academic Administrators*, 21, No. 4 (Spring 2011): 10.

Published Books

Don Hickey published his sixth book this past year. Co-authored with Ralph Eshelman and Scott Sheads, [The War of 1812 in the Chesapeake: A Guide to Historic Sites](#), was published by Johns Hopkins University Press.

Don has two other books in press, [The War of 1812: A Forgotten Conflict](#), revised and enlarged edition, and (co-authored with Connie D. Clark) [The Rockets' Red Glare: An Illustrated History of the War of 1812](#), and several other books and articles in the pipeline.

**Nebraska Academy of Science
~Lincoln, NE April 2011**

Ian Engebretsen

Title: Cloning, Over-Expression, and Purification of Nus-Free InlB From *Listeria Monocytogenes* as a Possible Drug Delivery Vehicle.

Abstract: *Listeria monocytogenes* is a foodborne pathogen known to internalize into mammalian cells. Surface proteins known as Internalin A (InlA) and Internalin B (InlB) appear to play a fundamental role in inducing this process, while excreted proteins such as Internalin C (InlC) may enhance the mechanism. The focus of this research is to ascertain the potential value of InlB as a drug delivery vehicle. This specific protein is required for induced internalization into epithelial tissues and HeLa cells in vitro. Internalization is stimulated by tyrosine phosphorylation and leads to cytoskeletal rearrangements in the host cell culminating in internalization of the entire organism. Previous work by this lab has led to successful isolation of over-expressed InlB but only when NUS-tagged in pET-44. However, in all likelihood NUS modification alters the protein to yield a non-native confirmation. Here the InlB gene was inserted into pET-46, and over-expressed without the NUS tag. The over-expressed protein was isolated with a His-tag column (Qiagen) prior to Western Blot analysis. Initial experiments to determine InlB's ability of induce internalization in HeLa cells includes fluorescent tagging and detection by microscopy and spectrofluorometry. *This research was funded by the Nebraska INBRE Grant Number: P20 RR016469.*

Instructors: Dr. Shawn Pearcy, Dr. Gustavo Zardeneta and Dr. Doug Christensen.

Neal Hahn

Title: The Effect of Plasmid Size on Transformation Efficiency (Honors)

Abstract: Many bacterial cells harbor plasmid DNA which code for typically non-essential proteins including those that may result in resistance to antibiotics. Plasmids can be obtained by other competent bacterial cells often resulting in the rapid spread of antibiotic resistance. The size of the plasmid may play a critical role in the efficiency of transformation from one organism to another. In order to determine the influence of plasmid size on its ability to be obtained by competent cells, three plasmids of varying size, each containing an ampicillin resistance marker, were transformed into chemically competent *E. coli* cells under controlled conditions. The transformed cells were grown on ampicillin plates allowing the number of transformants to be compared on a plasmid to plasmid basis. These results are not meant to mimic natural transfer by F⁺/F⁻ conjugation pili but instead provide insight to uptake of plasmid from local environments by natural competence.

This research was funded by the Nebraska INBRE Grant Number: P20 RR016469.

Advisor: Dr. Doug Christensen

**Northland Chapter American College of Sports Medicine
~ St. Cloud, MN April 2011**

Authors: Evan Janssen, Tyler Jensen, Rochelle Reinke and Emily Witte

Title: Effects of Palm Cooling and Direct Localized Cryotherapy on Multiple Set Bench Press Performance

Abstract: Palm cooling (PC) has been shown to improve multiple set high intensity bench press performance (Kwon, Y.S., et. al., *Med. Sci. Sports Exerc.*, 42:1557-1565, 2010) however, direct localized ice-bag cryotherapy (DLC) has produced inconsistent muscular performance results (Howard, R.I. et al., *J. Strength Cond. Res.* 8:129-133, 1994). **PURPOSE:** To examine the effects of PC and DLC on multiple set high intensity bench press performance. **METHODS:** Ten resistance trained males (mean \pm SD, age=20.3 \pm 0.95 y, height=176.6 \pm 6.6 cm, body mass=78.13 \pm 10.63 kg, body fat=11.88 \pm 3.78 %) performed 4 sets of 85% one-repetition maximum bench press to fatigue, with 3 min rest intervals. Exercise trials were randomly assigned and included: control (C), PC, and DLC. PC was applied by placing the palms on plastic water bottles cooled to 10°C and DLC was applied to the deltoids, triceps, and pectoralis major muscles. The PC and DLC treatments were applied in a seated position for 2 min 30 sec between sets of bench press and the C condition involved 2 min 30 sec of seated rest. Thirty sec was allowed to transition to and from the bench press exercise during rest intervals. **RESULTS:** Repeated measures one-way ANOVA analysis with Tukey post-hoc tests indicated both the C (18.5 \pm 1.27 reps) and PC (18.9 \pm 1.45 reps) treatments resulted in significantly greater ($p < 0.05$) bench press performance (average repetitions across 4 sets) compared to the DLC treatment (16.7 \pm 1.37 reps). Statistical analysis also showed there was no difference ($p > 0.05$) in bench press performance between the C and PC treatments. **CONCLUSION:** We conclude that DLC significantly decreases muscular endurance compared to C and PC treatments. Our data suggests that DLC should not be used between multiple sets of high intensity exercise because it impairs muscular performance.

Advisors: Dr. Donovan Conley and Dr. Tammy Evetovich

Northland Chapter American College of Sports Medicine
~ St. Cloud, MN April 2011

Authors: Austin Bright, Tiffani Kellerman, Paige Pollard and Katie Reikofski

Title: Postactivation Potentiation Improves Sprint Performance in Collegiate Football Players

Abstract: Postactivation potentiation (PAP) consisting of 4 repetition maximum (4RM) parallel back half-squats (PBHS) in collegiate women has been shown to improve 100 m sprint performance (Linder, E.E. et al., *J. Strength Cond. Res.* 24:1184-1190, 2010). However, it is unknown whether a similar preload stimulus will elicit improvement in sprint performance in collegiate football players. **PURPOSE:** The purpose of this study was to examine the effects of 3RM PHBS on 36.6 m sprint performance in collegiate football players. **METHODS:** Seven healthy trained National Collegiate Athletic Association Division II male football players that included defensive backs, wide receivers, and running backs (mean \pm SD; age: 20.4 \pm 1.6 y; weight: 87.81 \pm 8.25 kg; height: 184.3 \pm 7.2 cm; body composition: 10.6 \pm 3.1 %) volunteered to participate in the study. Subjects were randomly assigned to two 36.6 m sprint warm-up protocols to include: 1) Control (C) which consisted of cycling 5-min at 25 W, 5-min rest, 36.6 m sprint, 5-min rest, 36.6 m sprint and 2) PAP which consisted of cycling 5-min at 25 W, 5-min rest, 36.6 m sprint, 5-min rest, 8 repetitions PBHS at 50% 1RM, 2 min rest, 3RM PBHS, 8-min rest, 36.6 m sprint. All sprint times were assessed on an indoor track (200 m) using a touch activated electronic Brower TC timing system. **RESULTS:** Paired t-tests showed that 36.6 m sprint performance was significantly ($p < 0.05$) lower following PAP (4.6014 \pm .17995 sec) versus the best sprint trial for C (4.6714 \pm .18050 sec) and the sprint trial (4.6557 \pm .19603 sec) completed prior to PAP. **CONCLUSION:** We conclude that a preload stimulus consisting of 3RM PBHS significantly improves sprint performance compared to a general cycle warm-up. Our data suggests that PAP elicited by 3RM PBHS improves sprint performance in collegiate football players.

Advisor: Dr. Donovan Conley

Nebraska Academy of Science
~Lincoln, NE April 2011

Jennifer Harney

Title: Applied Electrochemistry in the Undergraduate Laboratory: Anodizing Aluminum and the Intercalation of Various Dyes.

Abstract: The anodizing process is a concrete example of applied electrochemistry that is easily accessible to undergraduates in a laboratory setting. Anodizing is used to create a durable, porous oxide matrix on the surface of aluminum metal. The newly formed matrix is highly susceptible to the addition of various substances, including dyes. Matrix thickness, dye type, and sealing techniques are all factors in the outcome of the anodized metal. Variations on the anodizing process and the use of multiple dye types and their effects on the aluminum will be discussed as well as applications in the undergraduate laboratory.

Advisor: Dr. Mary Ettel

Zach Sudbeck

Title: The Use of ATR FT-IR and TLC to Quantitate and Identify Organic Compounds

Abstract: Novel and complicated synthesis in an undergraduate organic chemistry class can be difficult to manage with large number of students, especially when the reactions do not give high yields or are difficult to purify in the time constraints of typical lab. GC/MS with an auto-sampler is an effective method to separate and identify substances but is costly, breakage is easy, and it is difficult to train 60 students in its use and in data retrieval. Attenuated Total Reflectance (ATR) FT-IR allows for sample to be directly analyzed without much sample preparation. The ATR adaptors are virtually maintenance free, rugged, and can stand up to typical, novice student use without breakage. However, acquiring an IR spectrum of a mixture generally leads to little useful information, so purification is needed. Here we will show an effective means of using FT-IR with low yielding reactions and mixtures. An ATR adapter can be used in combination with Thin Layer Chromatography (TLC) to separate and show qualitative functional group transformations to aid in identification. Difficulties associated with quantitation using FT-IR and TLC will be discussed. Traditional and non-traditional undergraduate organic lab reactions, such as converting phenols to ethers and esters, and alkenes to alcohols, will be evaluated for their effectiveness in using FT-IR with TLC.

Instructor: Dr. David Peitz

Nebraska Academy of Science
~Lincoln, NE April 2011

Tara Reichter and Amy Maika

Title: The Interaction of Natural Dyes with Selected Wool Fibers.

Abstract: Limited information is available for people wanting to dye fabrics like wool with natural dyes. Important information like what mordants work best for what colors, what concentration the mordants should be, or how long the materials should be exposed to the mordants have had limited systematic study. The results of a systematic study of several mordants with selected wool and wool blend fibers will be reported.

Micala Allen

Title: Simulation of American Raku Firing, A Reduction Environment, an A Laboratory Setting

Abstract: A Raku firing is the process of creating a reducing environment for the development of a ceramic glaze rather than using a traditional oxidizing environment in a kiln. Many times this reducing environment is created using an old metal barrel or trashcan upside-down on a patch of dirt or sand to limit the amount of oxygen allowed into the combustion chamber. The chamber is filled with combustible materials such as shredded paper, sawdust, straw, hay, dry leaves, shredded cloth or other flammable materials in order to “smoke” the pottery. The Raku firing technique was studied in the more controlled laboratory setting. The results of this closer study of the process will be reported.

Amy Maika and Tara Reichter

Title: An Exploration of the Effects of Selected Mordant's on Cotton Fibers and Natural Dye

Abstract: The art of natural dyeing has been known to cultures around the world for generations. Several factors are known to affect the results of a dye bath; most significant is the effect mordants have on the colors obtained during the dye process. The chemistry behind the effects of different mordants in color selectivity is explored.

Advisor: Dr. Mary Ettl

Northland Chapter American College of Sports Medicine
~ St. Cloud, MN April 2011

Authors: Alyssa Fischbach, Lisa Bellar, Hannah Engelkamp, Renee Wood

Title: Acute Heat Application Does Not Improve Wingate Test Performance During Menses in Female Collegiate Athletes

Abstract: Previous research has examined the effects of menstrual cycle phase on Wingate cycle test (WCT) performance (Masterson *J. Strength Cond. Res.* 13:325-329, 1999) however, research is lacking on the effects of therapeutic applications such as thermotherapy (T) on WCT performance during menses.

PURPOSE: To examine the effects of T on WCT peak power (PP), mean power (MP), and fatigue index (FI) during menses in female collegiate athletes.

METHODS: Ten healthy trained NCAA Division II female collegiate softball (n=5) and basketball (n=5) athletes (mean \pm SD, age=20.0 \pm 0.94 y, height=170.22 \pm 9.30 cm, weight=69.21 \pm 11.00 kg, body fat=23.6 \pm 4.27 %) volunteered to participate in the study. Subjects were randomly assigned to either T or control (C) treatments prior to the WCT. The T treatment involved applying heat packs (71.1 °C) to the lower back and abdomen simultaneously for 20 min. This was followed by a 4 min cycle ergometer warm-up (0 W) interspersed with 5 sec sprints at the end of each min. The C treatment included the same cycle ergometer warm-up without T. All tests were performed on a calibrated Monarch Peak Bike 894E. A SMI power computer program counted cycle revolutions for all WCT tests. Subjects completed the WCT on the 1st and 3rd day of menses. Menses was defined as vaginal bleeding. **RESULTS:** Paired t-tests indicated there were no differences ($p>0.05$) in the C and T treatments for PP (613.0 \pm 30.37 vs. 609.8 \pm 18.14 W), MP (441.6 \pm 20.36 vs. 453.1 \pm 18.61 W) and FI (42.65 \pm 1.56 vs. 40.31 \pm 1.93 %) measures. **CONCLUSION:** We conclude that acute T applied during menses has no significant effect on PP, MP, and FI assessed during the WCT. This suggests that acute heat application does not improve high intensity performance during menses.

Advisor: Dr. Donovan Conley and Dr. Kris Hinnerichs

**Northland Chapter American College of Sports Medicine
~ St. Cloud, MN April 2011**

Authors: Jennifer Hefner, Diedra Artz, Lee Anderson and Adam Matteo

Title: Effects of Dynamic, Cryotherapy, and Thermo-therapy Warm-up Methods on Vertical Jump Performance in Female Athletes

Abstract: Dynamic warm-up (DW) following cryotherapy (C) has been shown to attenuate the detrimental effects of C on functional performance (Richendollar et. al., J. Athletic Training 41: 364-370, 2006). However, the effects of DW, C, DW immediately following C (CW), and passive thermo-therapy (T) on vertical jump performance are unclear. **PURPOSE:** To determine the effects of DW, C, CW, and T on vertical jump performance in female athletes. **METHODS:** Twelve healthy trained female National Collegiate Athletic Association Division II athletes (6 volleyball, 6 basketball) volunteered to participate in the study (mean \pm SD, height = 177.3 ± 5.6 cm, mass = 71.99 ± 6.63 kg, body fat = 21.03 ± 2.73 %). Subjects completed 4 randomly assigned warm-up protocols on separate days to include: DW, C, CW, and T. The C and T protocols consisted of applying ice bags or heat packs (71.1 C) to the quadriceps muscles for 10-min. For the DW and CW protocols, a dynamic warm-up consisting of forward and backward running, high knees, shuffles, and ballerina walks was completed on an indoor track (200 m). The greatest of 3 vertical jumps (30 sec rest) measured using a Vertec measurement device was used to establish vertical jump performance. **RESULTS:** Repeated measures one-way ANOVA analysis with Tukey post-hoc tests indicated that vertical jump following DW (55.58 ± 9.03 cm) and CW (54.62 ± 8.15) were not different ($p > 0.05$), but were both greater ($p < 0.05$) than C (51.29 ± 8.04 cm) and T (52.21 ± 7.72 cm) treatments. **CONCLUSION:** We conclude that DW and CW warm-ups produce similar vertical jump performance and both methods are better than C or T treatments alone. Our data suggests DW or CW, but not C or T should be used prior to engaging in high intensity physical activity.

Advisors: Dr. Donovan Conley and Dr. Tammy Evetovich

**Nebraska Academy of Science
~Lincoln, NE April 2011**

Kelsey K. Augustin*, Alan M. Jones, and Etsuko N. Moriyama; *Wayne State College, The University of North Carolina at Chapel Hill, and the University of Nebraska-Lincoln

Title: Development of the Arabidopsis G-protein Signaling Network Database

Abstract: The heterotrimeric G-protein complex plays a central role in major signal transduction networks in both animals and plants. It's involved in the regulation of a wide variety of gene functions. Many diseases are caused from the malfunction of G-protein signaling genes. A number of proteins are involved in the G-protein signaling network. G-protein coupled receptors (GPCRs) detect signals at the cell surface. A G-protein complex consists of alpha, beta, and gamma subunits, which interact with a GPCR. This interaction causes a signal to be transferred to the downstream effectors within the cell. In animals 102-103 of GPCRs, 23 G-alpha, 6 G-beta, and 12 G-gamma subunits are known. The network complexity increases with multiple effectors. Identifying all the components, and understanding the protein interactions, could eventually result in the development of treatments or cures for many diseases. In contrast to the animal system, the G-protein signaling network in plants is much simpler. In the model plant *Arabidopsis thaliana* only one G-alpha, one G-beta, and two G-gamma subunits are known, and only 22 GPCR candidates have been identified. For our study, we chose to use *Arabidopsis* due to its relative simplicity. We are also interested in elucidating how plants and animals have different modes of evolution in G-protein signaling.

A high-throughput interaction screening was done using 24 of the bait proteins against 9 cDNA libraries prepared from a variety of *Arabidopsis* tissues with varying conditions. The bait proteins included G-proteins and other proteins that were confirmed to interact with G-proteins. Over 1000 interactions were found from these *Arabidopsis* proteins.

Sifting through the substantial amount of interaction data can be difficult. Finding the critical interactions, looking up additional information, and visualizing the interactions can be time-consuming. To facilitate the analysis of such a complex network of information, we have developed the G-protein signaling network database. It creates a more manageable approach by organizing, supplying, and enhancing the analysis of the protein interaction data. Search functions, external links, and visualization tools assist in the discovery of key proteins and their interactions. Records from The Arabidopsis Information Resource (TAIR) are also incorporated for comparison. The elasticity of the database also supports influxes of additional data to be analyzed, without over-complicating appearance or analysis.

This research was funded by the Nebraska INBRE Grant Number: P20 RR016469.

Advisor: Dr. Doug Christensen

Nebraska Academy of Science
~Lincoln, NE April 2011

Kassandra Connell

Title: Synthesis of Penicillin Derivatives and the Use of Plant Extracts in the Fight against Antibiotic Resistance.

Abstract: The mechanism of β -lactam antibiotic resistance is studied using ampicillin resistant bacteria. One known mechanism of resistance is the inactivation of penicillin, ampicillin and other β -lactams by lactamase via hydrolysis of the amide bond. A series of plant extracts and synthetic derivatives of penicillin are studied to determine if the effects of sulbactam (a known inhibitor of antibiotic resistance) can be increased or duplicated. In this study, antibiotic resistant bacteria (*E. coli*), ampicillin, sulbactam, plant extracts, and phenolic derivatives of ampicillin are screened for possible inhibition of antibiotic resistance by monitoring the growth of bacteria under various combinations of treatment dilutions. Growth inhibition due to any combination of these components will be presented. This research was partially supported by the Nebraska INBRE grant # P20 RR16469.

Instructors: David Peitz and Doug Christensen

Bethany Hippen

Title: The Use of Salmonella Typhimurium InvB/InvC as a Possible Drug Delivery System

Abstract: *Salmonella typhimurium* is a foodborne Gram negative bacterium with the capability to internalize into mammalian cells. Numerous proteins play a role in the internalization of this pathogen and include the invasive proteins InvB and InvC. *S. typhimurium* utilizes a type III secretion system in which the bacterial virulence proteins are injected directly into host cells. InvB is a chaperone within this system and binds to secretion proteins before leaving the bacterial cell. The pathogenic secretion proteins must be unfolded before entering the host cell. InvC assists in the unfolding of proteins prior to release from the InvB chaperone, resulting in uptake of the bacterial protein by the host cell. Exploitation of the invasive properties of InvB and InvC could serve as the foundation for a more efficient mode of medication delivery. Initial research in the cloning of InvB and InvC genes into plasmids for over-expression of the protein has been achieved. Purification of the proteins will allow for further study as to the value of these individual proteins as a means of drug delivery in mammalian cells. *This research was funded by the Nebraska INBRE Grant Number: P20 RR016469.*

Instructor: Doug Christensen

Northland Chapter American College of Sports Medicine
~ St. Cloud, MN April 2011

Authors: Drew Molacek, Matt Meier and Andre McIntyre

Title: Postactivation Potentiation Has Varying Effects on Vertical Jump Performance in Collegiate Football Players

Abstract: Sprint performance has recently been shown to improve following a preload postactivation potentiation (PAP) stimulus of three repetition maximum (3RM) using parallel back half-squat (PBHS) in professional rugby players (Bevan, H.R. et al., *J. Strength Cond. Res.* 24:701-705, 2010). However, it is unknown whether this preload stimulus will elicit similar improvement in vertical jump performance in collegiate football athletes. **PURPOSE:** To examine the effects of 3RM PBHS on vertical jump performance in collegiate football players. **METHODS:** Eleven healthy, trained male National Collegiate Athletic Association Division II football players (mean \pm SD, age=20.3 \pm 1.8 y, height=180.6 \pm 7.5 cm, mass=86.1 \pm 12.8 kg, body fat=10.0 \pm 3.2 %) that included running and defensive backs, and wide receivers volunteered to participate in the study. Subjects were randomly assigned to 2 warm-up protocols to include: 1) control (C) which consisted of cycling 5-min at 25 W, 5-min rest, vertical jump test and 2) PAP which consisted of cycling 5-min at 25 W, 5-min rest, 8 repetitions PBHS at 50% 1RM, 2-min rest, 3RM PBHS, 8-min rest, and vertical jump test. The best of 3 vertical jump scores with 1 min seated rest between attempts was evaluated using a Vertec vertical jump measurement device. **RESULTS:** A paired t-test showed there was no difference ($p>0.05$) in vertical jump performance following the C (68.35 \pm 2.16 cm) versus the PAP (68.12 \pm 2.51 cm) protocol. However, 6 subjects either improved ($n=3$) or showed no change ($n=3$) in vertical jump, while 5 had lower vertical jump scores. **CONCLUSION:** We conclude that PAP using 3RM PBHS with 8 min rest has no significant effect on vertical jump performance in collegiate football players. Our data suggests there are varying PAP responses between individuals and adjustments to the PAP protocol may be needed to elicit optimal results.

Advisor: Dr. Donovan Conley

**Life Sciences Senior Presentations
~ Wayne, NE Spring 2011**

Kyle Varon: Physician-Patient Interaction in End of Life Care

Alyssa Olsen: Exercise Delays the Onset of Alzheimer's Disease

Bradley Mitchell: *Scenedesmus* Oil Concentration Maximized with Varying Nitrogen Content

Tyler Murtaugh: *Botulinum* toxin (BOTOX®): A Therapeutic Approach

Dan Stockton: Variation in Mercury Concentrations in Nebraska Streams in Relation to Alzheimer's and Autism

Shane Winter: Endometritis in Mares

Kristen McGill: Variation in Chironomid and Amphipod Abundance and Biomass from Bays of Lake Hovsgol, Mongolia

Matt Thies: Essential Oils as an Antimicrobial Agent

Chris Chase: Small Mammal Survey at Ponca State Park

Devin Bethune: The Effect of Caffeine on Growth Rates of Pathogenic and Non-Pathogenic *E. coli*

Spring 2011 Honors Colloquium ~ Wayne State College ~

Jennifer Harney

Title: Investigation of Thermochromic Compounds and their possible Intercalation into an Aluminum Oxide Matrix

Instructor: Dr. Mary Ettel

Katie Rerkofski

Title: A Comparison of Student-Athlete and Non-Student-Athlete Academic Performance at Wayne State College

Instructor: Dr. Kristi Hinnerichs

Neal Hahn

Title: The Effect of Plasmid Size on Transformation Efficiency in G10 Cells

Instructor: Dr. Douglas Christensen

Spring 2011 Honors Colloquium ~ Wayne State College ~

Kassandra Connell

Title: Synthesis of Penicillin Derivatives and the use of Plant Extracts in the Fight against Antibiotic Resistance

Instructor: Dr. David Peitz

Jennifer Morgan

Title: Faith-Based Organizations: Limitations on Effectiveness in Rural Social Service Delivery

Instructor: Dr. Monica Snowden

Alyssa Olsen

Title: A Qualitative Research Proposal on How Exercise Affects Alzheimer's Disease

Instructors: Dr. Randa Garden and Dr. Barbara Hayford

Jason Youngmeyer

Title: Treatment of Vietnam Veterans and a Number of Reasons Why the American Public Behaved That Way

Instructor: Dr. Randy Bertolas

Julie Wagner

Title: The Analysis of S.B. 1070 and the Copycat Legislation in Nebraska

Instructor: Dr. Mark Leeper

Thomas Warzywak

Title: Dueling in Early National America: A Culture of Political Madness

Instructor: Dr. Randy Bertolas
