

March 29,
1996
8:00 - 6:00

A B S T R A C T S

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S y m p o s i u m

UNDERGRADUATE RESEARCH SYMPOSIUM

Division of Business and Accountancy

Division of Fine Arts

Division of Human Potential and
Performance

Division of Language and Literature

Speech Communication Symposium

Division of Math and Computer Science

Division of Science

Division of Social Science

Phi Alpha Theta History Symposium

Division of Business and Accountancy

THE INVERSE RELATIONSHIP BETWEEN INTEREST RATES AND THE S&P 500 INDEX

Andrew Bakota* and Tom Cella

Dr. Andrew Mun. Faculty Mentor

- 1 Interest rates have been a recognized leading indicator of stock market conditions for many years. Examining the correlation between the S&P 500 Index and short and long term interest rates can help investors better understand the unpredictable stock market. There is a direct inverse relationship between interest rates and stock prices. As interest rates begin to rise, the stock market's indices reflect a downward trend and vice versa. Recently, interest rates have continued to decline which has resulted in the stock market's biggest boom in its history. In order to determine the relationship between 1-month, 3 month, and 6-month C/D rates and the S&P 500 index, data has been taken from financial reports from July 1, 1994 to June 30, 1995. By understanding the correlation coefficient determined by this relationship, the investor will be better prepared to make sound financial decisions.

ERGONOMICS: EVER INCREASING IMPORTANCE IN THE WORKPLACE

Anita Belitz*, Danielle King*, Cynthia Parker*, Kenneth Baxter

Dr. Nabil Alghalith, Faculty Mentor

- 2 Ergonomics is the relationship between humans and machines. Due to vast amounts of computers in the workplace, computer ergonomics has become an important field. It has been found that many injuries result from everyday use of computers; accounting for 56% of work-related injuries. In the interest of companies and their workers, research and development in this field has increased. Two types of injuries that can result from computer related disorders, CRDs, are repetitive stress injuries and vision and headache problems. These can be a result of many hard to determine factors. Three major factors that contribute to CRDs are work environment, Workstation set-up and computer set-up, including work environment, equipment positioning and computer equipment used. In an effort to improve computer safety, companies have designed new computer products to make computers ergonomically safer.

UNDERGRADUATE RESEARCH SYMPOSIUM

ITALIAN CULTURE AND MANAGEMENT STYLE

Alessandra Gentili

Dr. Pyung Han, Faculty Mentor

- 3 "When in Rome, do as the Romans do". Such an expression best summarizes the need to be aware of the cultural context in which you want to operate a business in order to be successful. A businessman has to understand how the culture is going to affect the management of a company in that particular country. This research is going to focus on the way Italian culture influences management style, specifically: (1) the family involvement in management functions, both in the context of small and large enterprises, (2) the typical Italian management style, (3) the utilization of informal communication channels in business relationships. This paper will also provide suggestions to American managers who are going to operate in Italy and it will attempt to give general tips that any international business manager could use in the global market

RECRUITMENT ACTIVITIES TO ATTRACT UNDERGRADUATE BUSINESS MAJORS

Lisa Kralina and Connie Sherwood

Dr. Jeff Romine and Dr. John Perrachione, Faculty Mentors

- 4 A recent decline in college enrollment has lead to increased competition between individual institutions. This is also true of business schools. Research shows that colleges utilize a variety of recruitment techniques to attract students into their institutions. The purpose of this research is to explore the recruitment activities that are being utilized by undergraduate business schools in the nation. A survey instrument was developed and sent to five hundred schools with undergraduate business programs. The survey asked respondents to provide information about topics such as school size, funding sources, and recruitment activities. Respondents were asked to provide details of their recruiting activities. The research is designed to provide a comprehensive description of the recruitment activities being utilized by undergraduate business programs.

A STUDY OF BUSINESS COMBINATIONS AND THEORIES

Kuan-Hua Julia Lin, Beth Turner, and Louis Williams

Dr. Jason Lin, Faculty Mentor

- 5 Throughout history, mergers have been a primary means for diversifying a business. The terms "mergers" and "acquisitions" are often used interchangeably, when really, there is a fundamental difference between the two. A merger is the combining of two separate businesses under a completely new corporate shell. An acquisition is the combining of two separate busi-

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nesses under one already existing corporate shell. In summary, business combinations play a vital role in securities markets, as well as in the economy as a whole. The purpose of this presentation is to provide an understanding of the history of business combinations, the basic jargon, and the academic theories underlying business combinations.

THE CAUSE AND EFFECT OF THE RISING YEN: THE MARCH OF 1995

Mike Rejniak* and **Yen-ling Chen**

Dr. Andrew Mun, Faculty Mentor

- 6 The appreciation of the Japanese yen, during the first half of 1995, caused many problems for the Japanese. The economic environment in Japan was not healthy at this time. Interest rates plummeted across the board and Japanese investors were taking their money out of interest-bearing investments. Consequently, Japanese companies were taking huge losses on profits and the economy was teetering on recession.

This problem stemmed from, among other factors, a trade deficit run by the U.S. on Japanese and American investors selling their dollars to invest in more attractive investments overseas. As a result, Japanese exporters lowered prices on exported goods and switched to producing price insensitive high-value goods.

LIVES OF PROFESSIONAL ACCOUNTANTS

Jared Rogers

Dr. Jeff Romine, Faculty Mentor

- 7 Many people have some knowledge of the field of accounting; however, the researcher believes that there is little awareness of the professional activities performed by accountants. Movies, books, and even academic studies in the field do not portray an accurate picture of these professional activities. The overall goal of this research is to explore the lives of accounting professionals, and more specifically, to investigate how professional accountants spend their time. A survey instrument was developed and sent to a randomly selected group of five hundred professional accountants in the state of Missouri. The survey included questions about career opportunities, career demands, financial rewards and the nature of the professional accountant's work. The researcher will share his findings in order to create greater knowledge of the professional accounting field.

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THE HUMAN RESOURCE MANAGER'S ROLE IN CONFLICT RESOLUTION IN CASES OF SEXUAL HARASSMENT

Jill Thurau

Dr. Michael Blum, Faculty Mentor

- 8 One of the responsibilities of a human resource manager is conflict resolution within the context of employment disputes. Our research deals with how a human resource manager is involved in resolving cases of sexual harassment. We conducted over one hundred field interviews with human resource managers and of the one hundred, twelve yielded cases involving sexual harassment. We have chosen for this presentation a qualitative analysis. The results indicate about half of the disputes were between peers and half between supervisors and subordinates. A common strategy was applied by the human resource managers. There was a greater propensity for the sexual harassment cases to be brought directly to the human resource manager when that manager was female. Increasing legal and employee productivity costs for businesses due to sexual harassment warrant future studies in these areas.

Division of Fine Arts

ANDREW WYETH: THE ARTIST AND HIS ROLE IN AMERICAN ART HISTORY

Kathy Duda

Art History Senior Thesis Advisory Committee

- 9 Andrew Wyeth is a contemporary artist whose career has spanned nearly sixty years. He had his first successful gallery show at the Macbeth Gallery, New York, in 1938 at the age of twenty. This instant popularity helped build Wyeth into a pop icon in American culture. This research takes Wyeth out of the social framework of American society and puts him into an art historical context. The examination of his influences, styles, and techniques have proven that Wyeth is an independent artist of the twentieth century who has developed his own style of art. With this knowledge Wyeth can be placed historically into American art of the Twentieth century.

UNDERGRADUATE RESEARCH SYMPOSIUM

ARTEMISIA GENTILESCHI: FEMALE BAROQUE ARTIST

Elizabeth M. Duffy

*Dr. Sara Orel, Garry Gordon, Dr. James Harmon, and Julia DeLancey,
Faculty Mentors*

10

The 1970's marked a period in art history scholarship in which feminist historians, critics, and artists began to question the exclusion of women from the canon of "great" artists. In their desire to reclaim the forgotten history of women artists, feminists have urged historians to reinstate these artists into the history of cultural production. With this new focus on female creativity certain artists have prevailed as prime examples for the feminists' position. Among those female artists is the Italian Baroque artist Artemisia Gentileschi. In reviewing and reinterpreting her work, many feminists claim that Artemisia's images of women possess a female "assertiveness" that is profoundly alien to the work of her male contemporaries. This research re-examines the work of Artemisia within the artistic and social context of her time to determine whether or not similar stylistic and interpretive presentation are existent in the work of her male contemporaries.

RUSSIAN ART REDISCOVERED

Leigh Lammert

*Dr. Sara Orel, Garry Gordon, Dr. James Harmon, and Julia DeLancey,
Faculty Mentors*

11

Russian art remained a mystery to the public until 1962, when Camilla Gray introduced a pioneering survey of the Russian avant-garde in her book, *The Great Experiment: Russian Art, 1863-1962*. Since then, attention has been given to this modern era, with a focus on Suprematism and Constructivism. Artists attempted to design a new culture based on abstract forms and revolutionary ideas. Their audience denied the new art on the grounds that it was too elite to be useful. Artists responded with a utilitarian approach to art, while simultaneously satisfying their own artistic needs. Once Stalin gained power, artists were pressured to conform to a more realistic style, termed "Socialist Realism." Evidence indicates that despite stylistic differences, the art of Russian Socialist Realism, with regards to propagandistic value, was an ideological continuation of the avant-garde.

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CREATIVE DRAMATICS IN A SPECIAL EDUCATION CLASSROOM

Kristin Lee

Joan Mather, Faculty Mentor

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Creative dramatics have been used in the classroom for many years. These same activities, however, have been consistently omitted from the special education classroom. The few people who have used creative dramatics with special education classes have noted considerable positive effects: improved communication, development of social skills, and increase in voice, vocabulary, creativity, and personality development. This paper was written to promote the use of creative dramatics in special education settings. Special education teachers were interviewed and actual creative dramatic activities performed by special education students were examined.

IMAGES OF WOMEN IN THE PAINTINGS OF RAPHAEL AND TITIAN

Yoori Shin

Garry Gordon, Sara Orel, James Harmon, and Julia DeLancey, Faculty Mentors

13

Raphael's portrayal of women, using a specific hand gesture of the sitters influenced Titian's paintings of women. In many paintings by both artists, the female sitters are depicted as having one arm placed across their chest. The difference between the two can be found in that Raphael tends to depict women of nobility who are fully attired whereas Titian portrays women of every class, most of whom are half-naked with their breasts exposed. This research and presentation focuses on these types of paintings by the two painters from the High Italian Renaissance; in particular, it centers on Raphael's influence on Titian in the paintings of females and Titian's adaptation of the composition. Raphael mostly adheres to religious subjects in these images. On the other hand, Titian explores a variety of themes, religious, secular, and mythical. Titian utilizes Raphael's hand gestures and composition in his paintings, which evolve to convey more naturalistic, realistic, and sensuous qualities of the sitters than Raphael.

MULTICULTURAL MUSIC EDUCATION

Sarah Woody

Dr. Richard Weerts, Faculty Mentor

14

Multicultural music education develops the understanding that there are many different but valid forms of musical expression and encourages students to develop a broad perspective based on understanding, tolerance, and respect for a variety of opinions and approaches. The United States is

now being seen as a culturally diverse society. Cultures and languages are remaining distinct from one another instead of melting into one common culture. Multicultural music education is a way to show students that different cultures are very different but equal in validity. The cultures of India, China, and the Native Americans of the Southwest are treated in this paper. This paper discusses the traditions of these cultures and gives methods that can be used in the classroom to develop an understanding of these cultures.

Division of Human Potential and Performance

PEDESTRIAN SAFETY BEHAVIOR OF COLLEGE-AGED STUDENTS

Kirk Baker*, Katie Kraus*, and Saskia Farber

Dr. Ranjita Misra and Dr. Stephen Hohman, Faculty Mentors

15

Pedestrian safety behavior demonstrated by men and women when crossing an unmarked street includes looking both ways and not standing in the middle of the street while crossing. The present study examined the pedestrian crossing behavior of college-aged students at an unmarked street at NMSU. Data was collected by trained observers. The sample of 1,072 was almost evenly divided in gender with 550 males and 522 females. Results indicated that 15% of the respondents did not look both ways, and 12% stood in the middle of the road while crossing the street. Average speed of the passing vehicles was 16.3 miles per hour. Association between gender and the behavior of looking both ways was significant [$\chi^2 = 6.44$, $p = 0.01$]. Male pedestrians were more likely than female pedestrians to stand in the middle of the road and to not look both ways before crossing.

CONTRIBUTION OF STRENGTH AND POWER TO THROWING SPEED

Calaneet Balas and Lori Cox

Dr. Jerry L. Mayhew, Faculty Mentor.

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The purpose of this study was to determine the relationship among strength, power, and speed of an overhand throw. Twenty unskilled male college students were tested for softball throwing speed. Following 5 practice pitches, each subject was given 3 trial throws with speed determined

by a radar gun. Peak forward arm flexion strength and power were tested using a Cybex isokinetic dynamometer set at 60°s⁻¹ and 180°s⁻¹. Height, weight and arm length were also measured. Strength at 60°s⁻¹ was significantly albeit moderately related ($r = 0.55$) to throwing speed. Although power at 60°s⁻¹ was significantly related to throwing speed ($r = 0.44$), it accounted for only 19% of the common variance. Therefore, it appears that throwing speed is only moderately related to arm strength in college-aged males and could be more highly influenced by skill than by strength or power.

EFFECT OF EXERCISE INTENSITY DURING DOWNHILL
RUNNING ON ACTIVE FEMALE'S MAXIMAL ECCENTRIC
STRENGTH AND DELAYED ONSET OF MUSCLE SORENESS

Darren Burns

Dr. James Heimdal, Faculty Mentor

17

The purpose of this study was to determine the effect of a -10% grade and exercise intensity on eleven females' (mean age, 20 yrs) maximal eccentric strength (MES), and delayed onset of muscle soreness (DOMS). Subjects were randomly divided into two treatment groups: low intensity (LI) and high intensity (HI). Exercise intensities were 50 and 70% of VO_{2max} (mean, 42.1 ml kg⁻¹ min⁻¹) for a treatment distance of 1 mile. The MES was measured by a Biomedex at 60 and 90 deg sec⁻¹ for flexion and extension (immediate, 24,48,72 hrs post exercise). Questionnaires were used to determine DOMS (24,48,72 hrs). The data were analyzed by a two-way ANOVA for repeated measures followed by a Fischer's test. Determination of significance was at the P<0.05 level. The results indicate no significant difference for MES at 60 and 90 deg sec⁻¹ for flexion and extension. A significant increase in DOMS existed at all data collection points for the HI treatment. These data suggest that exercise at a -10% grade at different exercise intensities for a 1 mile duration has no effect on MES, however exercise at a higher intensity elicited a higher DOMS rating. An association between DOMS, muscle damage, and decreases in maximal concentric strength (MCS) is well documented following a down-hill exercise bout. This study represents the first data on the effect of down-hill running on MES.

EFFECT OF STEP HEIGHT ON THE OXYGEN COST AND
ENERGY EXPENDITURE OF STEP AEROBICS

Melissa Coffey*, Sara Hill, Tina Troy*, Erin Willey*

DR. JERRY L. MAYHEW, FACULTY MENTOR.

18

The purpose of this study was to determine the effect of step height on heart rate (HR), ventilation (V_E) caloric expenditure (kcal/min), and relative oxygen consumption (VO₂, ml/kg/min). Ten female college students experienced in step aerobics randomly performed three seven-minute trials on step heights of 4, 6, and 9 inches with a five-minute rest period between

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trials. Throughout the aerobics session subjects were monitored by an automated metabolic cart for energy expenditure and by a Polar™ heart rate monitor for HR. The mean of the final three minutes for each condition was compared using repeated measures analysis of variance. There was no significant difference in HR, V_E , kcal/min, and VO_2 between the 4-and 6-inch step heights, but the 8-inch step produced significantly higher values for these parameters. Therefore, step heights of 8 inches or more produce a significantly higher aerobic demand during a step aerobic session than lower step heights.

AUDIOLOGICAL SERVICES IN BELIZE, C.A.

Donna Donaldson

Dr. J. Paul Hunt, Ph.D., Faculty Mentor

- 19 In May 1995 a 25-person team of students, volunteers, physicians, nurses, speech-language pathologists and an audiologist provided free medical clinics in four communities in Belize, C.A.

The audiological team performed ear examinations, hearing evaluations, hearing aids and cerumen removal. The hearing needs of the population were hard to predict and the number of people needing assistance was staggering.

With donated hearing aids and supplies needed to make on-site silicone ear molds the team was able to fit nineteen (19) BTE (behind-the-ear) hearing aids. These services were provided along with assistance from the Local Disabilities Services staff from Belize City, C.A.

Plans are being made by the Northeast Missouri State University Communication Disorders Department in conjunction with the Rotary Club to establish a program to provide continuing assistance to Belize on a yearly basis.

RURAL ADOLESCENT INJURIES IN ADAIR COUNTY

Saskia Farber

Dr. Stephen Hohman, Faculty Mentor

- 20 Injuries, both intentional and unintentional, have become a serious threat to the health and well-being of Americans. Unintentional injury is the leading cause of death and disability among adolescents. There are many factors that influence adolescents in a rural area, including general adolescent risk factors and unique factors only witnessed in rural areas. The purpose of this presentation is (1) to present a review of literature regarding the type, frequency and cause of adolescent and rural injuries and (2) to present the results from a survey conducted in Adair County, Missouri which addressed adolescent injuries, respondents' perceptions, and corresponding risk factors. The sample size was 171. Results indicated that adolescent

injuries included broken bones, sprains, and cuts, with most occurring in sports. The researchers also suggest a possible approach for reducing rural injuries: to include the parents in the education process, something current risk reduction programs fail to do.

PSYCHOPHYSIOLOGICAL ASSESSMENT OF OVERTRAINING IN
DIVISION II COLLEGIATE SWIMMERS

Jennifer D. Frankenberg

Christopher D. Lantz, Ed. D. and Jerry L. Mayhew, Ph.D., Faculty Mentors

21

Overtraining and burnout are common responses to prolonged, excessive training stress and occur as a result of the continual depletion of an athlete's coping resources. A particularly susceptible population are endurance athletes who engage in year-round training (e.g., swimmers, distance runners). The purpose of this research project was to examine the psychophysiological stress response patterns of collegiate swimmers.

Psychophysiological measures were assessed on forty-four members (males=22, females=22) of the Northeast Missouri State University swim team each week over a four week period prior to the national meet. Body fat and blood pressure were measured as physiological indicators of burnout. The Daily Analysis of Life Demands for Athletes (DALDA) was used to measure levels of psychological stress. The DALDA is a self-report instrument which assesses sources and symptoms of psychological stress in athletes. Results revealed that overall the participants demonstrated psychophysiological stress response patterns indicating various levels of over-training and burnout.

EFFECT OF CARBONATED BEVERAGE INTAKE ON
 VO_2MAX OF COLLEGE-AGE WOMEN

Chris Jones and Lisa Prather

Dr. Jerry Mayhew, Faculty Mentor.

22

The purpose of this study was to evaluate the effect of a carbonated beverage consumed prior to exercise on the maximal oxygen intake (VO_2max) of college women. Eight moderately active college women were evaluated for VO_2max on an all-out, grade-incremented motorized treadmill test. The control condition required the subject to consume 240 ml of tap water, while the experimental condition required consumption of 240 ml of carbonated water. Each beverage was consumed 15 minutes before the exercise test. Test order was randomized, and each subject performed each test at approximately the same hour of the day. A dependent t-test indicated there was no significant difference ($t = 0.48$) between VO_2max values for the two conditions. Therefore, it appears that consumption of carbonated water immediately before all-out exercise has no significant effect on the ability to reach VO_2max .

COMPARISON OF CARDIO GLIDE TO
TREADMILL EXERCISE AT EQUIVALENT INTENSITIES

Sandra Kalsow

Dr. Jerry L. Mayhew, Faculty Mentor

- 23 The purpose of this study was to compare metabolic parameters between Cardio Glide and treadmill exercise at equivalent intensities. Nine college students were tested on each device during a 20-min exercise at 70-80% of age-predicted maximal heart rate (HR). Test order was randomized with a minimum of one week between tests. After a 14-min steady state, each subject was attached to an automated metabolic cart. HR was monitored by a Polar watch. The average of the final six mins was analyzed with a method by variable analysis of covariance holding HR constant. RPE and R were significantly lower for treadmill exercise than for the Cardio Glide. None of the other variables were significantly different between the two exercise methods. Therefore, at equivalent intensities the Cardio Glide was perceived to be a more strenuous exercise than treadmill exercise. This could be due to higher anaerobic involvement as indicated by the significantly higher R during Cardio Glide exercise.

LET'S GIVE THEM SOMETHING TO TALK ABOUT:
USING TECHNOLOGY CREATIVELY

Carrie Kamp and Susan Mittelstadt

Dr. Paula Cochran, Faculty Mentor

- 24 This presentation will focus on the use of multimedia materials in speech and language therapy. A group of undergraduate and graduate students has been exploring the use of new technologies. For this presentation, two recent projects will be demonstrated: 1) a switch operated spin art device for motorically disabled users and 2) multimedia worksheets including home movies. Special software produces pictures that are put onto special boards for communication. An example of a talking communication board will be presented. Home movies can be placed into word processing documents in order to create a stimulus for conversation about a target concept.

ACOUSTIC ANALYSIS OF SPANISH VOWEL PRODUCTIONS

Amy Kraft

Dr. Cornelis Koutstaal, Faculty Mentor

- 25 Speech samples of ten women and eight men were obtained from normal, native Spanish-speaking subjects. All subjects were of Mayan extraction and citizens of Belize living near the border of Guatemala. The investigator read the instructions in Spanish, whereupon the subjects produced the five Spanish vowels /i/, /ɛ/, /a/, /o/, and /u/ in the syllabic context of /dVd/.

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The recorded speech productions were analyzed with the Dr. Speech Science speech analysis software. Formant frequencies I and II were plotted. The acoustic vowel triangles obtained from this analysis were compared with those from other studies and SAE utterances. Similarities and differences will be discussed and future directions for research will be explored.

EVALUATION OF THE YMCA BENCH PRESS TEST FOR PREDICTING 1-RM USING FREE WEIGHTS AND MACHINE WEIGHTS

Katie Kraus

Dr. Jerry L. Mayhew and Dr. Beverly Tremain, Faculty Mentors

- 26 The purpose of this study was to compare the repetitions completed during the YMCA bench press test for predicting 1-RM bench press using free weights and machine weights. Fifty-eight beginning weight training students (25 M, 33 F) were randomly assigned to perform repetitions-to-failure (RTF) using 35lbs (females) or 80-lbs (males) and 1-RM using free weights (FW) and a Nautilus leverage bench press machine (NA). Both males and females performed significantly more repetitions on the NA than with FW. They also had significantly greater NA 1-RM than FW 1-RM. Previously published prediction equations using RTF significantly underestimated 1-RM in males by 20.9% on FW and 22.9% on NA. In females the equations significantly overestimated FW 1-RM by 9.6% but nonsignificantly underestimated MA 1-RM by 1.9%. Correlations between predicted and actual 1-RM ranged from 0.79 to 0.87. Care should be taken when estimating 1-RM bench press using RTF from the YMCA test because of the errors involved.

A VIDEO PRESENTATION OF SPEECH AND HEARING DISORDERS IN BELIZE, CENTRAL AMERICA.

Joshua Lindsay

Dr. Thomas A. Linares, Faculty Mentor

- 27 Five hundred patients were evaluated for speech, hearing, and medical disorders during five medical clinics in Belize, Central America. Two clinics were held in Belize City, another at the national prison, and two at remote villages. Common disorders found were hearing problems, cleft palate, upper respiratory infections, skin disorders, intestinal worms, rashes, muscular pains, headaches, dental and eye problems. The 25-member Medical Team dispensed over 500 pounds of medical supplies, including antibiotics, antifungal, and antihistamines. The current presentation is a video production of the trip with emphasis on speech and hearing disorders, including custom fitting of hearing aids.

PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECTS
OF HAND-HELD WEIGHTS ON A STEP AEROBICS ROUTINE

Jill M. Matthys

Dr. James Heimdal, Faculty Member

28

The purpose of this investigation was to determine the effect of hand-held weights on 12 active females' (mean age, 19 yrs) oxygen consumption (VO_2), heart rate (HR), blood lactate (BL), and rating of perceived exertion (RPE). Two exercise bouts were performed utilizing a prerecorded video step aerobic routine, one with 3 lb. hand-held weights (HHW) and one without hand-held weights (WHW). Oxygen consumption was determined by a Sensormedics 2900 metabolic measurement cart, and HR by a Polar Heart Rate Monitor. The BL was determined by a finger prick using a YSI 1500 Sport lactate analyzer, and RPE was determined by the Borg scale. The data (mean \pm SD) were analyzed by a correlated twotailed t-test. Determination of significance was at the $p < 0.05$ level. The results indicated a significant increase in the VO_2 (25.2 ± 2.8 , $23.3 \pm 2.4 \text{ ml kg}^{-1} \text{ min}^{-1}$). The data indicated no significant difference in HR (164 ± 11.4 , $160 \pm 12.7 \text{ bts-min}^{-1}$), BL (1.90 ± 0.34 , $1.74 \pm 0.57 \text{ mmol l}^{-1}$) and RPE (15.5 ± 1.2 , 15.3 ± 1.6) across the data collection periods. In conclusion it may be beneficial to include HHW during a step aerobic routine. The increase in metabolic demand (caloric expenditure) by the addition of HHW has not been associated with an increase in psychological perception of work performed.

REPETITIONS TO PREDICT MUSCULAR STRENGTH IN
DIFFERENT EXERCISES

Kristin McGuire

Larry W. Boleach and Dr. Jerry L. Mayhew, Faculty Mentors.

29

The purpose of this study was to evaluate repetitions-to-failure (RTF) in selected exercises for predicting 1-RM strength performance in those same exercises. The RTF exercises included bench press (BP), elbow flexion (EF), elbow extension (EE), and pushups (PU). The 1-RM strength exercises included bench press, elbow flexion, and elbow extension. In addition, men did pullup (PL) repetitions and 1-RM lat pull (LP). Sixty-two exercise science majors (21 M, 41 F) performed RTF and 1-RM in each exercise. Strengths in BP, EF, and EE were predicted from a previously generalized equation. BP was typically underpredicted by 2.2% to 3.8. 3%. EE and EF were overpredicted by 1.5% to 6.8%. PL nonsignificantly underpredicted LP by 5.2% in males. The correlations between predicted and actual 1-RM values ranged from 0.05 to 0.98. Care should be taken when predicting 1-RM values from various RTF exercises because of potentially large errors.

IMPROVING THE PUBLIC'S AWARENESS
OF ORGAN DONATION: A NATIONAL CAMPAIGN

Christy O'Laughlin and Patty Rogers

Kimberly Fatheree, Faculty Mentor

- 30 The increasing number of individuals awaiting organ or tissue transplantation and the limited number of donated organs was the focus of our innovative project. Based on literature review, we found there to be a tremendous need for public awareness on the demand for greater donation. We propose to institute a national public awareness campaign to increase the number of donated organs. This would be attained by accessing television, radio, and roadside billboards to augment understanding of the need for more donors. Community health nurses will conduct informational sessions with various church, social, and school groups in an effort to reach a majority of the population. Literature relating successful accounts as well as tragedy, will be placed in locations to reach the greatest number of individuals, including doctor's offices, dentist's offices, hospital waiting rooms, clinics and grocery stores. Statistics will be monitored and updated every six months to evaluate the effectiveness of the campaign.

RELATIONSHIP BETWEEN AGILITY AND POWER TESTS
IN COLLEGE STUDENTS

Lisa Prather

Larry W. Boleach and Dr. Jerry L. Mayhew, Faculty Mentors

- 31 The purpose of this study was to determine the relationship between agility and power tests in college students. Sixty-three exercise science majors (25 M, 38 F) were evaluated for agility using the SEMO test, boomerang test, quad jump, and Cozen test and for power using the Margaria-Kalamen test, vertical jump, Johnson power jump, and standing long jump. Within the agility tests, the quad jump was poorly related to the other 3 tests ($r<0.22$), while the interrelationship among the remaining tests was high ($r>0.57$). The interrelationships among the power tests were moderate to high ($r = 0.67$ to 0.92). The agility tests were moderately and negatively related to the power tests ($r = -0.53$ to -0.78). Factor analysis loaded all power and agility tests except the quad jump in a group accounting for 64% of the variance, while the quad jump was included in a second factor accounting for 13.7% of the variance. Power and agility tests may be interdependent on one another.

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A SUMMARY OF FIVE PATIENTS PRESENTING WITH CLEFT LIP AND PALATE EXAMINED IN BELIZE, CENTRAL AMERICA

Michelle Roberts

Ms. Janet Quinzer, Faculty Mentor

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Five patients presenting with cleft lip and palate were examined by the Belize Medical Team in Belize, Central America. Due to poor medical funding in Belize, clefts of the lip were usually not repaired until ten months of age or later. In contrast, clefts of the lip are typically repaired at the age of three to six weeks in the United States. Only one of the five patients had received surgery to correct the palatal defect. Palatal surgery for the particular patient was performed at nine years old. Clefts of the palate in the United States are normally repaired between the ages of nine to fifteen months of age. An oral mechanism examination was administered to each client and a medical history was obtained. Summaries of the results of the oral mechanism examination, known case history, and notes concerning each client's speech and voice characteristics will be presented.

THE DEVELOPMENT OF A PHYSICAL ACTIVITY ACCEPTANCE SCALE TO DETERMINE GENDER VIEWS ON FEMALE PARTICIPATION IN TRADITIONALLY MASCULINE EXERCISE AND SPORT PARTICIPATION

Jayne M. Scanlan and Katie L. Ballman

Christopher D. Lantz, Ed.D. and Jerry L. Mayhew, Ph. D., Faculty Mentors

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Limited research has been conducted focusing on the acceptance of female participation in traditionally masculine sports and exercise activities. The purpose of this study was to develop a survey instrument which assesses the acceptance of women who engage in traditionally masculine sports and exercise activities (e.g., heavy weight training, contact sports). Three hundred twenty-five students from general psychology and health and wellness courses completed a pool of 27 items believed to explore this construct. Principal components analysis with varimax rotation revealed a unidimensional structure with nine items loading on a single factor accounting for 27% of the variance. A total scale score was determined by adding the scores of the nine items. T-tests revealed that males and females responded significantly different on eight of the nine items and on the total scale score. Pearson product-moment correlation coefficient indicated that all nine items were significantly correlated to the scale total.

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EXAMINATION OF ATHLETIC IDENTITY AND GENDER-ROLE ORIENTATION IN UNIVERSITY VARSITY STUDENT-ATHLETES AND NON-ATHLETE STUDENTS

Peter J. Schroeder

Christopher D. Lantz, Ed. D. Faculty Mentor

- 34 The purpose of this study was to assess levels of athletic identity and gender-role classification in university varsity student-athletes and non-athlete students. Four hundred and nine students at a small Midwestern university completed the Athletic Identity Measurement Scale (AIMS) and the Bem Sex-Role Inventory (BSRI). Results indicated that masculine individuals scored significantly higher on the AIMS than feminine or undifferentiated participants. Male and female athletes also reported greater levels of athletic identity than non-athletes. Independent t-tests revealed significant differences between both female athlete and non-athlete levels of masculinity and male and female levels of athletic identity. Implications for parents, coaches, and administrators as well as contributing sociological factors are discussed.

COMPARISON OF HAND TIMING AND AUTOMATIC TIMING FOR THE MARGARIA-KALAMEN TEST

Kristin Sucher and Sally Skelton

Larry Boleach and Dr. Jerry L. Mayhew, Faculty Mentors.

- 35 The Margaria-Kalamen (M-K) test for evaluating anaerobic power requires expensive equipment which may limit its practicality in a field setting. The purpose of this study was to determine the accuracy of hand timing versus automatic timing for the M-K test. Sixty-one college subjects (20 M, 41 F) were evaluated using 3 trials on the standard M-K test. Automatic stair time was determined from touch pads attached to a digital timer. Hand times were gathered from the average of 3 timers positioned at the base of the stairs. The best of the 3 trials was used to calculate power. In the composite sample, power scores were significantly correlated ($r = 0.90$) and not significantly different ($t = 1.30$). When grouped by gender, hand timing produced a significantly higher power value in females although the two were highly correlated ($r = 0.85$). Hand timing is a viable option for the M-K test, but tester error can introduce considerable variability in time measurement.

EFFECT OF VISUAL STIMULUS ON ENERGY EXPENDITURE,
HEART RATE, AND PERCEIVED EXERTION DURING
STATIONARY CYCLING PERFORMANCE

Craig Utterback and Carrianne Prybylski

Dr. Jerry L. Mayhew and Dr. Christopher D. Lantz, Faculty Mentors

- 36 The purpose of this study was to compare energy expenditure, heart rate (HR), and rating of perceived exertion (RPE) during stationary cycling with and without visual stimulation. Ten college students (5 M, 5 F) of varying fitness levels performed two 15-min rides at 100 W. During the cycling, subjects were randomly shown a soundless, scenic video of traveling through Mt. Ranier Park or received no external stimulus. Energy expenditure was monitored via a metabolic cart every minute, and HR was recorded by a Polar™ monitor every 5-min period. The Borg RPE scale was used to evaluate perception of difficulty every 5 mins. A method x period (2 x 3) ANOVA indicated that the subjects registered significantly higher VO₂ and Kcal expenditure during the non-visual ride. HR and RPE were not significantly different between the rides. Therefore, if the emphasis during exercise is on caloric expenditure, significantly better results are produced while riding without a video.

COMPARISON OF LABORATORY TECHNIQUES AND FIELD
EVALUATION FOR THE ASSESSMENT OF PERFORMANCE
OF WOMEN RUGBY PLAYERS

**Danielle M. Wright*, Jason E. Glover, Robert J. Standing,
and Michael E. Longdon**

Dr. James E. Heimdal, Faculty Mentor

- 37 The purpose of the study was to determine the relationship between the physiological, metabolic, and psychological demands of maximal exercise on collegiate female rugby players in laboratory and match performance. Aerobic capacities (AC) were assessed utilizing the Bruce Protocol and heart rate:VO₂ relationships, and heart rates (HR) by Polar monitor and portable defibrillator in lab and field performance. Blood lactates (BL) and ratings of perceived exertion (RPE) were taken after maximal performance in laboratory and field assessments. Body composition (BC) were determined utilizing the sum of 3 skinfold measurements. Results indicated that the players maximal response for VO₂ was 42.5 ml kg⁻¹ min⁻¹. The BL concentrations at maximum effort were 6.9, in lab, and 4.3 mmol/L⁻¹ for field, the HR_{MAX} was 186 beats min⁻¹, RPE was 17.0, and BC was 20.5%. The VO_{2MAX} value was lower and BC higher than expected for the players physical size and training/ conditioning. Given the sports demand to engage in sustained activity, the implication might be that the athletes have developed an unusually high anaerobic threshold. The necessity of a high VO_{2MAX} in rugby players has yet to be established, since the sport has been categorized as intermittent. Rugby players may rely primarily on previously learned skills and techniques to compensate for AC which are not compa-

rable to that of distance runners. For these reasons the usage of $\text{VO}_{2\text{MAX}}$ data can be informative, but may not be an accurate indicator of rugby performance.

Division of Language and Literature

NATURE MYSTICISM IN THREE ART FORMS

Jill Goodheart

Dr. Robert Mielke, Faculty Mentor

38

Nature mysticism is a recurring theme in many art forms. This paper explores specifically the work of Joseph Stella, artist. A correlation between art, music, and literature will be made using specific aspects of nature mysticism.

EXISTENTIAL THEMES IN SIMONE DE BEAUVOIR'S LIFE

Elizabeth A. Kemery

Dr. Betty McLane-Iles, Faculty Mentor

39

"Each of us is responsible for everything and to every human being". This is the epigraph from Dostoyevsky that begins Simone de Beauvoir's novel *The Blood of Others*, which illustrates the importance of existential principles in her life. Her quest for personal freedom and her belief in social responsibility are shown through her work during the Algerian war with a young woman, *Djamila Boupacha*, and through her participation in the feminist movement. During the Algerian war, Beauvoir aided Boupacha by writing *Djamila Boupacha*, which depicted the atrocities of the French army against Boupacha. Beauvoir has been considered as one of the mothers of the modern French feminist movement. Her book *The Second Sex*, in which Beauvoir describes the post-war situation of women, became one of the catalysts for the new resurgence of feminism. It has been through her writing and political actions that Beauvoir has demonstrated the tenets of Existentialism.

AN INTERVIEW WITH JEFFREY EUGENIDES,
AUTHOR OF *THE VIRGIN SUICIDES*

Ron Klier

Dr. Adam Davis, Faculty Mentor

40

Jeffrey Eugenides is one of America's most promising young authors. His short story "Capricious Gardens" received an honorable mention in *The Best American Short Stories 1990*, and in 1992 he was awarded an Ingram Merrill Foundation Fellowship. His first novel, *The Virgin Suicides*, won the 1993 Whiting Award and has been translated into twelve languages. Holding degrees from both Brown and Stanford, Eugenides is an intelligent and articulate individual. In this interview he speaks frankly on his own writing, his influences, his methods and style. He offers his thoughts on postmodernism, the publishing industry, and on the current state of American literature. Eugenides represents the very best in contemporary writing, and though he has published only one novel, the promise and talent exhibited in that novel hint that he will be with us for some time.

"THE RETURN TO THE MIDDLE WEST":
A MURAL BY WILLIAM UNGER

Luke Mangan, Patrice Pupillo, and Sally Winger

Dr. David Partenheimer, Faculty Mentor

41

On the third floor of the Student Union Building on the Northeast Missouri State/ Truman State University campus is a valuable art work. "The Return to the Middle West," by William Unger. Though the piece has been there since 1976, most students, as well as the general public, are unaware of its significance, and even, in some cases, its existence.

Through extensive research in library artifacts, special collections, computer data bases, and general texts, in conjunction with information attained from the Missouri State Capitol Building, we are producing a brochure and a presentation that will aid further understanding of the rich traditions and cultures of this university.

PROPOSAL FOR A MINOR IN GENDER STUDIES

Clinton W. McCracken

Dr. Linda Seidel, Faculty Mentor

42

The result of this research is a proposal for a minor in Gender Studies at NMSU. This program would include both Women's Studies and Lesbian, Gay, and Bisexual (LGB) Studies courses, which will support interdisciplinary teaching and learning by and/or about the historical and contemporary experience of women and lesbian, gay and bisexual people and their

place in world culture. It has only been in very recent decades that a significant dimension of human experience, known as LGB Studies, has come to be seen as a legitimate topic of serious academic attention. Implementation of LGB Studies within university curricula has been occurring at various other institutions displaying many examples of legitimacy and support, both inside and outside academia.

**DO YOU COME HERE OFTEN?
GENDER BASED RESPONSES TO DIRECT AND INDIRECT
DISCOURSE IN HETEROSEXUAL BARROOM INTERACTION**

Rob Neal and Stacy Rummel

Dr. Adam Davis, Faculty Mentor

- 43 A barroom—a place of cold beer, good cheer and sexual tension. A place of secret desires, dreamers and liars, and misplaced inhibitions. With so many people going to the same place with the same intentions—why do they find it so difficult to communicate? This was a naturalistic research project that focused on the difference in male and female discourse in the barroom setting. Specifically, the researchers were looking for differences in the use of direct and indirect language. To isolate specific techniques of each gender, we formulated a question that seemed to embody the essence of why each person was in the barroom environment: “Will you have sex with me?” The researchers employed solicitation teams consisting of members of the same sex to aid in data gathering. The teams recorded the responses to their direct queries. Each same sex solicitation team questioned eligible members of the opposite sex. Limiting the research to four different bars in three different cities, this study examined and drew conclusions regarding the sometimes bewildering discourse found in singles bars. The researchers found that distinct differences seem to exist.

**INTERTEXTUALITY VS. ALLUSION IN THREE ART FORMS:
THE WORK OF ROGER BROWN**

Melanie A. Redman

Dr. Robert Mielke, Faculty Mentor

- 44 Specific works of art often make references to other works of art and certain political/social events or conditions. This is an exploration of the importance of understanding references made in three specific works of art. The main focus of this paper is the work of contemporary artist Roger Brown.

UNDERGRADUATE RESEARCH SYMPOSIUM

ANALYZING CULTURAL DIFFERENCES IN FRENCH FILM AND THE AMERICAN REMAKE

Paul B. Ribbing

Dr. Timothy Farley, Faculty Mentor

45

Cultural anthropologist Edward T. Hall is one of the leading figures of cross-cultural studies. His extensive research has led to the notion that a society's belief systems are the basis for cultural behaviors. These belief systems are on a subconscious level, and may be disrupted when exposed to other cultures. These cultural conflicts result from members of different cultures judging the other by their own belief systems. Raymonde Carroll, a French ethnologist working in the United States, has demonstrated Hall's studies through analysis of film. In particular, remakes of foreign films can reveal a great deal about the two different cultures.

In this study, I use the French film, "Cousin, Cousine" and its American remake, "Cousins" in order to examine cultural differences. A close comparison of selected scenes reveals divergent belief systems underlying French and American culture.

CHANNEL SURFING IN ART FORMS

Amy Ronek

Dr. Robert Mielke, Faculty Mentor

46

Channel surfing in our society has become a way of life for many people since technology has become an integral part of our culture. This paper focuses on the work of Nam June Paik, artist, and Mark Leyner, contemporary author. This paper will explore the relationship between much contemporary art and technology.

ON THE RAILS, THE BACKSIDE OF AMERICA

Brian Twenter

Dr. Adam Davis, Faculty Mentor

47

Have you ever wondered if a modern hobo still exists? The researcher set out on a ten day project to discover how people ride the rails. With one goal in mind, he set out to become a participant observer in the hobo lifestyle. Jumping a train in LaPlata, he made his way west across the plains of Kansas to the mountains of Colorado. Along the way he observed the people, he heard their stories and lived as a hobo would live. Upon his return, he discovered that what he had set out to do was not what he had accomplished. In fact, he had learned more about himself than he had about the backside of America.

Speech Communication Symposium

SUBLIMINAL MESSAGES IN DISNEY FILMS

Meghan Alexander

Dr. Barry Poyner, Faculty Mentor

- 48 Subliminal messages, nonconscious perception or perception without awareness, has been increasingly explored by psychologists and philosophers over the last hundred years. The potentiality of the effects subliminal messages may have on individuals, has been debated relentlessly, and without closure. The focus of this study was based on the accusations of subliminal messages in Disney films by the American Life League. The three animated blockbusters discussed were *The Little Mermaid*, *Aladdin*, and *The Lion King*, in which offensive scenes were found in each film. Explanations to the offensive scenes were put forth by Disney spokespeople, and opinions from other animation artists concerning the scenes were given. Effects of subliminal messages were discussed along with the explanations of the so-called offensive scenes.

“SONG OF MYSELF”

Erin Cerny

June Sullivan and Kirsten Olesen, Faculty Mentors

- 49 “Song of Myself” was a poem written by Walt Whitman in 1855. However, the poem was not named “Song of Myself” until 1881. Whitman revised the 1855 version, and some critics believe that the later version lost much of the powerful images used in the earlier version. The performance of this poem will be based on the 1855 version. As the title suggests, the poem is a celebration of one’s life. An oral interpretation of “Song of Myself” yields a unique performance.

DRAMATIC PERFORMANCE ON BARS

Stephanie Hay

Kirsten Olesen, Faculty Mentor

- 50 Many people have been to a bar or are planning to go when they turn of age. The bar as a social setting provides opportunities to sit back after a long day at school or work, and socialize. People go to the bars for various reasons: to meet up with some friends, meet new people, forget about the hard day, to go dancing, or play the variety of games that bars offer. No matter what the reason, the bar is the place where a person can be some-

one else. My oral interpretation is composed of poems, monologues, short stories, and jokes about bars that explores the social scene that they are.

HOW TO SPEAK EFFECTIVELY
TO BLOODTHIRSTY GROUPS OF PEOPLE:
GRIMKE WELD AND PHILLIPS' EXTEMPORANEOUS
REACTIONS TO PRO-SLAVERY MOBS

Matthew Herndon

Dr. Barry Poyner, Faculty Mentor

51

Angelina Grimke Weld and Wendell Phillips were two very outspoken and skilled speakers who, in the 1830s, faced very similar rhetorical situations. In May of 1838 Grimke Weld spoke as a female abolitionist at a general meeting of male and female abolitionist societies at Pennsylvania Hall. Her speech is an extemporaneous response to angry pro-slavery mobs just outside the Hall, who later destroyed the building the activists were meeting in. Phillips spoke a year earlier in Massachusetts at Faneuil Hall in response to an incident in Missouri, in which a slave-holding mob murdered an abolitionist newspaper editor. Phillips also spoke in the midst of angry pro-slavery protesters, and his speech is as much a response to this mob as it is an abolitionist treatise. This paper analyzes the strategies the two speakers use in response to these potentially dangerous and intriguing situations.

ASPECTS OF SELF-TALK

Jason Mathers

Dr. Barry Poyner, faculty Mentor

52

Self-talk is an essential part of every person's life. Self-talk determines how people will respond to situations throughout their lives. Two concepts related to self-talk are: an internal advisor and inner dialogue. Through the internal advisor, people give themselves direction and guidance. Through inner dialogues, people imagine that they are having a conversation with another in which they plan different scenarios so as to be prepared for future conflicts. Related to this, are the ideas of emotion control and self-fulfilling prophecy. People control their own emotional responses to situations, not others for them, and self-fulfilling prophecies often affect outcomes to situations. Both concepts are discussed in detail.

UNDERGRADUATE RESEARCH SYMPOSIUM

MYTHIC ANALYSIS OF *IT'S A WONDERFUL LIFE*

Jason McKnight

Dr. Jack Hart and Dr. David Williams, Faculty Mentors

53

It's a Wonderful Life is a film which was directed and produced by the late Frank Capra. The film was released in 1946, and received several Academy award nominations. The film, however, failed to win any Academy Awards, and it experienced mild financial success. In the contemporary era, the film has become a Christmas classic. The film is shown on television every year during the Christmas holiday and most Americans are familiar with it. This paper is a mythic analysis of the story of George Bailey and how he typifies many myths of the American psyche. This paper analyzes the myths which appear in the film and what these myths say about the people of the United States.

USAGE OF NATIVE-AMERICANS AND THEIR CULTURE AS SPORT MASCOTS

Kwameko Miller

Dr. David Williams

54

Using Native-Americans and their culture as sports mascots is questionable. Many people justify using Indians as mascots by appealing to tradition. They also cite economic reasons along with the incorrect notion that using Indians as mascots hurts no one. I provide examples of the specious arguments made by team owners. I also reference statements made by Native-American organizations to show their disapproval of using Indians as mascots. The paper contends that any form of racism is wrong.

SYMBOLIC ANALYSIS OF THE FILM *SILENCE OF THE LAMBS*

Cari Patton

Dr. Jack Hart and Dr. David Williams, Faculty Mentors

55

Silence of the Lambs is a film that was released in 1991. This movie was incredibly well received, as it won several Academy Awards and was acclaimed by critics. This analysis searches for the reasons behind its huge success and popularity. Several aspects of the film are considered, including the time period in which the film was made and released, the metaphorical symbols used, and the external structure. The external structure is the plot, scenery, lighting, camera angles, etc.

SLOGANS

Lori Zoll

Dr. Barry Poyner, Faculty Mentor

56

Slogans allow communication with hundreds of people using only a few words. Slogans have gotten Presidents elected, products bought, and people committed to causes. When learning about slogans, it is important to understand both their pervasiveness and their persuasiveness. In the presentation, I touch on how slogans are developed and categorized. Examples of slogans are given to further explain how slogans are categorized.

Division of Mathematics
and Computer Science

CAN COLLEGES ACCURATELY PREDICT
INCOMING STUDENTS' ABILITY TO ACHIEVE?

Kristin Adank

Dr. James Guffey, Faculty Mentor

57

The American College Test (ACT) claims to predict college success. In this study, a student's success will be measured by college grade point average (GPA). Because of this claim, almost every student has to take the ACT in midwestern states to apply for college admission. A student's performance on the ACT can affect into which college s/he may be admitted. Besides the ACT, colleges consider a student's high school GPA and the types of classes taken, such as college preparatory, honors, or required. Because of the emphasis on these tests and grades, the researcher surveyed 78 students, including sophomores, juniors, and seniors, at Northeast Missouri State University to investigate the relationship between college GPA, high school GPA, ACT score, and number of honors courses.

EFFECTS OF WIND ON SEED DISTRIBUTIONS

Travis Austin

Dr. Michael Kelrick and Dr. Steve J. Smith, Faculty Mentors

58

Conventional wisdom says that it is advantageous for a plant's seeds to end up far from the parent source. For example, if too close to the parent plant, the seeds must compete with the parent plant for survival. For this reason,

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how dispersal agents—e.g., wind and animals—change the distribution of a paternal plant's seeds about its base becomes relevant. In this study, we focused on dispersive action of wind on seeds in a sagebrush-dominated system. Groups of seeds were dropped at a point source and their subsequent distributions recorded over various times. We wanted to determine if the seeds would move in a preferred direction or if the seeds would become distributed randomly. The validity of a random seed distribution is investigated using circular statistics and related techniques.

AN INDIVIDUAL-BASED COMPUTER SIMULATION MODEL OF AN HERBICIDE-RESISTANT WEED POPULATION MODEL

Thomas Kent

Dr. Nicholas Jordan and Dr. Steve J. Smith, Faculty Mentors

59

Herbicide-based weed management has often led to evolution of genetic herbicide resistance. To avoid resistance, selection favoring resistant genotypes must be balanced by other selective factors. Resistant genotypes often suffer a physiological cost, either associated with, or caused by, genes conferring resistance. Exploitation of this cost of resistance can reduce fitness of resistant genotypes and thus balance selection for resistance that occurs when herbicide is used. However, durable schemes to protect useful herbicides by exploiting a resistance cost must avoid “self-destructing” by selecting for a reduced cost. To develop understanding of how to forestall such “self-destruction”, we apply an individual-based population genetics simulation model to evaluate durability of strategies to prevent evolution of herbicide resistance by exploiting a resistance cost.

Division of Science

IDENTIFICATION OF A MOBILE GENETIC ELEMENT IN MAIZE

**Kirsten Andrews, Tammy Benson, Catherine Clamp*, Tracey Dowey*,
Andy Dykens, Jeremy Grojean*, Karen Kemper, Janet O'Neal,
Walter Roensch, David Skibbe, Kathy Smock, Mindy Steiniger,
Andy Walkup and Mark Wissel**

Dr. Brent Buckner, Faculty Mentor

60

The *y1* gene of maize codes for phytoene synthase, an enzyme of the biosynthesis pathway to carotenoids. Previously, 5995 bp of the *y1* gene were sequenced, including upstream and downstream regions. Interestingly, transposable elements were found within coding sequences and also upstream of the gene without apparent effect on gene function. It

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is our goal to sequence an additional 700-1000 bp upstream of the *y1* gene in an attempt to locate any other transposable elements that reside near this gene. Plasmid DNA was transformed into *E. coli*, isolated, and sequenced. Subsequently, this sequence was used in a search of the GenBank sequence database using the Basic Local Alignment Search Tool (BLAST) via the World Wide Web. This search has identified a 90 bp sequence that has a high percent of sequence similarity to a subsequence found in a class of retroelements known as PREM and a downstream region of the polygalacturonase gene from maize. These data suggest that this sequence is a mobile genetic element. We have given this mobile genetic element the name "hitchhiker" since it has, in part, moved around the genome while "riding on" the PREM retroelement.

THE SPECTROPHOTOMETRIC DETERMINATION OF ZINC LEVELS IN HUMAN SERUM BY USING Br-PADAP

Jessica Arnold

Dr. Yinfia Ma, Faculty Mentor

61

Zinc has many important functions in humans. For example, zinc is involved in nucleic acid and protein metabolism, and hence in the process of cell differentiation and replication. It also has many biologically significant interactions with hormones. Zinc deficiency can cause growth retardation, it is essential in the immune system, and in fact, thymic atrophy has been associated with zinc deficiency in a variety of animals. Zinc deficiency has also been shown to adversely affect reproduction. These examples illustrate the importance of zinc and demonstrate some of the potential adverse effects of zinc deficiency. In this experiment, a method for the determination of zinc levels in human serum is being developed. Br-PADAP was used to complex with zinc. Zinc solutions of various concentrations were combined with Br-PADAP solution and the absorbances of the complex in each solution were measured. These absorbances were used to create a calibration curve from which zinc concentrations in serum samples may be determined. The interference from other metal ions will be studied in the near future.

ANALYTICAL CHARACTERIZATION OF NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAID's)

Peter Basta

Dr. Robert Libby, Faculty Mentor

62

Thermogravimetric analysis (TGA) is a useful technique for characterizing solid materials. TGA records all weight changes corresponding to thermally induced transitions, such as dehydration and/or decomposition. Compounds analyzed through TGA will result in a distinct curve relating temperature for the onset of decomposition. When used in combination with other methods of characterizing solid materials, such as Fourier trans-

form infrared spectroscopy (IR) and electron microscopy, chemical compounds can be characterized with confidence and accuracy. This research project characterizes the five over-the-counter nonsteroidal anti-inflammatory drugs (NSAID's) acetaminophen, ketoprofen, ibuprofen, aspirin, and naproxen, and the three prescription NSAID's meteridine, morphine, and tramadol hydrochloride using TGA, IR spectroscopy, and electron microscopy. Analytical data from this study is being related to chemical structure and function for pharmaceutical and forensic applications.

EFFECT OF VARYING SUCROSE CONCENTRATION IN THE
REACTION CHAMBER ON RESPIRATION OF MITOCHONDRIA
ISOLATED FROM MAIZE SHOOTS DURING OXIDATION OF
PROLINE, SUCCINATE AND EXOGENOUS NADH

Swati S. Baxi and Christine Healey

Dr. Gary Sells, Faculty Mentor

- 63 Water stresses affect a plant's response in that the mitochondria alters substrate usage so that it may continue to successfully respire despite periods of flooding and drought. In this study, the rate of respiration in mitochondria of corn shoots was measured during the oxidation of three substrates (exogenous NADH, succinate and proline) while varying the sucrose concentration. The variation in sucrose molarity is representative of the water stresses that a plant encounters. Respiration rates and RCRs (Respiratory Control Ratios) were calculated for the three substrates at three different sucrose molarities (0.05M and 0.35M sucrose compared to the control of 0.2M). The RCRs for the control, succinate, ranged from (1.31 to 2.71) for 0.2M, and (1.11 to 1.70) and (1.02 to 2.24) for 0.05 and 0.35, respectively. RCRs for NADH were also calculated and were found to be slightly higher while those of proline were found to be slightly lower. A comparison of the substrate's effects on respiration within a single category of sucrose molarity was made, with succinate standardized to 100%, and proline and NADH were measured against this. NADH is a highly oxidative substrate in comparison to proline and succinate. The range of such a deviation appears to be less significant in a 0.2M reaction (as opposed to in a 0.05M or a 0.35M) and further statistical analysis are being conducted to ascertain the validity of this initial judgement.

THE EFFECT ON CONCEPTION RATE
OF MATING EWES TO VASECTOMIZED MALES AFTER
VAGINAL INSEMINATION WITH FROZEN RAM SEMEN

Tammy J. Benson

Dr. Thomas E. Marshall, Faculty Mentor

64

Artificial insemination (AI) introduces spermatozoa into the female reproductive tract without contact between the male and female. AI with frozen semen has proven profitable in larger species of livestock. For sheep, however, no insemination techniques, that are practical for the majority of sheep breeders, have been developed. This project tested a new technique that would be inexpensive and easily performed by sheep breeders. It involved placing thawed semen into the ewe's vagina then mating her to vasectomized males. The males contributed the accessory fluids that normally accompany copulation, but not spermatozoa. These fluids contain buffers and nutrients, that should help thawed spermatozoa survive in the vagina, and prostaglandins which stimulate uterine contractions. Uterine contractions should push thawed semen through the reproductive tract of the female. According to the estrus detection and ultrasound methods employed in the study, mating ewes with vasectomized males after vaginal insemination did not increase conception rates.

DIFFERENCES IN APHID RESISTANCE BETWEEN
MALES AND FEMALES OF *SILENE LATIFOLIA*,
A COMMON WEED

Mary Blandford

Dr. Steven Carroll, Faculty Mentor

65

In plants having separate sexes, females generally invest more resources in reproduction as a result of the production of seeds and fruits. In *Silene latifolia*, a weedy member of the carnation family, females not only invest more in reproduction, but also grow larger. To determine whether females and males allocate resources differentially with respect to defense against insects, aphids from two infested source plants were allowed to move onto aphid-free, reproductively immature target plants. After 13 days, the target plants supported an average of 160.2 aphids (standard error = 19.59). As these target plants produce flowers, the gender of each will be determined and the number of aphids on females and males will be statistically compared. In addition, a second experiment is underway in which reproductively mature target plants will be exposed to aphids to determine whether resistance to aphids differs among males and females after investment in reproduction. Together, these experiments should help determine whether females allocate resources to reproduction and growth at the expense of other needs.

PREPARATION OF COLLOIDAL PARTICLES
CONTAINING AU AND CU

Allison Boney* and Ben Cutak*

Dr. Griff Freeman, Faculty Mentor

66

Colloidal suspensions of Au, Ag or Cu have long been used as substrates for surface-enhanced Raman scattering (SERS). When a molecule adsorbs on a rough metal surface the Raman scattering signal may increase by a factor of 10⁶ due to surface enhancement. During the last year two types of colloidal solutions have been prepared: Au colloids with 0-10% Cu included and Cu colloids containing 0 to 10% Au. The ultimate goal of this work is to prepare superior surfaces for SERS.

This presentation will begin with background information on the SERS phenomenon as well as an explanation of the reasons for mixing the metals. The results of experiments in which Au was deposited on previously prepared Cu spheres and the reverse experiment, Cu deposition on Au will be reported. A second approach, in which Au and Cu salt solutions are simultaneously reduced to form a mixed particle will also be discussed.

THE SYNTHESIS AND CHARACTERIZATION OF
BIS(N-METHYLBENZOHYDROXAMATO-O,O')COPPER (II) SALTS

Dan Brink

Dr. Pamela R. New, Faculty Mentor

67

The first of a series of bis(N-methylbenzohydroxamato-O,O')copper II salts were synthesized in part for their study as potential alpha-nucleophiles in substitution reactions. An alpha-nucleophile is one which has an unusually high degree of reactivity, for reasons that are not completely understood. The reaction of copper (II) nitrate trihydrate with 3-methoxy-4-methyl-N-methylbenzohydroxamic acid produced green crystals of bis(3-methoxy-4-methyl-NmethylbenzohydroxamatoO,O')copper (II). In a similar method, a bis(4-chloro-N-methylbenzohydroxamatoO,O')copper (II) complex was formed. Both complexes were fully characterized by IR, NMR, and X-ray diffraction techniques. The synthesis and structure of each complex will be discussed, and the future evaluation for nucleophilic activity will be described.

UNDERGRADUATE RESEARCH SYMPOSIUM

THE VALUE OF FIVE PRAIRIE LEGUMES FOR INTERSEEDING IN STANDING SWITCHGRASS

Lisa Brokaw*

Dr. Duane Merlin Ford, Faculty Mentor

- 68 We evaluated the relative merit of five native legumes—*Chamaecrista fasciculata* Michx., *Amorpha canescens* Pursh., *Shrankia unicata* Willd., *Lespedeza capitata* Michx., and *Dalea purpurea* (Vent.) Rydb. for interseeding into standing switchgrass (*Panicum virgatum* L.). Three 21 m² plots of switchgrass were interseeded with each legume in each of three locations in late winter 1995. Plant numbers, heights, and node numbers of legumes and the plant numbers and size of switchgrass were determined about every two weeks from May to October. Based on the number and size of plants produced, interseeding with *C. fasciculata* appeared most promising. *L. capitata*, *D. purpurea*, and *S. unicata* plantings resulted in low densities and/or small plants. *A. canescens* did not emerge. (We thank Mr. James Stribling,

Mr. Martin Hull, and Mr. Bernard Hepworth for donating the use of their switchgrass fields.)

EFFECTS OF MGBG AND DFMO ON MITOCHONDRIAL RESPIRATION IN DIGITONIN PERMEABILIZED PC12 CELLS

Sara E. Brokaw

Dr. Cynthia L. Cooper, Faculty Mentor

- 69 PC12 cells are an *in vitro* system for the study of neurotransmitter release, a process which requires ATP. Treating PC12 cells with MGBG and DFMO increased cellular ATP levels despite the known antimitochondrial activity of MGBG. To determine if the doses of 0.5mm MGBG and 1 .OmM DFMO were mitotoxic, a method was developed to measure mitochondrial respiration in whole cells. This procedure involved permeabilizing cells with digitonin, a cholesterol binding agent, and assessing mitochondrial respiration in permeabilized cells with an oxygen electrode. In control cells, the respiration rate was found to be linear from 2 to 16 million cells. The permeabilization procedure has been optimized with digitonin dose-response and time course studies. Treatment with MGBG enhanced mitochondrial respiration 4.5-fold and combined drug treatment increased respiration 4.7-fold. DFMO alone did not alter respiration ($p>0.05$). The results suggest that 0.5mM MGBG was not mitotoxic, but rather enhanced oxygen reduction by mitochondria in digitonin-permeabilized PC12 cells.

UNDERGRADUATE RESEARCH SYMPOSIUM

HISTORICAL REVIEW OF ELECTRICITY AND MAGNETISM

Allen Brokken*

Dr. David Chyba, Faculty Mentor

70

A common element missing in many physics courses is the history behind the great discoveries. This project focuses on four of the most famous contributors to electromagnetic theory: Charles Augustine de Coulomb, Carl Johann Friedrich Gauss, Michael Faraday, and James Clerk Maxwell. The display includes pictures and diagrams of their original apparatus, a brief personal history, an abbreviated listing of major contributions, a list of references and a time line to orient their lives to world events

MATHEMATICA: A PHYSICS STUDENTS HANDBOOK

Allen Brokken*

Dr. Maria Di Stefano, Faculty Mentor

71

In recent years the use of computers has made a large impact on how physics is done. To keep up with this technological trend the physics discipline has begun to integrate computer techniques into the curriculum. One of the most versatile tools is the computer program *Mathematica*. To help facilitate its introduction a tutorial has been developed. This tutorial is a step by step walk through many of the fundamental aspects of mathematics used in physics.

THE EFFECTS OF A FOREST CORRIDOR WITH RESPECT TO LATERAL STREAM CHANNEL MIGRATION

Jason C. Burckhardt*

Brian L. Todd, Missouri Department of Conservation, Mentor

72

A study was conducted to determine the relative rates of lateral migration of forested versus unforested stream banks. The rate of lateral migration of a stream channel can be calculated by determining the age and distance between successive stands of woody vegetation that are colonizing the corresponding point bar. Representative core samples were taken from the trees colonizing the convex stream bank. The cores were aged and the corresponding stands were placed into age classes. These age classes, when associated to their distances to other age classes, allowed for an accurate measure of lateral movement. The distance between age classes on a point bar with an unforested concave stream bank was greater than the distances between age classes on the point bar where the concave stream bank was forested. This suggest that stream channels with unforested stream banks migrate at a greater rate than forested stream channels.

DEVELOPMENT OF A RAPID ASSAY TECHNIQUE
FOR DETECTING URINARY PTERIDINE LEVELS
FOR MONITORING CANCER

Tim Busenhart

Dr. Yinfa Ma, Faculty Mentor

73

Urinalysis is fast becoming a new technique to monitor cancer levels. Pteridine levels, excreted in urine by healthy individuals, are found to be elevated in urine samples for patients with cancer, sexually transmitted diseases, and AIDS. Techniques to detect these pteridine levels have included High Performance Liquid Chromatography with Fluorescence detection. This research project is to develop a rapid-assay technique to detect urinary pteridine levels in cancer patients. An instrument, designed by the researcher, incorporated capillary electrophoresis and fluorescence to detect standard levels of pterins and those in urine samples. Standards were separated, by using different buffer systems. In the near future, we are going to use this method to quantify the pteridine levels in the urine samples of healthy and cancer patients.

ON THE TRAIL OF AN ELUSIVE CHAMELEON ENZYME

Eric Calhoun

Dr. Guy Thompson, Jr., Faculty Mentor

74

Acid phosphatase (AcP), an enzyme of eukaryotic cells, are mostly sequestered within lysosomes, for intracellular digestion, but strangely, AcP also seems to occur in both a membrane-bound form and a smaller, soluble, secreted form. This lab is interested in the secretion mechanism of acid phosphatase due to the ability of *Tetrahymena mimbres* (Tm) to suddenly secrete AcP when additional phosphate is needed. The present experiments were conducted to 1) determine if the protozoan Tm contains AcP bound to its outer membrane and 2) try to discover whether the membrane form is cleaved to the soluble form by proteolytic enzymes. At 10°C, we were able to slow AcP secretion and assay the cells' surfaces for AcP activity. It was observed that there was a considerable amount of activity on the cell surface (column 3 and 4 in Fig.2), and it was concluded that either acid phosphatase existed on a glycosylphosphatidylinositol (GPI) anchor or as a transmembrane protein. Past experiments have tentatively shown that the protein is not GPI anchor related. It was then decided to pursue the transmembrane possibility by looking for proteolytic activity that cuts the mature acid phosphatase to the soluble form. Cell homogenates were incubated at various pH conditions and for different time periods, and both membrane and soluble forms of AcP were assayed by measuring enzyme activity on electrophoretic gels. These experiments have yielded conflicting results, and the possibility exists that the right conditions for proteolytic cleavage have not been met. But we tentatively conclude that the soluble AcP does not arise through proteolytic cleavage of the membrane form.

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INVESTIGATION OF ULTRASONIC EFFECTS ON THE SEPARATION OF DNA FRAGMENTS IN AGAROSE GEL ELECTROPHORESIS

Aaron Cassely

Dr. Yinfa Ma, Faculty Mentor

75

Since its first use, agarose gel electrophoresis has become a useful separation technique in the analysis of nucleic acids. In particular the nucleotide sequence in DNA has become important to molecular biologists while limitations on electrophoresis are being discovered. Based on the theoretical behavior of DNA during electrophoresis and the properties of ultrasound, the effect of ultrasound on electrophoresis was previously studied. The results showed that at a specific transducer position and varying power outputs, the resolution in the separation of high range standard DNA fragments increased. This project was continued but the position of the transducer was altered and the frequency and power were varied. Due to present limitations of the experimental apparatus, more investigation is needed. If proved successful this technique will be applied to capillary electrophoresis.

ISOLATION OF DNA REPAIR MUTANTS IN THE SLIME MOLD, *DICTYOSTELIUM DISCOIDEUM*

Kevin Cook, Kathie Kunz, Christopher Meyer and Tamberlyn Stoneking

Dr. Michael L. Lockhart, Faculty Mentor

76

Our goal is to locate and sequence the slime mold gene(s) responsible for DNA repair. First, the wild type slime mold was mutated and tagged with a plasmid through Restriction Enzyme Mediated Integration (REMI). G418, an antibiotic for which the plasmid confers resistance, was used to select for slime molds which had integrated the plasmid. Next, replica plating was used to identify mutants which may have incorporated the plasmid into one of the genes responsible for DNA repair, as evidenced by increased ultraviolet sensitivity. Survival curves are currently being performed on the mutants which have shown sensitivity. In the future, mutants which have confirmed ultraviolet sensitivity will be sequenced. The gene sequence can then be compared with the human genome in order to locate the gene(s) responsible for DNA repair. This could eventually lead to treatments for cancer and other diseases caused by a failure of the DNA repair mechanisms.

COMPARATIVE POLLEN MORPHOLOGY
OF THE CALLITRICHACEAE: IMPLICATIONS FOR THE
EVOLUTION OF UNDERWATER POLLINATION

Ranessa L. Cooper

Dr. Jeffrey M. Osborn, Faculty Mentor

77

The Callitrichaceae, or water starworts, includes the single genus *Callitriche*. *Callitriche* consists of 50 terrestrial, amphibious, and obligately submersed species, and it is the only plant genus with co-occurring aerial, water surface, and subsurface pollination systems. This research focused on 12 species of *Callitriche*, including representatives of all growth forms. In this presentation, pollen morphology and ultrastructure are described using scanning electron and transmission electron microscopy. The pollen is compared with regard to the following characters: shape, size, surface ornamentation, apertural features, wall infrastructure, and wall thickness. Results confirm that the pollen of terrestrial and amphibious species has a well-developed outer wall layer (exine) present, whereas that of obligately submersed species lacks an exine layer. Correlative investigations focusing on pollination systems and pollen structure in *Callitriche* are rare. Therefore, the co-occurring systems within the genus provide the unique opportunity to study the evolution of underwater pollination.

X-RAY IMAGING THROUGH COMPUTED TOMOGRAPHY

Morgan Dawdy

Dr. Eduardo Velasco, Faculty Mentor

78

This project's focus is of writing and implementing computer code that uses information provided by x-rays to determine if a two-dimensional image of a target Computer Aided Tomography (CAT) is capable of producing images of great detail. Its purpose is to construct, by passing a series of rays through the target and using simple methods of inversion, a matrix of absorption coefficients. There are many possible images consistent with the data. We want to develop different algorithms to study some of the images they produce. Our purpose is to take into consideration the many possible outcomes and compare them using synthetic data so improvements to the algorithms can be made, allowing for better interpretation of the images.

UNDERSTANDING BOTANICAL STRUCTURE
THROUGH ILLUSTRATION

Bradford L. Day

Dr. Jeffrey M. Osborn, Faculty Mentor

79

Biological illustration integrates scientific observation and artistic ability. Illustrations are used in both textbooks and the primary literature as an important medium of research communication. This study involved the use of three types of illustrations to document several botanical specimens. Illustrations were created using pen and ink, utilizing a form of shading known as stippling. The first type of drawing focused on the development of *Brassica rapa*. Illustrations documented changes in gross morphology over the thirty-five day life cycle of this rapid-cycling plant. Secondly, details of *B. rapa* flower morphology were portrayed. The third illustration type depicted the three-dimensional structure of pollen grains. Drawings of pollen from three gymnosperm *Gnetum*, *Ephedra*, and *Eucommioides*, provide detailed information about overall shape, aperture type, and surface ornamentation. Different forms of illustration present a variety of challenges, but are invaluable learning tools; the ability to couple a picture with a concept enhances the opportunity for full comprehension.

EFFECTS OF GAMMA-INTERFERON AND RETINOIC ACID ON
MHC GLYCOPROTEIN EXPRESSION

S.M. Degler* and K.M. Eubanks-Meng

Dr. Diane Janick-Buckner, Faculty Mentor

80

Retinoic Acid (RA), a form of vitamin A, influences the immune response. Macrophages internalize and digest foreign antigens and express antigen peptide fragments on their surface in conjunction with major histocompatibility complex (MHC) glycoproteins. Class I MHC glycoproteins present antigen to cytotoxic Tcells, activating them to seek out and lyse altered self cells. Class II MHC glycoproteins present antigen to helper T-cells which results in their induction of proliferation and differentiation of other immune system cells. The magnitude of the immune response has been previously correlated with the level of MHC expression on antigen presenting cells (e.g., macrophages). Gamma-Interferon (gamma-IFN), a protein secreted by activated helper T-cells, activates macrophages and also enhances expression of both class I and class II MHC glycoproteins on their cell surface. Our goal was to determine whether RA alone or in combination with gamma-IFN modulate the expression of class I and class II MHC glycoproteins on the surface of macrophages. WEHI-3 cells, and J774A.1 cells, macrophage-like cell lines, constitutively express class I MHC glycoproteins, but express little or no class II MHC glycoproteins. However, class II MHC glycoproteins can be induced by gamma-IFN on the cell surface. Cells were treated with different levels of RA (10^{-8} M, 10^{-10} M, 10^{-12} M) and gamma-IFN (50U/ ml) alone or in combination. Class I and class II MHC glycoproteins were immunofluorescently labeled and

then analyzed by using a fluorescence activated cell sorter. We found that gamma-IFN alone enhanced MHC glycoprotein expression on the surface of WEHI-3 and J774A.1 cells. At all concentrations tested, RA appeared to slightly affect the expression of class I MHC glycoproteins. When used in combination with gamma-IFN, RA was found to alter the effect that gamma-IFN alone had on WEHI-3 and J774A.1 cells. RA may be influencing the immune response by modulating the expression of MHC glycoproteins on macrophages.

PREY CAPTURE AND SWIMMING BEHAVIOR
OF THE ARROWWORM *PARASAGITTA ELEGANS*
(PHYLUM CHAETOGNATHA)

Laura E. Foster and Angela M. Lohse

Dr. George L. Shinn, Faculty Mentor

81

Chaetognaths, planktonic marine worms, feed on crustaceans first by using ciliary vibration receptors for detection and then capture prey using grasping spines. *Parasagitta elegans* was studied using video-photography while feeding on brine shrimp larvae. The arrowworms were motionless prior to prey capture and then seized prey that were 0.05 mm to 1.15 mm away. Prey were never pursued and larvae encountered during swimming were never attacked. Since many species of chaetognaths have ciliary vibration receptors, our observations may lead to the generalization that chaetognaths are sit-and-wait predators. Furthermore, *P. elegans* has floatation cells that regulate sinking at an average of 0.51 mm/sec, 9x slower than *Ferosagitta hispida*, a related species without these cells. On average, *P. elegans* spends 1.5% of the time swimming, whereas *F. hispida* spends 10%. Enhanced floatation in *P. elegans* presumably increases the time available for feeding and minimizes the amount of energy required to stay in the water column.

BOUNDARY CONDITIONS FOR THE SKYRME MODEL
WHEN CYLINDRICAL SYMMETRY IS ASSUMED

Gerald J. Good

Dr. Peter Rolnick, Faculty Mentor

82

The Skyrme model is a field theory which can describe nuclei in the low energy limit of Quantum Chromodynamics. In the original model proposed by T. Skyrme, radial symmetry of the field is assumed and one baryon is considered. In order to study multiple baryon systems, where radial symmetry is not assumed, I will present a new environment and boundary conditions for the case where the field exhibits cylindrical symmetry.

VIBRATIONAL MODES OF CANTILEVERED BEAMS
AND WEDGES

Jason Gower

Dr. Ian M. Lindevald, Faculty Mentor

83

The normal mode vibrations of woodwind instrument reeds are more closely related to the vibrations of rigid one or two dimensional structures than they are to the more commonly studied flexible strings and membranes. The detailed geometry and small size typical of woodwind reeds adds complications to our ultimate goal of measuring normal modes of real reeds. As a preliminary study, we have measured normal mode resonant frequencies of several large cantilevered beams of various dimensions in order to investigate scaling properties in a way that allows comparison with predictions of simple models. The system is driven with a magnetic oscillator exciting resonant frequencies which are then detected using a surface-mounted one-dimensional accelerometer and analyzed either with an oscilloscope or with a spectrum analyzer. We have observed several resonant vibrations that are not included in the predictions of one-dimensional beam theory and which may indicate the onset of two-dimensional vibrations. Using the same experimental techniques, we have now begun to study cantilevered wedges which more closely approximate the true geometry of a standard reed.

POLLEN WALL MORPHOLOGY IN *CABOMBA CAROLINIANA*
(CABOMBACEAE): AN ONTOGENETIC STUDY

Benjamin L. Gutman

Dr. Jeffrey M. Osborn, Faculty Mentor

84

The waterlily *Cabomba caroliniana*, or fanwort, occurs in subtropical to temperate regions of eastern North and South America. The species is also cultivated as a popular aquarium plant. In this presentation, the details of pollen and anther development are described. Pollen was examined at stages progressing from undifferentiated sporogenous tissue to mature pollen grains. The ontogenetic timing of the following events were documented: differentiation of microspore mother cells, appearance of a callose wall, division into tetrads, formation of an aperture, and formation of the pollen wall. Features of anther development that were studied included: number and size of anther wall layers, appearance of endothelial thickenings, changes in tapetum morphology, and timing of tapetum dissociation. This is the first study to utilize electron microscopy in an investigation of pollen development in either *Cabomba* or any other member of the family. The new ontogenetic data are discussed as they relate to evolutionary interpretations of this reputedly primitive aquatic angiosperm.

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CHARACTERIZING PROLINE OXIDASE FROM PLANT MITOCHONDRIA

Brandon Hamm * and Eric Chatt

Dr. Gary Sells, Faculty Mentor

- 85 Previous studies have delineated that drought stress results in a logarithmic decrease in proline oxidase activity. This has been firmly established by Sells and Koppe (1981), K. J. Lee (1995) and by recent studies by Robinson and Whatley-Connell (1996). The cause of proline inhibition is unknown so we have set out to use electrophoreses to determine if there are any changes in succinic dehydrogenase and proline oxidase during stress. Thus far our attempts have been partially successful. There have been three bands for succinic dehydrogenase on agarose gels. Further modifications in techniques and strategies include altering the pH, using fresh mitochondria, and using acrylamide gels as well as agarose gels for isolating these two enzymes. Results obtained may provide a means to determine the nature of proline inhibition that occurs during drought stress.

IN-SITU DOXS PROCESS

Jay Hendren

Dr. Dana Delaware, Faculty Mentor

- 86 For the fall semester of 1995, I participated in a Co-op with American Cyanamid Company and NMSU. It was the first of three sessions. My main job was to help with the chemical development of in-situ DOXS. American Cyanamid Company currently is purchasing the starting material, DOXS in the solid form, from a company in Japan. Through a series of reactions, DOXS is converted into Scepter®, a herbicide for soybeans. Research is underway to develop an economical and safe method to make DOXS within the company. One reason for this research is to save the company initial overhead costs. Another reason is to eliminate small traces of benzene remaining in the DOXS that is purchased from Japan. Benzene has been banned from use in the United States due to health risks.

METALLOPORPHYRINS AND DNA

Amy Hurd

Dr. Dawood Afzal, Faculty Mentor

- 87 Metalloporphyrins are flat, ring-shaped macrocyclic molecules. They can be used as footprinting agents for other molecules including drugs. Currently metalloporphyrins such as Co-meso-tetrakis(N-methylpyridinium4-yl) are used in cancer research. Copper, nickel, and zinc porphyrins, among others, bind to DNA changing the chemistry of the DNA molecule. Adenine/thymine or guanine/cytosine specificities are determined by the

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specific metal and the porphyrin ring. The amount of steric hindrance and the charge of the macrocycle also affect porphyrin-DNA binding. A literature search and current research regarding these subjects shall be presented.

INVESTIGATION OF LEAD AND CADMIUM LEVELS IN ROADSIDE RHODODENDRON LEAVES IN BERGEN, NORWAY, UTILIZING MULTIVARIATE ANALYSIS

**Julia M. Hurst*, Adam R. Yeager*, Paul Johan Hol, Andrew J. Gawron,
Rolf Isrenn**

Dr. Dean Van Galen, Faculty Mentor

- 88 Rhododendron leaves were collected from ten sites in Bergen, Norway and analyzed for lead and cadmium by graphite furnace atomic absorption spectrometry. The data were subjected to multivariate analysis to examine the relationship between measured metal concentrations and variables including relative traffic density, distance from the roadside, and location of leaves on the plant, as well as the effect of $(\text{NH}_4)_2\text{EDTA}$ washing of the leaves. Using principal component analysis, it was possible to separate the ten sites into two classes (polluted and less polluted) of five sites each. Lead levels were found to be highly correlated with traffic density, and rhododendron leaves appear to be excellent bioindicators of roadside lead pollution. Cadmium levels were not strongly correlated with traffic density, suggesting that traffic is not a significant source of cadmium deposition in the city. This research experiment was part of a study-abroad experience in cooperation with the University of Bergen.

RECOVERY OF AQUATIC INVERTEBRATE COMMUNITIES IN SMALL DRAINAGES ON STRIP-MINED LAND

Christian Hutson and Scott Showers

Dr. Donald Kangas, Faculty Mentor

- 89 In the past 15 years Dr. Kangas has sampled more than 200 small stream stations on lands which were scheduled to be "strip-mined." Most of the areas have been mined, refilled, recontoured and planted for reclamation. New drainages have developed and intermittent streams and pools formed on the reclaimed land. Fourteen stations on these new drainages were selected for sampling in early spring or summer of 1994. Drainage areas of sampled stations ranged from approximately 3 acres to more than 250 acres. Our purpose was to describe the recovery of invertebrate communities in these small drainages on the strip mine land. A total of 31 taxa were collected in these samples from stations which ranged from 2-years old to 9-years old (since mining). The taxa were mostly insects which have relatively short life cycles and the capacity (as adults) to fly from one station to another. In addition, two genera of gastropods were collected in the samples. These were probably introduced by birds moving through the area.

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The number of taxa per station ranged from one to sixteen, with a mean of 8.9 taxa per site. Numbers of taxa and types were consistent with the communities that existed before mining.

EDDY CURRENT DAMPING OF A DRIVEN OSCILLATING MAGNET

Erik M. Johnson* and **Allen P. Brokken***

Dr. Kenneth D. Hahn, Faculty Mentor

90

A magnet moving in the vicinity of a conductor will create electric currents (*eddy currents*) in the conductor. These eddy currents, in turn, produce a magnetic field which opposes, or damps, the motion of the magnet. This phenomenon results from Faraday's Law of Electromagnetic Induction and Lenz' Law. This project centers around the damped oscillatory motion of a magnet attached to springs. A drive coil connected to a function generator drives the oscillator through resonance. A pick-up coil and lock-in amplifier determine the amplitude of the magnet's oscillations. Placed near or inside metal tubes, the damping effect of the eddy currents causes a significant reduction in the oscillation amplitude. A theoretical model of the system, based on Maxwell's equations and the solutions to the damped, driven harmonic oscillator, has given excellent agreement with the data.

THE SYNTHESIS AND APPLICATIONS OF THE WATER SOLUBLE PORPHYRIN: TETRA-MESO-PYRIDIAL-PORPHYRIN, H₂-TMPyP

Patrick L. Kirchhoefer

Dr. Dawood Afzal, Faculty Mentor

91

Porphyrins in general and specifically water soluble porphyrins are of great importance to the field of biochemistry. Nucleic acids and nucleosides are a few of the many biological molecules that porphyrins interact with. Although both water soluble and water insoluble porphyrins are involved in these interaction, water soluble porphyrins are much more important and are the focus of this presentation. Complexes of porphyrins and transition metals, particularly Palladium(II), are of much interest in this area of research and were synthesized. ¹H and ¹³C NMR and visible spectroscopy are all methods used to characterize these products, and the results will be shown during the presentation.

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SPERM DEVELOPMENT IN *DROSOPHILA MELANOGASTER*: A COMPARATIVE STUDY

Gretchen M. Krueger

Dr. Janna R. McLean, Faculty Mentor

92

Segregation Distorter, abbreviated *SD*, is a meiotic drive system found in *Drosophila melanogaster*. Male flies heterozygous for an *SD* second chromosome generally produce at least 95-99% *SD* bearing sperm instead of the 50% expected. By electron microscopy this has been attributed to abnormal chromatin condensation and histone protein transformation in the *SD* flies. *SD* has been observed to primarily affect the condensation of chromatin in about half of the spermatid nuclei during the individualization and coiling stages of spermiogenesis. This project uses light microscopy to observe variations between the spermatogenesis of nomal flies and several *SD* strains. The sperm nuclei were strained with Hoechst 33258 to screen for possible abnormalities. Differences in the nuclei among the various *SD* strains have been observed and the preliminary findings will be presented. Funded by NSF/REU grant #BIR-9424223.

DEFINING OPERATING PARAMETER VALUES OF THE WEIMER AND SMITH OSCILLATING REACTION

Amy Jo Kruger

Dr. Kenneth N. Carter, Faculty Mentor

93

In the April '94 edition of the *Journal of Chemical Education*, authors Jefferey J. Weimer and Wayne L. Smith describe an oscillating reaction useful in demonstrating the principals of mass and heat transport. The procedure described uses a heated platinum wire to catalyze the combustion of methanol. Some steps in the procedure lack details, and the authors imply the possible need for adjustment of the procedure to attain acceptable oscillating behavior. The purpose of this research is to define the values of the operating parameters so those wishing to demonstrate this reaction have the information to do so successfully and efficiently. This research investigates temperature, shape of flask, height of platinum wire from the surface of methanol, and the size of the flask's orifice. Times between oscillations are measured with a stopwatch to gather data on reproducibility, and randomness of the oscillations. Observations from adjustments made in the procedure are used to define the values of the operating parameters yielding oscillating behavior.

NEITHER DUMB NOR DIFFERENT:
THE MYTH OF THE “SECOND TIER”

Matthew S. Lomax and David T. Woods*

Dr. Roger R. Festa, Faculty Mentor

94

In 1990, Tobias suggests that “the system” of science teaching in higher education is shutting out potential science majors from among non-science majors who enroll routinely in science courses designed for science majors. However, none of the students planted in these courses by Tobias have a stake in their performance in the classes and none are traditional college students. Using a bias-controlled group of traditional undergraduate non-science majors and methods similar to those of Tobias, we examine the responses of these students in a majors’ introductory chemistry course which each participating student needs to pass to complete the science requirement in a general education core curriculum. A random sample of similar students enrolled in an introductory chemistry course for non-science majors is evaluated for similar outcomes, and the results of these investigations are compared. In addition, longitudinal data from student evaluations of both courses are examined. The synergism of these results and outcomes suggests that there may be no basis for the “second tier” of would-be scientists proposed by Tobias. Further, it is suggested that motivation, interest, and cognitive ability play the greatest role in determining student disposition toward science courses, and that if interest is lacking even the most successful non-science majors in a majors’ course are unlikely to become science majors.

THE EFFECT OF MALE FLOWER AGE ON POLLEN VIABILITY
AND PROGENY PERFORMANCE IN *SILENE LATIFOLIA*

Jean Ly

Dr. Steven Carroll, Faculty Mentor

95

In *Silene latifolia*, a weedy member of the carnation family, individual plants produce female or male flowers, but not both. Male flowers contain 10 anthers (pollen producing structures), which generally do not open simultaneously. As a result, pollen is available to pollinators over a 2-3 day period. In an ongoing greenhouse experiment, we did a series of hand pollinations using pollen taken from 1-, 2-, or 3-day old flowers. Previously, we demonstrated that male flower age had a significant effect on mean seed mass, but not on seed number/fruit, seedling emergence time, or seedling dry weight. In the present study, we extended this work by comparing pollen from flowers of different ages on the basis of its stainability (an indication of viability) and its germination on a standard growth medium. Flower age did not have a significant effect on the proportion of pollen grains that took up stain. In addition, low pollen germination (likely a result of the particular germination medium we used) limited our measurements of pollen tube growth. On the basis of these experiments, we conclude that male flower age does not have a significant effect on early

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growth of resulting progeny. Future work will examine effects on later stages of offspring growth.

THE FOUCault PENDULUM

Jonathan W. Mallard

Dr. Mohammed Samiullah, Faculty Mentor

96

The Foucault Pendulum is a pendulum whose equations of motion are significantly affected by the Coriolis Force. This force is a result of the earth not being a true inertial reference frame. The exact solution to the equations which govern the motion of the Foucault Pendulum are unknown. To approximate the solution, a computer model of the Foucault Pendulum was constructed.

SYNTHESIS DIRECTED TOWARDS A PORPHYRIN BASED MOLECULAR WIRE

Ben Martin

Dr. Dawood Afzal, Faculty Mentor

97

As technology rushes towards miniaturization, the demand for smaller electronic components rises. Scientific advances now push this miniaturization to the molecular level. There have been numerous studies recently which have focused on the development of electrically conductive one-dimensional arrays which have been termed molecular wires. Organometallic polymers are ideal for this purpose due to inherent versatility in the design of organic frames coupled with the charge flow directing capability due to differing metal oxidation states. This study has focused on the design of a molecular wire that is composed of porphyrin moieties. Porphyrin, composed of an organic ring surrounding a metal atom, should serve as an ideal building block for the design of a conductive polymer. This work is based on the stepwise building of porphyrin using dipyrromethanes. Through careful stepwise addition of pyrrole and aldehyde to 1,4-bis-dipyrromethane, a phenyl bridged porphyrin dimer was synthesized. This is an exemplary reaction to show the utility of the dipyrromethane in molecular wire synthesis.

THE FINANCIAL CONDITIONS AND GROWTH POTENTIAL OF NORTHEAST MISSOURI FARMS.

Elisa Martin

Dr. Paul Armah, Faculty Mentor

98

The objective of this research project was to study the financial conditions and growth potential of Northeast Missouri (NEMO) farms. Interpretation

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of the results of a survey of 1500 NEMO farmers revealed that most of them are in poor financial conditions: their average rate of cash flow to equity is low and their debt to equity ratio is high. Despite the fact that they are loosing money in their operations, the majority of farmers have no intention of leaving farming for some other form of employment. However, many farmers are supplementing their income by working part time at jobs unrelated to agricultural production. Analysis of the growth potential of the NEMO farms revealed that their rate of growth is below the average for operations in similar industries.

REPRODUCTIVE ALLOCATION PATTERNS OF *LOBELIA SPICATA* ACROSS A SAVANNA/FOREST ECOTONE

Kelly McConnell

Dr. Steven Carroll, Faculty Mentor

99

Ecotones are regions of transition between structurally different plant communities. The savanna/forest ecotone is today preserved through active management because suppression of fire and natural herbivory have enabled canopy plants to overtake native savanna grasses. To determine the effects of a local savanna restoration project on reproductive allocation patterns in plants, we quantified characters including flower size and number, seed yield, and fruit set in four populations of perennial *Lobelia spicata*. One population was located in the open savanna, one was located under a closed oak canopy, and two were located in ecotone sites that were intermediate with respect to incident sunlight. Plants in savanna and ecotone habitats produced larger flowers and had greater seed yields than those under the canopy, suggesting that habitat restoration and management may affect the reproductive fitness and population dynamics of this species.

DISTRIBUTION OF ARGININE VASOTOCIN, NEUROPEPTIDE Y AND SEROTONIN IMMUNOREACTIVITY IN THE SUPRACHIASMATIC REGION OF THE GREEN ANOLE, *ANOLIS CAROLINENSIS*

Jason McCoy

Daniel Janik, Faculty Advisor

100

In rodents, the hypothalamic suprachiasmatic nucleus (SCN) is known to act as a circadian pacemaker. It also contains particular distributions of the neurotransmitters arginine vasotocin (AVT), neuropeptide Y (NPY) and serotonin (5HT), which are thought to be definitive in identifying this functional entity across vertebrate species. Several behavioral and physiological studies of circadian rhythmicity have been conducted using the lizard, *Anolis carolinensis*, but the identity of the SCN, or its functional equivalent, is unclear in this species. To determine its identity in this species, I examined the distribution of AVT, NPY and 5HT in its hypothalamus. There was a relatively dense plexus of NPY-immunoreactive neural fibers in the region

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corresponding to the Nissl-stained SCN. A diffuse pattern of 5HT was found throughout the hypothalamus. AVT immunoreactivity was found in the paraventricular and supraoptic nuclei with some fibers extending into the Nissl-stained SCN. The distributions of these transmitters show a pattern similar to that found in the SCN of rodents, suggesting that this area of the hypothalamus of *A. carolinensis* contains a homolog of the SCN.

COMPARISON OF EQUINE BODY WEIGHTS OBTAINED BY AN ARRAY OF METHODS

Arlene Nohilly*

Dr. Glenn R. Wehner, Faculty Mentor

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A Florida State University study (1995) showed that 100% of equine veterinarians and 94% of horsemen surveyed used live weights of horses for medication, feeding and management decisions. Only 10% of the veterinarians and 12% of the horsemen utilized scales. Guessimates by both groups usually underestimated live weights by an average of 185 lbs. This study was conducted to compare weights obtained by weight tapes (TW), heart girth X body length formula (FW), weight charts (CHW) and by a regression equation developed at NMSU utilizing a weight tape in the measurement (ATW). 6 horses of varying size were scale weighed, heart girth and body length measured and tape weighed over a 3 month period on a triweekly schedule. Horses were maintained on pasture with *ad libitum* hay and fresh water. Grain mixtures were hand-fed once daily. SW were greater than TW, CHW and FW by 5%, 21.5% and 25%, respectively. TW were higher than CHW and FW by 17.5% and 21%, respectively. CHW and FW methods were in the closest agreement varying by only 4.4% but both of these two methods yielded the lightest and most inaccurate weights. TW, CHW and FW methods significantly ($P < .05$) underestimated live weights.

PREPARATION, CHARACTERIZATION AND APPLICATIONS OF ALKANETHIOL-COATED AU NANOPARTICLES

Ken Patel*

Dr. Griff Freeman, Faculty Mentor

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The use of alkanethiols, such as octadecylmercaptan, to form self-assembled monolayers on flat macroscopic Au surfaces has become widespread. In our work, colloidal Au, containing spherical Au particles with varying diameters in the range of 5-50 nm, has been reacted with alkanethiols and other materials which form selfassembled monolayers on the spherical Au surfaces. The resulting solutions have been characterized via UV-vis absorption spectroscopy and transmission electron microscopy. We will report on methods for isolation and possible applications for these coated Au particles. Potential applications include the ability of these solutions to act as substrates for surfaceenhanced Raman scattering (SERS) and their

potential as packing material for high-performance liquid chromatography and capillary electrophoresis.

**α -EFFECTS IN METHYL TRANSFERS FROM ARYLDIMETHYL
SULFONIUM SALTS CORRELATE WITH SINGLE
ELECTRON TRANSFER CHARACTERISTICS**

Ken Patel

Dr. K R. Fountain, Faculty mentor

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The α -effect results in an increase in nucleophilic reactivity in S_N2 reactions. α -electrons neighboring the nucleophilic reactive site are suggested to contribute to SET character in the transition state. An experimental method was designed to investigate SET character transfer via a methyl transfer to the α -nucleophile, N-methylbenzohydroxamate anion, to a series of Aryldimethyl sulfonium salts substrates. Substrate salts of increasing concertedness (9-anthracyl \leftarrow l-naphthyl \leftarrow phenyl dimethyl sulfonium) were synthesized. Kinetic method used to determine the α -effect was a competition reaction with a 10 fold excess of reagent to substrate. A GCMS was used for separation, identification, and quantization of the reaction mixtures. The series of experiments performed indicated that the α -effect in methyl transfer involves SET character and the degree of concertedness is related inversely to the size of the α -effect in the reaction.

THE SYNTHESIS AND ANALYSIS OF METALLOPORPHYRINS

Ron Patel

Dr. Dawood Afzal, Faculty Mentor

104

There has been growing interest in the synthesis and analysis of metalloporphyrins. The porphyrin itself is composed of four units of pyrrole and four units of aldehyde. The metallation can take after the porphyrin has been synthesized. This interest in metalloporphyrins is primarily generated because of their growing applications in today's society. One particular interest is the metalloporphyrins interactions with DNA. These interactions are of importance because they are paving the way to new diagnosis and treatment in disease pathology. The main emphasis on this research project was synthesis and analysis of specific metalloporphyrins and the focus of this presentation will be the similarities and differences in the synthesis of nickel, copper, and zinc metalloporphyrins. The next segment of the presentation will concentrate on the analysis of these metalloporphyrins by using UV-visible and NMR spectroscopic techniques. There will also be a discussion on the future direction of the project. Some water-soluble porphyrins interact well with DNA fragments and our goal is to study the binding sites of copper, zinc, and nickel metalloporphyrins on DNA fragments. This approach deals with the synthesis of water-soluble metalloporphyrins which is currently taking place. These particular metalloporphyrins have been chosen because they interact well with DNA fragments in a

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water media and they actually serve as tracking devices to monitor the different reactions of the DNA fragments and its replication. Therefore, it is of great importance that the metalloporphyrins be of good purity for successful results.

COST ANALYSIS OF HOME HEATING

Matt Phoenix

Dr. Peter Rolnick, Faculty Mentor

105

A computer model is developed to model the heating of a typical home on a cold winter day. The model accounts for such factors as the insulation of the home, the efficiency of the furnace and the temperature inside and outside the home. We then analyze the cost of heating the home and make recommendations about how to most inexpensively heat the home at a comfortable level.

EFFECT OF WATER-STRESS ON ACTIVITY OF SELECTED ENZYMES OF MITOCHONDRIA ISOLATED FROM MAIZE SHOOTS

René Robinson and Adam Whaley-Connell*

Dr. Gary Sells, Faculty Mentor

106

For some time it has been known that proline accumulates in droughted corn plants. Previous studies by Lee (1995) showed that the activity of the proline oxidase enzyme in 0.2 M sucrose solutions dropped 50% when corn seedlings were water stressed. It has been hypothesized that the decreased activity of the proline oxidase enzyme could be due to inhibition of the enzyme itself and/or decreased transport of proline to the enzyme. To test whether the build-up is due to transport differences, this study measured enzyme activity in varying sucrose concentrations in droughted and nondroughted corn seedlings. Thus far, the percent of proline oxidase activity compared to activity of succinic dehydrogenase (which is unaffected by drought) in non-water stressed maize shoots has been 53.1, 54.4, 62.4, and 58.6 percent in 0.05 M, 0.1 M, 0.2 M, and 0.4 M sucrose solutions respectively. In contrast, the percent activity of proline oxidase became 21.7, 23.3, 13.7, and 11.4 percent, respectively in water stressed shoots at 0.05 M, 0.1 M, 0.2 M, and 0.4 M sucrose solutions. It appears that increased activity exhibited by proline oxidase from the droughted shoots when placed in lower sucrose concentrations (where the mitochondrial membrane is stretched) indicates that transport changes may be one factor that causes reduced proline oxidase activity in droughted plants. The possibility of enzyme inhibition cannot be fully ruled out; however, since there was still some proline oxidase activity in the droughted mitochondria when tested in the higher sucrose concentrations.

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P-ELEMENT MUTATION AND mRNA ANALYSIS OF STERILE *DROSOPHILA MELANOGLASTER*

Walter L. Roensch

Dr. Janna McLean, Faculty Mentor

107

There are many genes necessary for the proper development of embryos. One gene in the *SD* region of fruit flies (*D. melanogaster*), codes for a protein that is necessary for fertile eggs. I have mutants that have a lesion in one or both of two overlapping genes. Presumably one or both of these genes are necessary for embryonic development. My research consists of two methods to analyze the function of these genes: attempting to produce more mutants of this type by using P-element mutation and analyzing the mRNA of mutants already obtained. The mRNA is being analyzed by making a cDNA of the mRNA and amplifying the cDNA of the mRNA in question, to see if the mRNA of both genes are present in the sterile flies.

EVALUATION OF *BACILLUS* SPORES AS SURROGATE ORGANISMS FOR THE DETECTION OF *GIARDIA* CYSTS AND *CRYPTOSPORIDIUM* OOCYTS IN DRINKING WATER

Michael Rothermich

Dr. Gary Sells, Faculty Mentor

108

Giardia and *Cryptosporidium* are water born parasites that cause serious illness and sometimes death in humans. The only currently approved method of detecting these organisms in drinking water is a direct immunoflorecence method that is expensive, highly unreliable and takes 5-7 days to get results. In this study an alternate method, proposed by Rice et al from the EPA, was examined in which *Bacillus* spores, which are even smaller and more resistant to treatment than *Giardia* cysts and *Cryptosporidium* oocysts, were used as surrogates. The procedure is straightforward, inexpensive and results are obtainable in 22 hours. Water from the Missouri and Mississippi Rivers was examined and found to have sufficient endogenous spore concentrations to provide a quantitative basis for evaluation of this method. Results suggests that *Bacillus* spore concentrations are strongly correlated to turbidity, *E. coli* concentrations and heterotrophic plate counts in river water samples. However, these correlations were weaker in water sampled from farther into the treatment process, where the smaller, chlorine resistant, *Bacillus* spores were still found in measurable quantities. These preliminary results strongly indicate that this experimental method of examining water may provide a more discriminative test for evaluating the bacterial quality of treated water.

CEMENT KILNS' EFFECTIVE INCINERATION
OF HAZARDOUS WASTES

Charlene Schambach

Dr. Dana Delaware, Faculty Mentor

109

By reviewing newspaper articles from around the country, it was noted that many civilians were concerned that cement kilns burning hazardous waste for fuel resulted in hazardous products being formed. The cement industry has established that hazardous waste can be safely burned as fuel with all products of the procedure being nonhazardous according to EPA guidelines. Operating cement kilns must be tested approximately every three years to continue to renew their license to burn hazardous waste. This project involved understanding how a cement kiln works and then participating in the testing of two different kilns to establish their conformity with EPA regulations for safely disposing of hazardous waste. Both National Cement Co.(CA) and Lone Star Industries (IN) met the EPA requirements.

EFFECTS OF SELFING AND OUTCROSSING ON SEED
CHARACTERISTICS IN A WEEDY *HIBISCUS*

Joie Scott

Dr. Steven Carroll, Faculty Mentor

110

Hibiscus trionum, or flower-of-an-hour, is a weedy self-compatible member of the mallow family (Malvaceae). The plant's name derives from the fact that individual flowers open for only a few hours on a single day. These few hours provide the only opportunity for pollinators to remove and deliver pollen, suggesting the possibility either that seed production might be limited by insufficient pollen or that seeds will be produced primarily through self fertilization. In a field experiment, we compared seed number and mass for seeds resulting from three treatments: 1) hand pollinations using self pollen; 2) hand pollinations using outcross pollen; and 3) open pollination, in which flowers were available to insect pollinators. Seed number per fruit did not vary among these treatments. However, seeds resulting from outcross pollen were significantly heavier than those resulting from self and open pollination. Thus, it appears that outcrossed seeds may be more fit, but that self pollination may ensure full seed set in the event that outcrossed pollen is not available. Future work will compare the three treatments with respect to seed germination and seedling growth.

1,3-DINITROBENZENE ANALYSIS
IN THE TISSUES OF *CRYPTOTIS PARVA*

David S. Skibbe

Dr. Yinfa Ma, Faculty Mentor

111

1,3-Dinitrobenzene (1,3-DNB) is an important chemical intermediate used extensively in the manufacturing of dyes, explosives, plastics, and a number of drugs. This nitroaromatic contaminant has been identified in groundwater and soils near military munitions production and test sites. Some health problems that result from exposure to 1,3-DNB are methaemoglobinemia, nausea, and nervous symptoms. Therefore, the development of a reference method to monitor the DNB level in the soils, biological fluids, and tissues is of great importance to human health and to environmental researchers. Shrews (*Cryptotis parva*) were fed a supplement of 1,3-DNB, and the accumulation of 1,3-DNB was measured in the heart, liver, kidney, spleen, and brain tissues using high performance capillary zone electrophoresis. Evaporation tests have been carried out, and future goals include improving recovery and applying this technique to tissue samples. The results of this experiment may serve to establish subchronic toxicity data supportive of no observable adverse effect levels. It will also benefit the Department of Defense in their efforts to clean up military bases and proving grounds impacted by nitroaromatics.

MITOCHONDRIAL OXYGEN CONSUMPTION IN
PEROMYSCUS LEUCOPUS AND WHITE LABORATORY MICE

Kathy K. Smock

Dr. Michael Tannenbaum, Faculty Mentor

112

Mitochondrial Oxygen Consumption (MOC) is lower in hibernating animals compared to active animals. It is believed this reduction is due to a decreased demand for energy while in the hibernating state. Although much is known regarding the reduction of MOC in hibernators, there has been no research on rates of MOC in species that undergo shallow daily torpor, a state similar (but shorter than) hibernation. The goal of this research was to determine if there was a difference in MOC between torpid and active animals. Mitochondria were isolated from the livers of torpid and active *Peromyscus leucopus*, a species which enters torpor, and white lab mice, a species which does not enter torpor. MOC was measured at 30° and 20°C using a Clark Oxygen Electrode, while body temperature was measured telemetrically. No significant differences were found between torpid and active *Peromyscus*, suggesting a difference between hibernation and torpor at the cellular level. Furthermore, MOC in active *Peromyscus* vs. active lab mice was similar, suggesting that the ability to enter torpor may not require special adaptations at the mitochondrial level. Supported by NSF grant #BIR 9424223.

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DETERMINATION OF SERUM IRON BY KINETIC TECHNIQUES

Amy Spain

Dr. Yinfia Ma, Faculty Mentor

113

In light of the greater than six percent of Americans who suffer from iron-related disorders, a sensitive and convenient method for serum iron determination is needed. Current methods of determining the concentration of iron in serum demand that iron be split from binding proteins before measurement, requiring large samples and time-taking preparation. A better system for determination of unbound Fe(III) in blood serum is being developed using spectrophotometry and kinetic techniques. The reaction of indigo carmine (deep blue) with H₂O₂ to yield a colorless product is catalyzed by and is first order with respect to iron(III). Thus, various concentrations of iron(III) in the reaction system lead to different decolorization rates, which can be determined spectrophotometrically. Optimum reaction conditions were determined and a standard curve relating iron concentration to reaction rate was prepared. Serum samples are now being analyzed and accuracy of results tested using standard additions. Copper and Zinc interferences will also be studied.

THE EFFECT OF IMPATIENS SP. EXTRACTS ON THE DELAYED-TYPE HYPERSENSITIVITY REACTION CAUSED BY THE POISON IVY ANTIGEN, URUSHIOL

Mindy M. Steiniger*, Tom C. Leeper

Dr. Anne E. Moody and Dr. Diane Janick-Buckner, Faculty Mentors

114

Folklore has suggested that the extracts of the species *Impatiens pallida* and *Impatiens capensis* have an effect on the Delayed-Type (Type IV) Hypersensitivity response caused by the poison ivy antigen, urushiol. We propose that these extracts may affect this immune response by interfering with T-cell proliferation.

The bioactive components of the plant were extracted with water and ethanol at various temperatures as suggested by folklore. These extracts were further preserved by lyophilization. Two bioassays are being pursued to investigate the bioactivity of these extracts. First, a T-cell proliferation bioassay was developed. This bioassay has been optimized with respect to the number of cells isolated from the spleens of C57BL/6N mice, the type of mitogen used to initiate cell proliferation, various medium components, and the detection method. Second, a general toxicity bioassay using brine shrimp is currently being investigated.

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DNA FINGERPRINTING OF SOUTHERN FLYING SQUIRRELS, *GLAUCOMYS VOLANS*

Sarah M. Tofari

Drs. Cynthia L. Cooper and L. Scott Ellis, Faculty Mentors

115

The natural mating system of the Southern Flying Squirrel, *Glaucomys volans*, has been studied through field observations and protein (isozyme) analysis. Results of field analyses suggest *G. volans* has one of three types of non-monogamous mating systems. A sensitive method for paternity analysis is the use of DNA fingerprinting. Procedures were developed to isolate and analyze DNA from field samples. DNA was isolated from squirrel tissue through the use of Proteinase K, an enzyme that degrades proteins, and phenol/chloroform extraction which separates DNA from protein and lipid. Following isolation, the DNA was cut by restriction enzymes and the fragments were separated by gel electrophoresis. The DNA was transferred to a Nytran membrane and was detected by treating the membrane with an enzyme that bound to the DNA bands and formed either a colored product on the membrane or an image on X-ray film. Six different DNA detection probes are being compared for their effectiveness at detecting the DNA banding patterns (fingerprints) from *G. volans*. Knowledge of the mating system of this species will aid in the management of populations in Big Creek State Park, MO

THE EFFECT OF POLLEN COMPETITION ON SEEDLING EMERGENCE AT DIFFERENT TEMPERATURES

Tiffani K. Truitt

Dr. Steven Carroll, Faculty Mentor

116

Silene latifolia (bladder campion), a member of the carnation family, is a weed that grows throughout the northeastern U.S. This species has been widely used in studies of pollen competition, in which the intensity of competition among pollen grains for available ovules is manipulated. In a previous study in our lab, the time required for the emergence of seedlings from the soil was found not to be significantly affected by the intensity of pollen competition under which the seeds were produced. However, this result contradicts work done elsewhere. In an attempt to resolve this discrepancy, we subjected seeds to four different temperature regimes in greenhouse and growth chamber plantings. In none of these treatments was the time required for seedling emergence significantly affected by the intensity of pollen competition. We propose that population-to-population differences in seed germination dynamics likely account for the discrepancy between our results and those of others.

AN ANALYSIS OF BLUE COLOR VARIATION
IN THE BIRDFOOT VIOLET (*VIOLA PEDATA*)

Kevin F. Tulipana

Dr. Steven Carroll, Faculty Mentor

117

Blue color in flowers is caused by the pH-sensitive, three-ringed organic chemical, anthocyanin. Three factors can affect the hue of anthocyanin: 1) concentration, 2) number of substituent groups on the third ring, and 3) interaction with other pigments. Populations of *Viola pedata* (birdfoot violet) include two different plant types that differ in their flower color patterns. One flower type possesses five light blue petals, while the other possesses three light blue, and two dark purple petals. To determine if the blue and purple colors result from different anthocyanin concentrations or from structural differences in the pigment, infrared spectroscopy and spectrophotometry of petal extracts were performed and qualitatively analyzed. The data suggest that variation in *V. pedata*'s flower color is the result of concentration differences of the same anthocyanin. Further examination of *V. pedata* flower color is slated for this spring.

USE OF THE WORLD WIDE WEB
IN SCIENCE EDUCATION

Carolyn A. Turner

Dr. Brent Buckner, Faculty Mentor

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We have constructed a World Wide Web page to expand our Eukaryotic Molecular Genetics course beyond the confines of our university. The principle goals for the Web site are to: 1) provide a means through which alumni and other interested molecular geneticists can contribute to the development of the course by suggesting topics for discussion and research through use of our "hot topics" page, 2) connect with prospective students who are interested in taking the course by asking them to register in our guest book, 3) give students an opportunity to learn hyper-text markup language by including summaries of their molecular genetic interests in our Web site, 4) provide links to databases, biotechnology companies, and other interesting genetics sites. Through this Web site, we are opening a dynamic forum for scientific discourse that is not always attainable in the traditional classroom or laboratory.

THE TWIN PARADOX AS A METHOD OF TRAVELING
THROUGH TIME

J. Andrew Upchurch

Dr. Peter Rolnick, Faculty Mentor

119

The twin paradox is a situation in special relativity where, in essence, time travel takes place. The common treatment is that a twin traveling at near light speed goes forward in time compared to his earth-bound twin.

The amount of time travel that occurs varies depending on whether there is a sudden acceleration to a maximum velocity or a smaller acceleration spread out over a larger portion of the trip. We can compare the age differences of the twins for different ways that the traveling twin might accelerate, and then determine the manner which gives the greatest difference in age. I will demonstrate these time travel differences explicitly for the case of constant acceleration from the reference frame of the earth-bound twin. By comparing this with similar calculations for different accelerations, we can determine how to get the most age difference.

NATURAL PRODUCT ANALYSIS OF THE *GANODERMA TSUGAE*
MUSHROOM WITH COMPARISON TO THE
GANODERMA LUCIDUM MUSHROOM

Adam Yeager

Dr. Anne Moody, Faculty Mentor

120

Ganoderma tsugae is a mushroom that grows in the eastern United States and is a close relative of the Reishi mushroom (*Ganoderma lucidum*), which grows in Asia. Reishi has long been prized for its healing capacity, and the identification of those natural product components believed responsible for these health benefits has been actively pursued by many research groups. The present study hopes to find comparable natural product components in *G. tsugae*. The natural product components of the fruiting bodies of the mushrooms are removed using simple extraction procedures. The extracts are then subjected to various chromatographic methods, including column, thin-layer, and high performance liquid chromatography. Characterization of the natural products can be accomplished through various spectroscopic techniques.

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COMPARISON OF NONPARAMETRIC CONFIDENCE INTERVALS FOR ENDPOINTS OF CONDUCTOMETRIC TITRATIONS

James M. Young

Dr. Kenneth N. Carter, Jr., Faculty Mentor

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Establishing a statistical model for analysis can be a complex, error-prone process, which may throw away information. Nonparametric statistics combined with the ability of computers to handle computationally intensive algorithms, may lessen the number of assumptions, such as normal distribution, necessary to build a model. These algorithms may also allow more data to be used and produce more trustworthy estimates. Bootstrapping, a nonparametric method, is compared to standard parametric methods. Various methods to optimize efficiency and accuracy are discussed.

TREATING MENTAL DISEASES BY MANIPULATIVE MEANS: PSYCHIATRY WITHIN EARLY OSTEOPATHIC MEDICINE

Sarah Zapf

Dr. Philip Wilson, Faculty Mentor

122

Since A. T. Still founded osteopathy in the late nineteenth century, scores of publications have praised its ability to cure various ailments, including mental disorders. Manipulation, the distinguishing tool of osteopathic treatment, was also applied to the field of psychiatry. Osteopaths used manipulation to improve restricted circulation to the brain, the leading factor thought to cause sudden onset of mental diseases. In 1914, osteopaths Arthur Hildreth, Charles and Harold Still established the Still-Hildreth Osteopathic Sanatorium in Macon, MO, specifically to treat mental and nervous patients. A similar institution, the Durfur Osteopathic Sanatorium, was built in Amblin, PA in 1919. Using osteopathic treatments, these institutions reported a "cure rate" of more than 50%, significantly higher than that reported by non-osteopathic psychiatric institutions. Though recognized for their success, both hospitals closed later in the century as American psychiatry came under the influence of European psychotherapy and drug-based psychiatry.

Division of Social Science

THE EFFECTS OF ETHNIC MAKEUP ON COOPERATION AND COMPETITION IN THE PRISONER'S DILEMMA GAME

Shirley S. Arteaga

Dr. Terry Palmer, Faculty Mentor

123

Previous research has shown that Anglo-Americans tend to be individualists, emphasizing personal needs, whereas African-Americans, Asians and Hispanics tend to be collectivists, stressing group goals. The present study examined the cooperative and competitive responses of 114 college students of the afore-mentioned ethnic groups in the Prisoner's Dilemma Game. The participants were placed in either an ethnically heterogeneous dyad which consisted of an ethnic minority and an Anglo-American or an ethnically homogeneous dyad composed of two Anglo-Americans. Statistical analysis found significant differences between the Hispanic and Asian dyads. These results indicated that the mere presence of Hispanics increases cooperative tendencies among Anglo-Americans and that Asians have the opposite effect. There were no significant differences between the Anglo-American and African-American dyads.

THE INTERACTION BETWEEN ODORS AND MEMORY

Daniel Baack

Dr. Mark Hatala, Faculty Mentor

124

What is the relationship between odor and memory? Schab (1990) showed that the presence of one odor at encoding and recall has a positive effect on recall. Our study tried to expand on these results by pairing a list of fifty words with fifty odors. It was hypothesized that a long-term recall benefit would result from this pairing. Subjects performed a paired-associate task by linking the name of the odor with the to-be-remembered word by using them together in a sentence. The first independent variable was whether the subject received an odor or an odor's name at encoding. The second was whether or not the subject smelled the odors at recall. Subjects returned to recall the words at one and three weeks after the initial recall. The results confirmed the hypothesis that odors would improve memory.

ATTRIBUTES, MEMORY, AND CHOICE BEHAVIOR:
A TEST OF THE UNIQUE-FEATURES MODEL
WITH CONSUMER PRODUCT PREFERENCES

**Meagan K. Bonnell*, Daniel W. Baack, Ryan T. Parmenter,
& Katherine A. Milewski**

Dr. Mark N. Hatala, Faculty Mentor

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Based upon Tversky's Contrast Model of Similarity (Tversky, 1977), the unique-features model assumes that when people are comparing consumer products, they ignore features which are shared by both of the products (because they are not diagnostic) and concentrate on the features which are unique to each product. In this memory task, the product presented second has the advantage. This occurs because all of the products' unique features are present, whereas the features of the first product must be retrieved from memory. The purpose of this experiment was to better understand the function of the unique-features model. This involves determining whether uniform (all positive feature) unique-feature sets are preferred to mixed unique-feature sets; whether the discounting of common features is complete or partial; and whether the time between presentation of the first and second products is important. The results of this experiment are in accordance with the unique-features model. They confirm that subjects prefer uniform unique-features when making a preference decision, and that common features are being discounted from the preference decision because they are not diagnostic.

AGGRESSION IN RELATIONSHIPS: WHO'S DOING WHAT?

Susan Bucher

Dr. Judi Misale, Faculty Mentor

126

This study used a modified, 22-item subscale of the Sexualized Violence Questionnaire to assess undergraduates' sexually aggressive behaviors. Half the items presented males as aggressors; the other half assessed aggression by females. Further, half of each group of male and female participants rated the behaviors from their own perspective and the other half took the perspective of "most men" or "most women." The most interesting results of this research regard the effects for perspective. Participants in the "self" conditions rated themselves as less likely than most men or most women to engage in behaviors ranging from threatening to stop dating a partner who failed to give sex to psychologically or physically pressuring another to engage in sex. Interestingly, results also indicated—contrary to popular conceptions of males as the aggressor—that both genders contribute to relationship aggression, although subjects rated males as being significantly more aggressive overall than females.

SOUNDS LIKE A LINE SUCH AS *Izzy Ben* MIGHT WRITE:
THE GERSHWINS AND THE BOTKINS

Jason Clampet

Dr. Jerrold Hirsch, Faculty Mentor

127

George Gershwin emerged from Tin Pan Alley in the late teens and soon established himself as a creative force in American music. His brother Ira soon began working with him and their success was considerable. Around the same time George first started being heard? Harry Botkin, a cousin of theirs came from Boston to live with them in New York. Harry soon became quite close with George due to their shared taste in art. If Harry was George's able partner, Harry's brother Benjamin was the same to Ira. The letters between Harry and Ben and Ira and Ben reveal that Ben was a major influence on Ira's development as a writer. Ben went on to write numerous works concerning American folk history and became one of its primary theorists. Harry became an accomplished painter and with George's money, built an incredible collection of art. The relationship between the two sets of brothers, their similarities, and their importance to American cultural history are demonstrated through the letters between each other and their public acts as well. By contrasting the accomplishments and ideas of the Botkins and the Gershwins, the importance of these figures is apparent.

ATTITUDES TOWARD DISABILITY ISSUES BASED ON DISABLED
STATUS OF SURVEY ADMINISTRATOR

Brett Deacon

Dr. Michele Breault, Faculty Mentor

128

Attitudes toward persons with physical disabilities were investigated. 70 able-bodied participants (39 women and 31 men) were randomly selected from 2 public shopping centers to fill out a brief survey about their attitudes toward disability issues. The survey was administered by either an able-bodied experimenter or a wheelchair-bound experimenter. Even though the means moved in the hypothesized direction, independent groups t-tests did not yield significant differences between the 2 conditions. The data did not support the prevalent assumption that attitudes toward disabled persons are negative and prejudiced. Methodological limitations and theoretical implications are discussed.

AN EXAMINATION OF CONDITIONS
AFFECTING STUDENT HELPING BEHAVIOR

Debra J. Drenth and Audra R. Polen

Dr. Judi M. Misale, Faculty Mentor

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Many investigations document people's tendency to self-enhance, i.e., to show themselves in a favorable light relative to others. Previous research also demonstrates relationships between the cost of helping, affiliation with and empathy toward the person in need, and the likelihood people will help. The present study further examines how these variables affect helping and also explores the relationship between the self-enhancing bias and helping behavior. NMSU students rated the likelihood of lending notes to another student, Nathan, after reading a scenario in which Nathan's class attendance was varied, and the excuse for requesting the notes was either good, bad, or nonexistent. Participants made their ratings from either their own perspective or from the perspective of "most students." Results generally demonstrated the self-enhancing bias, moderated by information about Nathan's excuse and his attendance. Overall, NMSU students were more willing to help than not.

INTEGRATING SOURCES OF INFORMATION WHEN
APPRaising PERFORMANCE

G. Farrow*, S. Castro*, D. Drenth*, A. Hannah, D. Porter, & J. Curtner

Dr. Teresa Heckert, Faculty Mentor

130

This study is a preliminary attempt to see how individuals combine information from many different sources when completing a performance appraisal. Participants will be 20 undergraduate students who have taken a course in industrial/organizational psychology. They will assume the role of a supervisor in a fast food restaurant whose job is to rate the performance of 2 employees. Participants will examine index cards containing information from various sources about the particular employee's job performance. When participants feel they have enough information, they will conduct a performance appraisal. The total length of time each participant spends gathering information will be recorded as well as which pieces of information the participants use and in which order.

VALIDATION OF A TWO-SESSION DIAPHRAGMATIC
BREATHING PROTOCOL

Eric Greve and Ryan Parmenter

Dr. Fred Shaffer and Dr. Jerry Mayhew, Faculty Mentors

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A previous investigation of our two-session group diaphragmatic breathing protocol validated its effectiveness with healthy undergraduates.

Participants increased inhalation volume 35% (1565 to 2108 ml) and decreased respiration rate 50% (12.6 to 6.3 breaths-per-minute). The present study attempted to replicate and extend these results by using a metabolic cart. Twelve healthy undergraduates were trained to breathe diaphragmatically through their noses during two weekly 60minute group sessions, and were assigned daily exercises and charting. They were pre- and postassessed on inhalation volume, tidal volume, %ECO₂ (percentage of CO₂ in exhaled air), and respiration rate. Inhalation volume was measured using a 4000 ml Sherwood Medical Inc. Voldyne Incentive Inspirometer. The remaining measures were obtained using a Sensormedics 2900 metabolic cart. Inhalation volume increased 79% from 1108 ml to 1980 ml. A one-tailed *t*-test for correlated groups revealed a significant rise between pre- and post-assessment conditions ($t(11) = -3.15, p = .005$). Tidal volume increased 51% from 660 ml to 1000 ml. The %ECO₂ increased 16% from 3.3 to 3.8 percent. A one-tailed *t*-test for correlated groups revealed a significant rise between pre- and postassessment conditions ($t(11) = -3.15, p = .005$). Respiration rate decreased 31% from 17.31 to 11.98 breaths-per-minute. A one-tailed *t*-test for correlated groups revealed a significant rise between pre- and post-assessment conditions $t(11) = -3.15, p = .005$. A one-tailed *t*-test for correlated groups revealed a significant decrease between pre- and post-assessment conditions ($t(11) = 5.66, p < .0001$). This study replicated our previous findings and increased our confidence in this diaphragmatic breathing protocol.

PREDICTORS OF INHALATION VOLUME

Eric Greve and Katie Reinagel

Dr. Fred Shaffer, Faculty Mentor

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Clinicians use an incentive spirometer, which measures the volume of air inhaled during a single breath, to assess diaphragmatic breathing proficiency. This study evaluated the relationship of abdominal excursion (difference between maximum stomach expansion and contraction), respiration rate, and rib movement, with inhalation volume. Twelve healthy undergraduates were trained to breathe diaphragmatically using the nose during two weekly 60-minute group sessions, and were assigned daily exercises and charting. They were assessed one week after completion of training. Abdominal excursion and respiration rate were monitored using a K-S Industries strain gauge and J & J I-330 Physiological Monitoring System. Movement of the third and ninth ribs was calculated using a cloth tape to measure the difference between maximum expansion and maximum contraction. Inhalation volume was measured using a 4000 ml Sherwood Medical Inc. Voldyne Incentive Inspirometer. Participants were instructed to breathe diaphragmatically throughout assessment. Pearson product-moment correlations revealed that abdominal excursion was the only measure associated with inhalation volume ($r(11) = .794, p < .003$). Neither respiration rate nor third or ninth rib movement were correlated with inhalation volume. This finding is consistent with the observation that greater abdominal excursion produces larger inhalation volume. This study supports emphasis on abdominal excursion instead of respiration rate dur-

ing diaphragmatic breathing instruction and discourages measurement of rib movement using a cloth tape to evaluate training success.

CREATION OF A NEW NEEDS ASSESSMENT QUESTIONNAIRE

Aaron Hannah, Jennifer Curtner, and Danielle Porter

Dr. Teresa M. Heckert, Faculty Mentor

133

The Manifest Needs Questionnaire (MNQ) is one of the most popular needs assessment scales for the workplace. The twenty-item measure was designed to measure four social needs: need for achievement, affiliation, autonomy, and dominance. Numerous studies (e.g., Mayes & Ganster, 1983) have found measurement problems with the MNQ. The purpose of this study is to evaluate additional items for potential inclusion in a revised MNQ. Approximately four hundred undergraduate (NMSU) students completed a 60-item questionnaire, which consisted of the 20 MNQ items and 40 additional items. Factor analysis will be used to evaluate the items.

MOTHER-CHILD INTERACTIONS: AN ASSESSMENT OF ATTITUDES TOWARD DIFFERING TEACHING STYLES

Catherine Hougham, Andrew Revell, Stephen Walkup, Kimberly Kerlin

Dr. David Conner, Faculty Mentor

134

In the third year of a three part investigation, experimenters are currently examining mother's and their 8-9 year-old children's perceptions of differing teaching styles, based in part on the theories of Albert Bandura (modeling) and Lev Vygotsky (contingent interactions). Early parts of the study were spent developing videotaped segments depicting modeling and contingent teaching styles with age appropriate learners and easy or hard tasks. Currently, experimenters are recruiting and collecting data from 40 mother-child dyads to examine their behaviors and interaction styles during free play activities and experimenter specified tasks. In addition, participants are rating videotaped teacher-learner interactions based upon their personal attitudes toward those styles. Preliminary data analysis will be briefly discussed.

LOCUS OF CONTROL AND BELIEF IN PARANORMAL PHENOMENA

William Keller

Dr. Terry Palmer, Faculty Mentor

135

Belief in paranormal phenomena and its relationship to locus of control were studied in 45 university students. Participants completed a Belief in Paranormal Phenomena Scale (Tobacyk & Milford, 1983) and the Rotter

Internal - External Locus of Control Scale. Contrary to previous research, no significant correlation was found between belief in paranormal phenomena and locus of control. These findings support a recent trend in research that challenges earlier data which suggested belief in paranormal phenomena is significantly correlated to locus of control.

AUTOCORRELATION DISCRIMINATES BETWEEN DIAPHRAGMATIC AND THORACIC BREATHING

David Knight and Eric Greve

Dr. Fred Shaffer, Faculty Mentor

136

Diaphragmatic breathing protocols teach slow, regular excursion of the abdomen. The abdomen should gradually expand during inhalation and then gradually contract during exhalation. Clinicians do not routinely measure how closely patient abdominal movement matches a diaphragmatic rhythm. This study examined whether the autocorrelation of abdominal strain gauge tension values could assess breathing rhythm and discriminate between diaphragmatic and thoracic breathing patterns. Nine healthy undergraduates were trained to breathe diaphragmatically and thoracically during two weekly 60-minute group sessions. Participants were randomly assigned to one of two orders: diaphragmatic breathing, rest, thoracic breathing; or thoracic breathing, rest, diaphragmatic breathing. Strain gauge tension was recorded for three minutes (180 one-second measurements) during each condition. An autocorrelation (with lag 1) of the 180 tension values was calculated for each condition. (This computed the degree of association between adjacent values.) Each autocorrelation was significant at the .0001 level. Autocorrelation was 73% stronger during diaphragmatic (.759) than thoracic breathing (.438). A one-tailed t-test for correlated groups revealed that autocorrelation was significantly greater during diaphragmatic than thoracic breathing ($t(7) = -3.047$, $p <.009$) This study supported clinical use of the autocorrelation of abdominal strain gauge measurements to evaluate the rhythm of abdominal movement during breathing. Therapists should expect the autocorrelation of strain gauge tension values to increase as breathing shifts from a thoracic to a diaphragmatic pattern.

THE AUTONOMIC EFFECTS OF DIAPHRAGMATIC AND THORACIC BREATHING

David Knight and Jacqie Tesky

Dr. Fred Shaffer, Faculty Mentor

137

Clinicians often incorporate diaphragmatic breathing instruction in stress management programs. This practice may reflect the belief that a shift from thoracic to diaphragmatic breathing will produce autonomic changes like increased digital temperature and decreased heart rate and skin conductance level. This study examined whether diaphragmatic and thoracic

breathing patterns produce different autonomic effects. Twenty-four healthy undergraduates were trained to breathe diaphragmatically through their noses during two weekly 60-minute group sessions, and were assigned daily exercises and charting. They were assessed one week after completion of training. A J & J I-330 Physiological Monitoring System was used to measure abdominal excursion and respiration rate, and autonomic measures (blood volume pulse, heart rate, skin conductance level, and heart rate). Inhalation volume was measured using a 4000 ml Sherwood Medical Inc. Voldyne Incentive Inspirometer. Participants were randomly assigned to one of two orders: diaphragmatic breathing, rest, thoracic breathing; or thoracic breathing, rest, diaphragmatic breathing. Measurements were taken for three minutes in each condition. Blood volume pulse was 17% higher during diaphragmatic (6.01) than thoracic breathing (5.05). A two-tailed t-test for correlated groups revealed a significant difference between these conditions $t(23) = 2.267, p < .0165$. Conversely, skin conductance level was 16% higher during diaphragmatic ($18.50 \mu\text{mhos}$) than thoracic breathing ($15.95 \mu\text{mhos}$). A two-tailed t-test for correlated groups showed a significant difference between these conditions ($t(14) = 4.19, p < .0009$). These findings showed that diaphragmatic breathing produced weak and mixed autonomic effects on phasic measures (BVP and SCL) during a three-minute measurement period.

ANALYSIS OF IMF ADJUSTMENT PROGRAMS IN ZAMBIA

David Kunau

Dr. Emmanuel Nnadozie, Faculty Mentor

138

As the aftermath of the debt crisis of the early 1980's, African nations were constrained to adopt the International Monetary Fund's (IMF) reform programs. The extent to which these programs have been successful in adjusting and correcting African economies has been a subject of debate among economists. This analysis will attempt to evaluate the policy measures adopted by Zambia in the early 1990's under the IMF Adjustment Programs. The specific programs undertaken by Zambia are financial markets liberalization, the removal of import tariffs, the reduction of agricultural taxes and the privatization of public enterprises. GDP changes, debt reductions and improvements of the balance of payments will be used as indicators to determine the effects of the policies implemented on the overall economy. These assessments would help to suggest policy measures that can be implemented in order to improve the economy of Zambia.

FOREIGN EXCHANGE:
DETERMINANTS OF EXCHANGE RATES

Christina Lee and Yu-San Lee

Dr. Jane Sung, Faculty Mentor

139

The importance of the foreign exchange market in international trade explains why many economists have for decades concentrated on studying which factors influence the value of a nation's currency. The evolution of exchange rate models over the postwar period embodies a major shift in emphasis from the influence of real factors to that of financial markets. This paper examines the influence that interest rates, inflation and gross domestic product have on the exchange rate. The empirical findings support the economics standard theoretical claims of a positive relationship between exchange rates and interest rates and a negative relationship between exchange rates and both inflation and gross domestic product.

DECISIONMAKING IN THE WORKPLACE

Julie A. Lindstrom

Amy L. Otto, Faculty Mentor

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Our most significant disputes may occur at work. However, the best methods for resolving these disputes remain unclear. Previous research of workplace conflict indicates our perceptions are strongly influenced by organizational culture. This study experimentally tests the impact of three organizational culture variables shown in earlier survey research to influence perceptions of conflict. These variables reflect levels of communication, presence of formal systems for solving problems, and perceived rationality of relationships. Eighty subjects read one of eight workplace scenarios and completed a questionnaire to examine their perceptions of the conflict and possible methods for its resolution. Communication level affected subjects' judgements of the dispute the most. Subjects believing communications to be high were more likely to believe the dispute would be resolved, $F(1,76)=13.79$, $p < .05$, and that this would occur by talking informally with others involved, $F(1,76)=4.07$, $p < .05$. Further analysis will focus on how individuals decide that a conflict has occurred.

AYN RAND, OBJECTIVISM, AND MODERN ECONOMICS

Justin Lovenduski

Dr. David Gillette, Faculty Mentor

141

In her 1957 book *Atlas Shrugged*, Ayn Rand provides an in depth discussion of the philosophy of objectivism. This philosophy is deeply rooted in economics and Rand explores many issues which have remained at the forefront of modern economics and politics. *Atlas Shrugged* includes exami-

nations of the roles of capitalism, government, individuals, and business in modern society. The research includes comparisons of Rand's philosophy with the writings of several contemporary economists. The works of these economists provide both support for and arguments against objectivism in economics. The implications of this philosophy for ongoing debate on the tax system, government regulation, and social programs are also examined.

PRESIDENT HARRY TRUMAN
AND THE UNITED STATES SUPREME COURT

Jennifer Lunsford

Dr. Paul Parker, Faculty Mentor

142

Harry S. Truman is an important figure to the state of Missouri as well as an important national figure. His life, specifically the period he served as President, reveals much about our history and the political factors of Truman's Presidency. Each Supreme Court member has considerable influence on the future of the legal system's decisions in our society. Studying the nomination process of President Truman's four nominees allows the public to understand the variables which are often considered when determining future Supreme Court nominees. Harry Truman served as President during a period of great change in United States history, making his nominations all the more critical to our future. This study aims to provide relevant background regarding Truman's Supreme Court nominees, outline the nomination process, and reveal the factors surrounding each nomination.

CENTRALIZATION AND STANDARDIZATION
OF COMPUTING RESOURCES IN CITY GOVERNMENT

Ryan McCune

Dr. Candy Young, Faculty Mentor

143

The question of whether to centralize or decentralize is one that is familiar to both the political science and the computer science communities. Whether one is speaking of the decentralization of power—a measure often heralded by advocates of "reinventing government"—or the decentralization of computing resources, a concept promoted by systems administrators in terms of computer networking, the same basic tenets apply. This study is based on research conducted over the past nine months as a member of the City of Kirksville's Computer Assessment and Planning Committee. Even after volumes have been written about the importance of decentralization in state and local government, this case demonstrates the tendency for the bureaucrat to centralize even in the midst of a decentralization effort.

PSYCHOLOGICAL WELL-BEING CORRELATES WITH THE
MOTIVATION UNDERLYING AN INDIVIDUAL'S RELIGIOSITY

Michelle Metzger

Dr. Terry Palmer, Faculty Mentor

144

Previous studies indicate that extrinsically motivated religiosity, as opposed to intrinsically motivated religiosity, is a generally inconsistent predictor of psychological and physical health. The present study extends this by measuring the correlations between intrinsically and extrinsically motivated religiosity with one's self-esteem and life satisfaction. Twenty-five undergraduate members of the Baptist Student Union completed a survey rating their intrinsic and extrinsic religious motivation, in addition to their self-esteem and life satisfaction. Statements concerning these areas were rated on their truthfulness to the participant by a five-point Likert scale. Results show a positive correlation between one's life satisfaction and original intrinsic religious motivation. Furthermore, negative correlations were found between one's self-esteem and extrinsic religious motivation. These results indicate that people who are more religiously motivated from within tend to be more psychologically healthy.

PERCEPTIONS OF RACISM
AS A FUNCTION OF ETHNIC GROUP

James H. Meyer III

Dr. Judi Misale Faculty Mentor

145

This study assessed participants' attitudes and behaviors regarding racism. Students at Northeast Missouri State University responded to a scale which indicated, among other things, the ways racism is manifested on campus, their personal involvement in racist incidents/and classroom variables that reflect racism. Male and female AngloAmericans comprised half the group completing the scale; the remaining respondents were male and female African-Americans The data from these two groups, along with other longitudinal data using the same scale, indicate racism is not diminishing at NMSU. A consistent majority of students indicate that racism exists on campus. They report that racism is demonstrated more in psychological ways than in physical ways; however, the number of people reporting actual involvement in racists incidents is steadily increasing. Results also revealed interesting discrepancies between the two groups in the perception and assessment of racism. Implications for policy and procedure are discussed.

THE EFFECT OF GROUP MEMBERSHIP
ON MORALITY RATINGS

Katherine Milewski*, Nicole Siener, and Jason Marquart

Dr. Teresa Heckert, Faculty Mentor

146

Previous studies have shown that members of one group tend to view their members more positively than members of another group. Our experiment tested the hypothesis that members of a social sorority will rate immoral action of another person more positive if that person is in a sorority. Likewise, non-members will rate immoral actions of another person more positively if that person is a nonmember. We found non-members rated immoral actions of non-members less positively than immoral actions of sorority members. Sorority members rated immoral actions of members less positively than immoral actions of non-members. We are gathering more data to assess additional characteristics.

POLITICAL CHAOS: WHAT POLITICAL SCIENTISTS
CAN LEARN FROM JURASSIC PARK

Paul Mortensen

Dr. Keith Doubt, Faculty Mentor

147

Chaos theory shows promise for addressing some of the serious predictive problems traced by political scientists employing standard empirical scientific methodologies. The behavioral revolution of the early 20th century ushered in a rigorous, scientific approach to the study of politics which emphasized empirical observation, statistical analysis, and strict objectivity. However, applying these rigors to the complex political system has proved difficult. Michael Crichton's popular novel *Jurassic Park* provides the framework for reviewing many of the problems researchers have experienced and suggests ways in which chaos theory may offer solutions.

NEW INSIGHTS ON COUPLES LIVING TOGETHER
BEFORE MARRIAGE

Juanita Myles

Dr. Teresa Heckert, Faculty Mentor

148

Cohabitation, or living together, before marriage has often been looked upon negatively. The purpose of this study was to assess student attitudes toward living together and marriage. A survey was conducted on the campus of Northeast Missouri State University. Students were asked to fill out a survey and told that their responses were confidential. It was found that the majority of students surveyed felt that cohabitation before marriage was acceptable. On the other hand, students opposed to cohabitation listed, on average, several reasons for their attitude. Results, also, indicated that single

students had different attitudes toward cohabitation outside of marriage than students in relationships.

PHYSICAL AND VERBAL INITIATION
AMONG COLLEGE MEN AND WOMEN

Juanita Myles

Dr. Teresa Heckert, Faculty Mentor

149

Differences in physical and verbal contact have been widely associated with different sexes. This study tested the widely held assumption that males are more likely to initiate physical contact and females are more likely to initiate verbal contact when in a social situation with the opposite sex. A total of twenty opposite sex couples were observed on the campus of Northeast Missouri State University. A checklist was used to record the different possible contacts, including hugging, kissing, touching, and talking. Results indicated that males were more likely to initiate physical contact and males and females were equally likely to initiate verbal contact.

MEDIA EFFECTS ON PERCEPTIONS OF RAPE VICTIMS

Rebekah S. Oehring* and Jennifer R. Wheelehon

Amy L. Otto, Faculty Mentor

150

Television movies frequently show women as victims. Research indicates that these films raise empathy. Recently, however, there have been numerous films which depict women as perpetrators (WP), rather than victims of violence (WV). This study explores whether WP films negate positive effects of WV films and possibly produce strong negative reactions against female victims in individuals viewing films of both types. Subjects were randomly assigned to one of two experimental groups. Group 1 viewed a WV film, then a WP film, and finally a videotaped rape trial. Group 2 viewed the WP film followed by the trial. Preliminary results indicate that Group 1 subjects were less upset by the WP film, $F(1,10) = 5.57$, $p < .05$, believed the rape victim suffered less physical harm, $F(1,10) = 4.18$, $p < .10$, and, most importantly, believed the victim deserved to be raped ($F(1,10) = 3.43$, $p < .10$). Our results support the idea that media depictions of crime victims pose a potential problem to the courts.

ASSESSING PREHISTORIC POLITICAL DEVELOPMENT
AND EVOLUTION THROUGH ART

Christina M. Phillips* and **Ralph M. Rowlett**

Dr. Ralph M. Rowlett, Faculty Mentor

151

Fisher, using ethnography, detected predictable psychological relationships between perceived political conditions and the structuring of artistic embellishment. Robbins and Dressier, using intact archaeological pots, confirmed the applicability of the method to archaeology, although little further application has occurred. Here it is applied to stratified potsherds from the Iron Age town of Titelberg (Luxembourg), dating from ca. 250 BCE until ca. CE 400. Political perception at various phases of well-understood Roman Imperial authority (CE 1-200, 300-400) serve as internal controls to verify the principles established by Fisher, Robbins and Dressier for determining historical political development. The data are genderized since the sample includes ceramics made by presumably identifiable female and male potters. This genderization permits comparison of female and male perceptions of prehistoric political processes.

HIV STATUS AND DATING:
A CONTENT ANALYSIS
OF GAY MALE PERSONAL ADVERTISEMENTS

Ryan T. Parmenter*, **Daniel W. Baack**, **Todd Sievert**,
Meagan K. Bonnell, & **Katherine A. Milewski**

Dr. Mark N. Hatala, Faculty Mentor

152

Although personal advertisements are very popular in the gay community, psychological research on personal advertisements has concentrated almost exclusively on the heterosexual community (Gonzales & Myers, 1993; Harrison & Saeed, 1977). This study examined the content of HIV-positive and HIV-negative gay male personal advertisements, both in terms of what the placers of ads are willing to disclose about themselves, and what they are seeking in others. Results supported the hypotheses that HIV-negative men would be more likely to stipulate what characteristics they were seeking in a partner, while HIV-positive men would be more likely to disclose health information. An unexpected finding was that HIV-positive men were more likely to explicitly seek someone with a good sense of humor.

SELF-REPORTED AGEISM AND PERCEPTIONS
OF ELDER ABUSE: A STUDY OF YOUNG ADULTS

Kathleen Reinagel* and **Renee Byers**

Dr. Sherri Palmer, Faculty Mentor

153

The growing number of elderly persons in the United States has brought the issue of elder abuse to the attention of those concerned with the welfare of this segment of our population. In this study, the Braithwaite, Lynd-Stevenson, and Pigram (1993) questionnaire of ageism and the Moon and Williams (1993) 13-scenario measure of elder abuse were given to 53 university undergraduates to determine if a relationship exists between the participants' views toward the elderly and their perception of elder abuse. This study found that (1) attitudes toward the elderly and awareness of ageism in society and (2) attitudes toward the elderly and frequency of contact with the elderly were positively correlated, while attitudes toward the elderly and perception of elder abuse were not significantly related.

POLITICAL PARTICIPATION
AS A FUNCTION OF SEXUAL IDENTIFICATION

Jay David Terwilliger II

Dr. Candy Young and Dr. John Ishiyama, Faculty Mentors

154

This paper addresses an area which has previously not been investigated in the study of political participation, by nonheterosexuals. Specifically, non-heterosexual males are studied to see if their sexual preference affects their level of political activity. The null research hypothesis for this study is non-heterosexual males are no more politically active than heterosexual males. My research will use data from 1988 to 1993 to determine if there is evidence to disprove the null hypothesis.

Phi Alpha Theta History Symposium

ETHNIC DIGNITY IN THE MELTING POT: ITALIAN-AMERICAN MISCONCEPTIONS AND MANIPULATIONS OF FASCISM

Angela DiCostanzo

Dr. Mark Hanley, Faculty Mentor

155

In the 1920s and early 1930s, Mussolini and Italian Fascism were admired by many Americans. At the same time, Italian-Americans and other immigrants were unacceptable in the nativist American environment. Wealthy, well-established Italian-Americans sought to benefit from the temporary approval of Mussolini and the new Italy. The Italy America Society (an organization of prominent Italian-Americans and Americans) published first the *Italy America Monthly* and later the *Italy America Review* in order to promote a positive image of Italy and Italians in America. They presented Italy as both a timeless land of civilization, art, and literature and as a modern, innovative nation. Their praise of Mussolini was not an avowal of fascist ideology: given their limited understanding of fascism, it represented merely another example of Italian greatness which could improve their status in America. The achievements of Fascism proved the worth of Italians as a people – and their potential to become valuable American citizens.

A MEMORY UP IN SMOKE: A LOOK AT THE COAL MINING INDUSTRY IN THE KIRKSVILLE AREA

Brant Donis

Dr. Robert Cummings, Faculty Mentor

156

Many do not realize the importance of one of the Kirksville area's largest industries, coal mining. The abundance of coal in the late 1800s and early 1900s stimulated the growth of Kirksville and Novinger especially. Yet with the closing of the coal mines, the history has faded into memories and a few texts. Looking at the mines offers an insightful glimpse into the settlement of the region and helps us understand the growth of the Kirksville area that few other events allow.

WOMEN, WHEELS, AND POP CULTURE:
DISABILITY AND ITS EFFECTS ON SELF-IMAGE

Courtney Gillenwaters

Dr. Martha Edwards, Faculty Mentor

157

Through the 1940s and 1950s, society and mass media created an image for women. They were the wives, the mothers, and the sisters of the nation. Pop culture gave society a clear image of what the perfect American woman was supposed to be. Donna Reed, June Cleaver, and Harriet Nelson were broadcast into American homes each week. Well-kept and able-bodied was the norm for these television women. Women were supposed to cook, clean, and raise the children without a hair out of place. It was these popularized images of womanhood that little girls wanted to attain when they grew up. Something, though, lurked in the corners of everyone's mind that threatened both appearance and ability. It was poliomyelitis, infantile paralysis. With the coming of polio, these roles and images created for women were in danger.

EXECUTIVE ORDER 9981:
THE SUCCESS OF A. PHILLIP RANDOLPH

Jason Marquart

Dr. Mark Dalhouse, Faculty Mentor

158

African Americans have served in every major U.S. conflict since the Revolutionary War; yet before 1948 they did not serve as equals. African Americans in the U.S. Armed Forces fought in segregated units, were trained in separate battalions, and were rarely awarded higher commissions.

A. Phillip Randolph believed that the desegregation of the military was essential to the civil rights movement, claiming that it would be particularly hard for the African American soldier to return to a discriminatory civilian society. In 1943, Randolph spearheaded the movement to desegregate the U.S. Military by first appealing to Franklin Roosevelt and finally, Harry S. Truman. Through extensive campaigning, formation of active organizations, and the threat of non-violent protest by African American youth, A. Phillip Randolph was crucial to the authorization of Executive Order 9981, the mandate to desegregate the U.S. military in 1948.

UNDERGRADUATE RESEARCH SYMPOSIUM

THE SUPERPOWERS IN ANGOLA: FOREIGN INFLUENCE IN THE ANGOLAN CIVIL WAR

Chris Norton

Dr. David Hartsfield, Faculty Mentor

- 159 The late 1960s and early 1970s was a period of great turbulence and transition for many countries in Africa. During this time the long period of imperialism was ending and new countries were being born where old colonies existed. To complicate matters for these countries, political and military influence from the competing superpowers was taking place. Through this competition, many wars and revolutions erupted. One of the most controversial and involved wars took place in Angola. This paper analyzes the influence of the various superpowers and how their alliances and policies played their part in the development of Angola in the 1970s, affecting it for over a decade.

THE AMERICAN CHURCH GOES ABROAD: MORMON MISSIONARY WORK 1832-1900

James Thomas Nugent

Dr. Mark Y. Hanley, Faculty Mentor

- 160 The paper explores the relationships between the foreign missionaries of The Church of Jesus Christ of Latter-day Saints, potential converts, missionaries and clergy of competing faiths, and the authorities representing foreign and domestic governments during the period 1832-1900. It is the further object of the paper to examine the Mormon foreign mission with respect to the prevailing economic and social conditions of the period while at the same time focusing on the American nature of the movement. By 1900, missionaries of the Mormon Church had penetrated each of the habitable continents and many important island settlements throughout the world. Although each contact achieved varying degrees of success, the period 1832-1900 was characterized by steady growth. Overcoming many difficulties in the establishment of its world mission, The Church of Jesus Christ of Latter-day Saints has taken its place among the great religions of the world, due mainly to the leadership and determination of its early missionaries.

FAITH: KIRKSVILLE WOMEN OF THE 1920S

Brenda Seale

Dr. John Ramsbottom, Faculty Mentor

- 161 In the late nineteenth-early twentieth centuries, Kirksville and its surrounding regions was characterized by patterns of revivalism. But by 1920 only one-eighth of the adult female population in Kirksville was found to be in

church. If this was a time of revivalism, where were the women? The inaccessibility of church records can only account for a portion of the seven-eighths of women not in church. Concerning the earlier revivalism, either 1) Kirksville women were especially heathen before the revivals, 2) the revivals attracted large numbers to meetings but not to solid commitments, 3) the revivals caused more division than ecumenicalism (Kirksville was the “town of churches”), or 4) the revivals affected primarily men. To understand the affects of earlier revivalism, women in church were profiled to determine if any of the population was significantly missing from church records. Doctrines and attraction of specific denominations were compared.

THE CRUSADES: NOT JUST A HOLY WAR

Ryan Totten

Dr. Martha Edwards, Faculty Mentor

162

The Crusades were a bloody time in human history full of triumph and tragedy. They consisted of eight military campaigns by Europeans whose ultimate goal was to wrest control of the Holy Land from the Muslims. The chaotic situation in the Middle East between Christians, Muslims, and Byzantines created a huge conflict caused by many factors in addition to the desire for control of the holy land. Economic conditions everywhere were harsh and this war was seen as a path to accumulating vast wealth, riches, and land. Political strife at home and abroad urged people to seek their fortunes and glory in unfamiliar lands, hoping to attain a higher station in life. Social motivations came from the church, and specifically, the various popes in power. The pope served as a rallying force to get people to fight and die for the church in the name of a righteous cause to free the Holy Land from Muslim control. Kings urged their people to fight to show their national pride and to unify all of the Europeans against a common foe. All of these factors show that people throughout Europe were tired of the same old routine and wanted something new and exciting to believe in.

THE FATE OF THE FORTUNE-TELLERS

Dawn Vogel

Dr. David Robinson, Faculty Mentor

163

Throughout history, the racial group known to the world as the Gypsies or Romani has been the subject of much persecution. There are two time periods which stand out in the history of the Gypsies for having profound impact on their entire “race” - early industrialization in England, and World War II in Germany. While the Gypsies of these periods had very little in common other than their ancestry, they faced persecution for similar reasons. The Gypsies did not fit into the popular view of what society should be, and therefore had to be either assimilated or eliminated. By comparing and contrasting the attitudes towards the Gypsies in these two eras, this paper attempts to show how similar and different attitudes were expressed towards the same group of people, a marginal group, although separated by time and geography.

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