

NORTHWEST MISSOURI STATE UNIVERSITY

ABSTRACTS OF COMPLETED RESEARCH PROJECTS APPROVED BY FACULTY RESEARCH COMMITTEE PERIOD 2002-

Northwest Missouri State University budget grants for Faculty Research began in 1974. Since that time, approximately 328 research proposals have been funded. The authors, titles, dates funded and abstracts are as follows:

Abstracts

“CHARACTERIZATION OF FACTOR(S) PRESENT IN BITTERMELON (MOMORDICA CHARANTIA) THAT CAUSE DELAY OF TUMOR DEVELOPMENT IN LINE 69-2F WAP-RAS MICE”, AND “EFFECTS OF TAMOXIFEN, VITAMIN E, INTERLEUKIN-2 OR THEIR COMBINATION ON THE DEVELOPMENT OF TUMOR IN LINE 69-2F WAP-RAS MICE.”

“CHARACTERIZATION OF POWDERY MILDEW DISEASE RESISTANCE FACTOR(S) IN CUCUMIS MELO VAR. SWEET THING HYBRID.”

PI: Alejandro Ching Jr., CoPI: Rafiq Islam CoPI: David Smith

From bittermelon seeds, using Cibacron blue matrix we were able to purify a protein that was determined to be 30 kDa by SDS-PAGE. Characterization of this protein as the factor for tumor delay was not complete as Dr. Smith, who was working on this part of the project, left for a year on sabbatical. The following year when he returned, he decided to retire and take a teaching position at a medical school on the Caribbean.

We isolated mitochondria from the seeds of Cucumis melo var. Sweet Thing hybrid as well from the parents. Following isolation, the DNA from each variety was PCR amplified using 20 random primer sets from Operon. Analysis of the PCR amplified products from each variety showed differences in a number of DNA bands from the random primer set 6, 8, 10 and 15. The different DNA bands were isolated from the gel, but were not enough to sequence. We were repeating these experiments to isolate more mtDNA and PCR products. Then the research on this part was also put on hold upon the unfortunate death of Alex Ching, who was producing and supplying the seeds.

Although we could not progress much with the proposed projects for the unavoidable reasons, the grant allowed us to purchase the following equipments: (1) Thermocycler/PCR, (2) -20°C freezer 7.5 cft, (3) UV/VIS transilluminator, (4) Polaroid camera, (5) Electrophoresis gel box, which are currently part of the Biochemistry lab equipment and are regularly used in Biochemistry laboratory courses as well as research projects in which over 8 students were involved, among them 6 presented their works at a number of meetings. The grant also supported Dr. Islam to continue his research in other areas that resulted in submission of a number of outside grants, of which two were successful.

GAS PHASE SOLVENT QUANTIFICATION OF A COMMERCIAL PRODUCT

Michael Bellamy, Chemistry/Physics Dept., Fall 1999.

The goal of the project was to quantify a residual solvent on a commercial pharmaceutical product, since their current method of analysis is too slow. With funds from an Applied Research grant, an infrared gas cell was purchased. We worked to fabricate a system that would work in a manner that is similar to a commercial pharmaceutical dryer. Test samples were made using the actual product of interest.

A vacuum was used to pull headspace samples of the solvent over the powder into the gas cell. We were able to accurately and precisely measure the residual solvent in the gas phase with the system that we made at Northwest. We were able to show that water and carbon dioxide that are normally interfere with measurements mid-IR work were not a problem with the solvent that we were quantifying. This is important since it greatly simplifies the equipment needed to make the measurement.

The next step would logically be to show that our method would work with the actual commercial dryer. However, while our industry contacts were interested in the results, we were not able to coordinate a means of trying our system on their commercial dryer.

In order to get the most out of the equipment that was purchased, a second experiment was designed. A homemade breath-alcohol tester was fabricated using the IR gas cell. Students in an Instrumental Analysis class used the IR gas cell to measure their breath-alcohol levels after gargling with a commercial mouthwash. The results were similar to another study in the literature. Students then used the instrument to test the reports of other studies that we found. Again, the results were good. This procedure was submitted as an Instrumental Analysis experiment to the Journal of Chemical Education and is currently in the peer review process.

ANALYSIS OF ACTIVE COMPONENTS PRESENT IN A NATURAL DRUG USED FOR TREATMENT OF SARCOIDOSIS IN BANGLADESH

Rafiq Islam, Chemistry/Physics Dept., NWMSU

Original Duration: August 2000-May 2001.

Introduction

Sarcoidosis is a multisystemic disease of uncertain etiology and is characterized by the presence of noncaseating granulomas. Organs involve in this disease may include lung, heart, skin, eyes and other. Although the clinical syndrome of the disease is recognized throughout the world, the pragmatic understanding of its diagnosis and management remains poorly understood and controversial. As causative agents, virus, fungi, bacteria, or autoimmune syndrome were described. Steroids with 10-20 mg/day is the common choice of therapy, but long term continued steroid therapy poses side effects, which most often includes edema, weight gain, osteoporosis, compromised immunity, insomnia and diabetes. We obtained the medicine(s) through a patient, who claimed the medicine gave him best treatment without any side effect of the steroids.

Results and Discussion

Part I Aaddom Syrup: Light pink color with fruity smell. Some suspension of undissolved materials was visible with naked eyes. This might not be due to spoilage as there was no bad odor, or it might be possible that the bad odor was masked by the fruity odor of the syrup. The liquid was very viscous, as a drop on a paper towel was immediately absorbed and formed a glossy spot. The syrup was subjected to a series of qualitative tests, namely Biuret for protein was positive upon heating, Fehling test for reducing carbohydrate (like glucose) was positive

upon waiting, and Unsaturation test was negative. Based on these tests, we concluded that the syrup contains mostly sucrose with some degraded glucose and some flavor. The concentration of total sugar (sucrose and glucose) was measured by the method of Dubos et al (5) and found to be 11.3 mg/ml (33 mM) of the syrup.

Part II Tablet: White tablet with no smell and no label on it. We crushed the tablet with mortar and pestle to fine particles, and extracted with water-CH₂Cl₂ (1:1) mixture. A fraction was also obtained at the interface of water-CH₂Cl₂ mixture. All fractions including the undissolved one were made dry by evaporation at room temperature and subjected to a number of analyses, both qualitative and analytical with IR, UV-VIS and GC-MS. The IR spectra obtained from the CH₂Cl₂ fraction showed a broad band at 3300 cm⁻¹ suggested presence of -OH group. The IR spectrum as well as the UV spectrum obtained of the fraction showed significant similarity with those of cholesterol suggesting the tablet contains cholesterol. Quantification of the free cholesterol using the Lieberman-Burchard method gave only 0.12 mg/tablet. The tablet powder (0.1 g) after acidifying with 0.5 ml of conc. HCl, was extracted with 0.5 ml of CHCl₃. The CHCl₃ was applied to GC-MS analysis. Two major components identified were hexadecanoic acid (palmitate) and octadecanoic acid (stearate). The total amount of these two components was 43 mg/tablet. These two fatty acids may be present as ester of cholesterol and was hydrolyzed during extraction with acid.

SNAILS OF NORTHWEST MISSOURI

Dr. Peter Kondrashov, Biology Dept., Fall 2001

Snail fauna of Missouri was rather poorly known and the northwestern corner of the state was less studied region. Neither species composition nor their distribution among the counties of Northwest Missouri was studied before. My study resulted in the accumulation of a collection of land snails from several counties of Northwest Missouri. Most of the species in the newly formed collection were never recorded for northwest Missouri before. For example, the known diversity of snails for the Nodaway County was 11 species. I found 25 species of land gastropods in this County.

More than 1500 specimens of land snails were collected and identified by the author during years 2001/2002. They belong to 28 different species: *Anguispira alternata* (Say, 1816); *Carychium exile exile* Lea, 1842; *Catinella avara* (Say, 1824); *Cochlicopa (Cochlicopa) morseana* (Doherty, 1878); *Euchemotrema leai aliciae* (A. Binney, 1841); *Euconulus trochulus* (Reinhardt, 1883); *Gastrocopta armifera* (Say, 1821); *Gastrocopta contracta* (Say, 1821); *Gastrocopta pentodon* (Say, 1822); *Gastrocopta procera* (Gould, 1840); *Gastrocopta tappaniana* (C.B. Adams, 1842); *Glyphyalinia indentata* (Say, 1823); *Hawaia minuscula* (A. Binney, 1840); *Helicodiscus parallelus* (Say, 1817); *Neohelix alleni* (Sampson, 1883); *Novisuccinea ovalis* (Say, 1817); *Punctum minutissimum* (Lea, 1841); *Pupoides albilabris* (Adams, 1841); *Rabdotus dealbatus* (Say, 1821); *Stenotrema fraternum* (Say, 1824); *Strobilops labyrinthica* (Say, 1817); *Triodopsis fosteri* (F. C. Baker, 1921); *Vallonia (Vallonia) parvula* Sterki, 1892; *Vallonia (Vallonia) pulchella* (Müller, 1774); *Vertigo (Angustula) milium* (Gould, 1840); *Vertigo ovata* Say, 1822; *Vertigo tridentata* Wolf, 1870; *Zonitoides arboreus* (Say, 1816).

The samples of gastropod mollusks were collected in the following counties: Nodaway, Holt, Atchinson, Andrew, Worth and Gentry. 15 of the identified species had not previously been established in Nodaway County. Eight of them were new for Gentry County.

The following objectives were fulfilled during year 2001/2002:

- a. Faunal list of the snails of Northwest Missouri was obtained.
- b. The majority of snails were preserved as dry specimens for shell examination.
- c. The collection of snails was stored properly with detailed labels.
- d. A database was created to store the identification and locality data.
- e. Ecological niches of the snails found in Northwest Missouri were identified.

Two scientific publications were prepared based on the collected material:

1. LAND SNAIL FAUNA OF THE NODAWAY COUNTY, MISSOURI.
2. FIRST OCCURRENCE OF *CORBICULA FLUMINEA* IN NORTHWEST MISSOURI*

*ALTHOUGH THE SECOND PAPER IS BASED ON MATERIAL ON BIVALVE

MOLLUSKS, THESE MOLLUSKS WERE OBTAINED DURING THE “SNAIL HUNT” ON THE MONEY FROM THE NWMSU GRANT..

Overall the project has been very successful resulting in accumulation of an extensive collection of land gastropod mollusks (more than 1500) at the Biology department. The specimens are now used for regular scientific work, for undergraduate research (3 students: one in spring 2002, one - fall 2002, one – spring 2003) and for General Zoology Lab.

Principle Investigator: Dr. Robert M. Theodore, Research Title: USING STUDENT PERFORMANCE AND SATISFACTION DATA IN ADMINISTRATIVE AND CLASSROOM SUMMARY OF RESEARCH: Fall 2001

The Missouri Academy of Science, Mathematics and Computing (MASMC) implemented an integrated system of assessment and research that provides MASMC students, Northwest Missouri State University faculty and administrators and MASMC administrators with information on students’ academic performance and campus experience. The five-year longitudinal study was initiated November 2001. The interaction between students and faculty was assessed using the College Student report and research into the connection between student assessment and campus decision making was initiated. Furthermore, data are currently being collected to identify characteristics of students who are at risk of dropping out of the program prior to graduation. Two assessments were used to collect data regarding students’ personality characteristics and persistence. Student Characteristics and Persistence.

The Personal Career Development Profile, also referred to as the 16 Personality Factors (16PF) was used to establish a database of student characteristics from which persistence information could be obtained. A first step in identifying the characteristics of persisters was to establish baseline data for Academy students and the typical high school student. Data was collected comparing 62 MASMC and 114 same-age students at a regional high school (HS).

MASMC students were significantly different than HS students in level of warmth or extraversion, reasoning ability and ego strength. Academy students were more introverted, $\bar{x} = 4.52$, than high school students, $\bar{x} = 5.58$. Therefore, the typical high school student is more socially oriented seeking more time with friends and establishing relationships, whereas the typical MASMC student, although interested in having friends, will prefer to have a few close friends and tend to keep more to themselves. This finding is consistent with anecdotal reports from Academy students’ parents who report that their students felt ostracized in their home school and were hoping that they would feel more accepted at the Academy. This seems to be true. Students report that they feel as though they “fit in” at the Academy, or are more accepted by their Academy peers than they were at their sending school.

As might be expected, MASMC students show stronger reasoning ability than the average HS student with respective scores, $\bar{x}=7.14$, $\bar{x} = 4.23$. Since Missouri Academy students are chosen from the top of their high school class, a difference in reasoning or problem solving ability may be expected. In fact, the average gpa of MASMC students surpasses the gpa of Northwest Missouri State University students taking the same classes.

MASMC students also surpass HS students in ego strength, $\bar{x} =5.35$ and 4.03 respectively. Ego is the part of self that we call "I" as distinct from other things in the world. Ego is considered by psychoanalysts to be the conscious personality component and gatekeeper between the conscious world and unconscious mentation. People low on ego strength find life to be difficult and are often struggling with life's challenges both within and without. The lower the ego strength the less likely an individual will pursue their goals, the more likely to find life unsatisfying, and their self-esteem and sense of well-being sagging. Therefore, for most of the Academy students, in spite of the possible setbacks or rejection they may have experienced from their peers in their sending school, their ego strength has buoyed them through difficult times and has been an aid in accomplishing their goals.

High school and Missouri Academy students also differ significantly on level of vigilance or trust $\bar{x} = 6.12$, creativeness $\bar{x} = 6.96$ and openness to change $\bar{x} = 6.93$. High school students appear less trusting $\bar{x} = 7.10$ and a higher score indicates higher vigilance, thus less trust. Therefore, on the 16PF, MASMC students are indicating a level of trust 1.1 stens above the average range. Level of trust usually relates to ones early childhood experience. If ones childhood is relatively consistent, stable and nurturing, then the probability that a child will be trusting increases. On the contrary, if a child's early experiences with primary caregivers are disappointing or traumatic, then s/he grows up to be a vigilant, suspicious adult, looking for some negative event to happen. If it is valid that positive, early, childhood experiences generate a trusting young adult, then this finding may support that theory. Further study is warranted to provide further evidence.

On the scale of creativeness or imagination, although their scores were significantly different statistically, the difference between mean scores was small, MASMC 6.96 and HS 6.32 suggesting that Academy students scored higher than chance in creativity compared to their HS peers, but the difference appears to be very small.

Missouri Academy students also scored more open to change than their HS peers, $\bar{x} = 6.39$ compared to $\bar{x} = 4.89$ respectively. Interview with MASMC students confirm that the students were not only open to change but were ready for a change from their sending school whereas, the scores of the regional, rural high school suggest that the students are not as open to change.

Since the Academy has not had a large number of students withdraw, the data pool is as insufficient to describe characteristics common to those who withdraw. Data collection continues on this question.

Effect of Student Instructor Interaction

It was hypothesized that students' gpa's would increase as they interacted more with their professors. The effect of student time and contact with professors outside of class was assessed using the College Student Report (CSR) correlation with student gpa. Six questions were selected from the CSR that directly addressed students' interactions with their professors. However, no significant correlations were found between students' gpa and contact with instructors. Several factors may contribute to this outcome, one of which is that we may not be asking the right questions. Investigation will continue on this hypothesis. Student Development and Persistence

MASMC students were also administered the Student Developmental Task and Lifestyle Assessment (SDTLA), the Learning Context Questionnaire (LCQ) which was substituted for the originally planned Learning Style Questionnaire and the Attributional Style Questionnaire (ASQ). The SDTLA data has been entered into a database and is presently being evaluated. SDTLA statistics are available on the first Academy class, the Pathfinders. The data indicates that the Pathfinders, 16 and 17 years old, are on a developmental par with typical Northwest college freshman (NWF). Thirty-one Academy students participated in the initial SDTLA assessment and were compared to 1098 NWF, a bit of a disparity in sample size. The mean for the SDTLA is 50 with a standard deviation of 5 points. Therefore, the average range is 45 to 55 points. The test is normed on college freshman ranging in age from 17 to 21. On instrumental autonomy, students' ability to structure their lives and meet responsibilities, MASMC's mean score was 48.15, N WF 53.39, a difference of 5.34. Both of these scores are in the average range of the national norm. Academy students also scored in the range of college freshmen in categories of cultural participation, peer relationships, health and career planning.

However, it has not been determined how student development relates to student persistence. More data is required to determine this relationship.

A database is being established for the LCQ and ASQ. Valid statistics will be available on these measures as sample sizes increase and more data are collected. Cohort Group, Dissemination of Data, Further Study

An agreement has been established with a regional high school to administer the 16PF and LCQ. An agreement had been made with LBJ Magnet School in Austin, Texas, but that agreement has not been fruitful. Therefore, collaborative arrangements with other magnet schools or academies are being sought. The North Carolina School of Science and Mathematics agreed to use the 16PF and other schools will be contacted about collaborating in the research.

This is the first year of a five-year study. More data is needed to generate sufficient data bases to determine the utility of the instruments being used in the study and to generate valid, reliable statistics about student characteristics, student interaction with faculty and comparisons with magnet, regional and schools similar to MASMC. Furthermore, the first group of students to graduate from MASMC will be completing their first year in college in May 2002. MASMC is a member of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology (NCSSSMST). MASMC, in cooperation with the Illinois Mathematics and Science Academy and other NCSSSMST academies, have agreed to survey academy graduates to follow their academic and professional development. MASMC graduates will also be asked to evaluate their Academy experience.

"Finding A Real Manuscript Road: A Camino of New Williams Manuscript Researches"
Jeffrey B. Loomis. 2001-2002

I worked at the University of Texas—Austin, in the Harry Ransom Humanities Center archives, during the daytime for three weeks (excluding Sundays, when the Center was closed) in early August 2002. I took down three notebooks full of citations and quotations from the Tennessee Williams collection of drafts, working my way through three different boxes that had been packed full with draft materials. In the end, I probably had two folders left in one box that I was unable to consult and should see on some later occasion. As has been the case for the last few years, I will prepare a conference paper on the Williams drafts I saw in the summer and submit it for presentation to the Comparative Drama Conference, which meets annually in April at The Ohio State University (I am secretary of the Conference's board, and have read papers at ten consecutive Conference meetings).

2. "The Year's Work in Hopkins Studies/2001-2002"

Jeffrey B. Loomis

During my three weeks of evenings at Texas, I worked in the Perry-Castaneda Library (the university's largest general reference library) on tracking down materials written on Gerard Manley Hopkins during 2001-2002 (and, occasionally, on some materials that date from earlier than 2001 but had not been heretofore indexed). I read a total of four books and fifteen scholarly articles, and compiled my commentary on them for the annual column "The Year's Work in Hopkins Studies," which I write for the journal Victorian Poetry. This was a particularly gratifying year to be writing this column, for one of the best books ever written on Hopkins, Bernadette Waterman Ward's World as Word: Philosophical Theology in Gerard Manley Hopkins, was released during the year, and I was able to comment on its excellence in my general review of all the new Hopkinsian critical materials.

MINERALOGY AND SOURCE MATERIAL FOR THE TOLSONA MUD VOLCANOES IN THE COPPER RIVER BASIN, ALASKA

**C. Renee Rohs, Northwest Missouri State University, rrohs@mail.nwmissouri.edu
Staci L. Goetz, Central Michigan University, staci.goetz@cmich.edu. Spring 2002.**

The focus of this research is to determine the source of the mud being extruded from the Tolsona mud volcanoes, based upon its mineral content. The mud volcanoes lie within the Copper River basin, which is comprised of Pleistocene glacio-lacustrine sediments at the surface and Mesozoic rocks at depth. Two existing hypotheses were tested for the source of the mud. First, the mud may be the result of diapiric movement from Lower Cretaceous and Upper Jurassic marine sedimentary rocks at depth to the surface as a result of abnormal pressure (Foresman, 1970) and low-grade metamorphic activity. Secondly, the mud may be representative of Pleistocene glacio-lacustrine sediments. Na-Ca-rich groundwater, methane, and nitrogen gas seep from the mud volcanoes. The water chemistry and gas composition have been previously studied (Foresman, 1970; Motyka et al., 1989) and suggest their source is from rocks of Cretaceous or Jurassic age. The presence of unabraded Upper Cretaceous fossil shell fragments in the mud also supports this thesis (Gantz et al., 1962).

For this study, samples were collected from each mud volcano, nearby glacio-lacustrine sediments, and exposed Mesozoic sedimentary and metasedimentary bedrock. Samples were dried, crushed, and sieved to $<63\mu\text{m}$, then analyzed for their mineral composition using a Cu radiation source in a Miniflex x-ray diffractometer (XRD). Data reduction of the XRD peak locations and intensities suggest the presence of the following minerals: quartz, feldspar, chlorite, and illite. Diffraction patterns of the mud samples most closely resembled that of a Lower Cretaceous/Upper Jurassic rock sample and differed significantly from an Upper Cretaceous rock sample. The glacio-lacustrine sediments contained too much organic matter for successful mineral composition determination with the XRD. Therefore, these preliminary data, when considered with water and gas chemistry, support the initial hypothesis.

**Theodore, Robert; Pinizzotto, Russell; King, Terry. Construction and Validation of a Science, Mathematics and Computing Outcome Based Assessment
Start Date: Spring 2002 Completion Date: Spring 2003**

The first year of a two-year study was completed on the Core Assessment of Science and Mathematics Knowledge (CASM), and the results were presented and discussed with members of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology at the NCSSTMST Annual Meeting. Presentation of the data was the culmination of a year of intensive collaboration with Northwest Missouri State University professors in the chemistry, physics, biology, mathematics and computer science departments.

Professors from each department contributed ten questions that they believed reflected the fundamental or core knowledge of their academic discipline that Missouri Academy of Science, Mathematics and Computing students should know and retain when they graduate from MASM. To measure the change in students' fundamental science and math knowledge, the test was administered to enrolling students during their first week at the Academy and again two years later upon graduation. Therefore, the CASM was utilized as a pre- and post-test.

Test items were checked for validity and reliability on two enrolling classes, Pacesetters and Explorers. Although they had not taken the CASM as a pre-test, Pathfinders, the Academy's first graduating class, took it as a post-test. Pathfinder scores were compared to Pacesetter and Explorer scores to determine the tests' utility as an outcome or value-added measure. Test results were striking.

Chemistry, physics, mathematics and computer science all showed large, statistically significant differences beyond the standard .05 level of significance. In other words, outcome scores indicated that students had learned and retained the fundamental knowledge that professors in their respective disciplines identified as most important to their field. However, no significant difference was found between the scores of enrolling and graduating students on the biology section of the CASM. No significant difference suggests several possibilities. The most probable explanation: high pre-test scores indicate that the students knew the knowledge when they enrolled making it difficult to measure change. Another possibility is that information was taught, but not retained and yet another possibility is that the information was not learned. In any case, discussions are taking place with the chair of the biology department to identify the source of the problem and/or revise the questions.

The Illinois Mathematics and Science Academy and the Texas Academy of Mathematics and Science have expressed interest in the CASM. The Texas Academy administered the test to their junior-year students. Illinois is providing information on the CASM and may employ it with their students.

Study of Marsupialia and Condylarthra (Mammalia) from the Torrejonian (lower Paleocene) of New Mexico

**Faculty Research Grant 2003-2004 Abstract
Dr. Peter Kondrashov, Northwest Missouri State University**

Paleocene condylarths and marsupials are some of the most diverse and complex groups of therian mammals. Their classification and phylogenetic relationships have been open to discussion until recently. Most of the specimens of Paleocene condylarths and marsupials from New Mexico are housed at the American Museum of Natural History, New York (AMNH) and New Mexico Museum of Natural History and Science, Albuquerque (NMMNH). I spent one week at AMNH and two weeks at the NMMNH in May – June 2004 studying the type specimens of some condylarths and marsupials from San Juan Basin. I have described, measured and photographed the following species of condylarths and

marsupials: *Loxolophus hyattianus*, *Loxolophus priscus*, *Loxolophus pentacus*, *Anacodon ursidens*, *Anacodon cultridens*, *Desmatoclaenus protogonoides*, *Ectoconus ditrignonus*, *Ectoconus Arctocyon ferox*, *Arctocyon corrugatus* and *Arctocyon acrogenius*, *Oxyclaenus cuspidatus*, *Oxyclaenus antiquus*, *Oxyclaenus simplex*, *Tetraclaenodon puercensis*, *Haplomytus speirianus* and *Peradectes elegans*.

The studied material was included into three scientific publications:

3. Kondrashov P.E., Lucas S.G. 2004. *Arctocyon* (Mammalia, Arctocyonidae) from the Paleocene of North America. NMMNH: Bulletin 26. P. 11-20.
4. Kondrashov P.E., Lucas S.G. 2004. *Oxyclaenus* from the early Paleocene of New Mexico and the status of the Oxyclaeninae (Mammalia, Arctocyonidae). NMMNH: Bulletin 26. P. 21-31.
5. Lucas S.G., Kondrashov P.E. 2004. Taxonomic revision of the genus *Ectoconus* (Mammalia, Periptychidae) from the Paleocene of western United States. NMMNH: Bulletin 26. P. 33-44.

The collected data along with the photo illustrations is the basis for 3 new papers:

1. Kondrashov P.E., Lucas S.G. Revision of *Loxolophus* (Mammalia: Arctocyonidae) from the early Paleocene of North America. NMMNH Bulletin.
2. Kondrashov P.E., Lucas S.G. Postcranial morphology of an early Paleocene mammal – *Tetraclaenodon* (Mammalia: Phenacodontidae). Journal of Vertebrate Paleontology.
3. Didelphid marsupials (Mammalia: Metatheria: Didelphidae) from the lower Paleocene of New Mexico. NMMNH Bulletin.

“Everything Seems to be Going Backwards These Days”: The Knights of Ak-Sar-Ben in Omaha. Thomas Spencer. Fall 2003

While similar St. Louis and Kansas City organizations claimed to benefit all, they remained exclusive and focused on rituals flaunting the elite nature and social status of their members. The Knights of Ak-Sar-Ben, while retaining the elitist ball and an exclusive leadership and governance structure, would become a genuine philanthropic organization relatively soon after its founding in the 1890s.

As Sherman Berg, the current president of the Knights put it in March of 2004, “The organization was founded with the idea of economic stimulus in mind. After the first few decades they quit focusing so much on economic stimulus and moved on to trying to help the community at large.” The Knights organization eventually provided hundreds of college scholarships, entertainment packages, and numerous other benefits for people in the region. However, the organization eventually faced a major fiscal crisis in the 1980s and 1990s as revenue from the track began to decline. The track closed in 1996. This fiscal crisis and closure forced the organization to scale back its philanthropic efforts significantly.

Mühsam, Armin. (Assistant Professor, Department of Art) “Creative work for an exhibition.” Fall 2003

My proposed research was to present new work at an exhibition at Clark House Gallery, Bangor, ME, in July/August of 2004. The focus of this new work was to incorporate two ideas in my landscape paintings, the model of a landscape and the construction site (see my research proposal).

The exhibit went well. I traveled to Bangor for the opening, which also featured works of two other artists, one of them being the well-known photographer Berenice Abbott.

My research into landscape painting explores the dichotomy between what the general public acknowledges as the “beauty” of natural landscapes and the “ugliness” of landscapes that have been technologically altered by man. My intent is to challenge these conventional notions of “beauty”. I do this by revealing the manner in which and the extent to which the natural has already been replaced by the artificial while retaining a mode and style of painting that has traditionally been reserved for expressing the “sublime” or the “beautiful” (or at least the “picturesque”). The most recent landscapes consist mostly of structures resembling foundations – forms that cut and dissect both the picture plane and the depicted scenery but whose construction does not necessarily serve a purpose. Demonstrating the ambiguity of these structures is as important to my work as showing their formal beauty.

There is not much tangible profit in this research for Northwest students other than the fact that through my ongoing exhibition and research record I serve as a role model for art students – they benefit from my experiences and see how a degree in art, generally perceived as “breadless,” can nevertheless lead to a fulfilled, meaningful profession.

METEORITE OR METEOR-WRONG: A COMPARISON OF METEORITES WITH TERRESTRIAL ROCKS.

C.R. Rohs, 2004, Northwest Missouri State University, rrohs@mail.nwmissouri.edu.

Abstract

Most meteorites have distinct characteristics that differentiate them from rocks that formed on Earth. In order to recognize these characteristics, it is necessary to have some basic knowledge of mineralogy and petrology. Major divisions of meteorites include stony, iron, and stony-iron groups. Ordinary chondrites, carbonaceous chondrites, and achondrites are all subdivisions within the stony group based on differences in mineralogy, chemistry, and texture. The stony-iron group is subdivided into pallasites and mesosiderites based on texture and origin. One characteristic that is almost exclusively found in meteorites is the presence of native, metallic iron as the minerals taenite and kamacite. The occurrence of taenite and kamacite in a Widmanstätten textural pattern is produced only in meteorites. This characteristic pattern can be recognized fairly easily in iron and stony-iron meteorites with a simple etching process. Stony-iron meteorites are also readily identified with olivine or pyroxene mineral grains supported in an iron metal matrix. Cumulate magmatic rocks that formed on Earth in a mafic intrusion may have a similar appearance to a stony iron meteorite; however, native iron metal will not be present. Most stony meteorites contain chondrules giving rise to ordinary and carbonaceous chondrites, two of the three major subdivisions. Chondrules are typically between 0.5 and 2 mm in diameter with a spherical shape and can be identified on the surface, in a cut and polished face, or a thin section. Chondrules are not present in rocks formed on Earth and may be differentiated from igneous textures such as spherulites by petrographic observations. Many stony meteorites also contain some taenite and kamacite in small quantities that may be recognized in a polished or thin section sample. Common “meteor-wrongs” include, but are not limited to hematite, magnetite, goethite, manganese nodules, pyrite concretions, basalt, diabase, mafic cumulate rocks, and furnace or smelter slag.

Hendrix, Rebecca R. (Assistant Professor in the Department of Psychology, Sociology, and Counseling) “Emergence of Parental Prohibition in Response to Self-Produced Locomotion and its Accompanying Emotional Changes.” Spring, 2005

I would like to thank the Faculty Research Committee for selecting my project for funding. This grant was a follow-up to an earlier grant I received and its purpose was to help fund the presentation of these materials at Society for Research in Child Development in Atlanta, GA on April 7-10, 2005. The following abstract describes the original study.

The impact of self-produced locomotion on physical and social environments, affect, discipline, and compliance was examined.

Forty, 6-month-old, prelocomotor infants and their mothers were initially contacted. At age 8-months, locomotors (13 males, 7 females) could move forward 3 feet in under 30 seconds unassisted. Prelocomotors (13 males, 7 females) were matched by age and sex with the locomotors. At both occasions, parents were interviewed about their children's physical abilities, social interactions, and emergent discipline and filled out the Infant Behavior Questionnaire (IBQ). An observation of the parent-child dyad in an office also occurred during the second contact.

Compared to prelocomotors, interview reports revealed environmental changes over time in that locomotors spent more time playing on the floor, had a wider interest in toys, and were subject to increased child-proofing in their homes. Moreover, locomotors displayed greater affection toward mothers than prelocomotors at both contacts. Separation distress peaked for all children as they neared the transition to locomotion but locomotors were more likely to maintain physical contact with their caregivers.

Observed affect revealed no differences among groups but interviews indicated all children displayed more emotions, especially negative ones, over time. Boys reportedly showed more emotions than girls, most noticeably other-oriented emotions. IBQ scales revealed that distress to limitations increased over time for all children while soothability decreased for locomotors and increased for prelocomotors. Positive correlations between time one and time two interview questions revealed consistency in individuals' affect over time as did IBQ scales.

Within the observation, reactive discipline was more often used with locomotors, especially the use of "no," but no group differences existed for proactive discipline measures. Furthermore, maternal reports indicated increased use of prohibition with their locomotors including verbal prohibitions, facial expressions, physical restraint, removal of objects, and distractions with alternate objects. Observations of compliance were inconclusive.

Changes in the examined variables coincided with the onset of locomotion but it appears that not all changes resulted from this transition

"NEGOTIATING THE ENABLING AND CONSTRAINING FEATURES OF FORMAL MEDIATION MODELS"

Melody A. Hubbard, Ph.D. February 1, 2004

Abstract

The aim of this study was to explore how mediators are constrained and enabled by the Kansas State mediation model and whether or not they experience tensions. Research to date focuses almost exclusively on mediator tactics and techniques. This study sought to understand mediation processes when viewed through the lens of Giddens' theory of structuration, which integrates macro processes (formal mediation models) with micro ones (communication during

mediation settings). In addition, structuration enables a researcher to differentiate between the spirit and the features of a structural system thereby highlighting contradictions that contribute to tensions. The results suggest that mediators not only experience tensions related to contradictions regarding their role as third-party neutrals, but are experiencing perverse consequences as they find themselves in conflict with the legal system that established and governs mediation in Kansas. Mediators adapt the model based on the own unique backgrounds and experiences using it as a guiding framework. While it provides mediators with a common language about the philosophy and goals of mediation, they implement model phases based on the personal preferences, style and interpretations of the mediator. Although the focus of this study was not identifying mediator responses to tensions, their inclusion buttresses the conclusion that conflicting pressures, personal values and rationalization shape the way in which mediation is actually practiced. Tensions revolve around the following issues: crafting agreements, perceptions that mediators must be attorneys, difficulties working with attorneys, role conflicts, the paradox of neutrality, mediator bias, values and cultural background, time pressures, power, and emotion. There are two structural contradictions that contribute to mediators experiencing tensions. The primary contradiction is anchored in key differences between how the mediation system approaches conflict resolution and the legal system's approach. A secondary contradiction was identified as stemming from mediator understandings of neutrality. These findings are a significant contribution to the study of communication as they illustrate the communicative consequences of structures. In addition, this study highlights how contradictions between the spirit of a structure and the features of a structure can result in actors experiencing tensions that lead them to alter the structure in ways that may negate the original spirit the structure was intended to embody. The most notable findings of this study, however, are not the tensions that mediators experience, but the unintended and perverse consequences that mediators appear to be experiencing. Specifically, although mediation in Kansas was legislatively established and its practice is both governed and sanctioned by statute, mediators are finding themselves in conflict with the legal system. Ironically, a sub-system established by the legal system to resolve conflicts is producing additional conflict, though unintended.

Ferguson, Ernest. (Associate Professor in the Department of Computer Science / Information Systems) "Offshore Outsourcing: Impact on CS/IS Curriculum." Spring 2004.

A draft survey was made and personal interviews of Chief Information Officers were conducted at Cerner Corporation and St. Luke's Hospital. These interviews were used to refine the survey form. This form was faxed to J. B. Hunt and Wal-Mart. Phone interviews were conducted with representatives from these two firms. The revised survey form and cover letter was mailed to the other 96 companies listed in ComputerWorld's "100 Best Places to Work In IT Profession" for 2003. The results of this survey are being studied as they are returned.

Initial results indicated that as a result of outsourcing, employers say they are still hiring entry-level folks for application development if they can see the potential in that graduate to move to the leadership role of project manager in a short time span. Employers are wanted computer science graduates to have greater business savvy and some real-world experience in an internship or volunteer work for companies or non-profit organizations.

Town, Stephen (Professor of Music in the Department of Music). "Observations on the Creative Process of Charles Villiers Stanford: A Presentation for The College Music Society." Spring 2004.

Throughout the last ten years, Dr. Town conducted archival research [funded by the NWMSU Faculty Research Committee and the Carthusian Trust of Godalming, England] at The British Library, the Royal College of Music Library, and the Oxford University Bodleian Library on the voluminous autograph manuscripts of, among others, Ralph Vaughan Williams, Hubert Parry, and Charles Stanford, the last of whom is best known today as the composer of *Songs of the Sea* and "Beati quorum via" from *Three Motets*. This presentation focused on the creative process of Stanford, which emerged through the study of his holographs, while centering specifically on *Elegiac Ode* and *Three Holy Children*. The choice of works reflects their historical importance, their significance in the oeuvre of the composer, and their pertinence after a thorough examination vis-à-vis the autograph manuscripts.

The attendees of the presentation conducted an aural and visual examination of the first movement from *Elegiac Ode* and one movement from *Three Holy Children*, together with "Beati quorum via" of the *Three Motets*; the music of the ode and motet was performed by the Tower Choir, a 40-voice, premiere choral ensemble, while the scores were consulted by the listeners. Questions considered in the presentation, as the compositions were compared and Stanford's efforts were summarized, ranged from the general and particular (why did he compose and how did he compose; what were his compositional goals, and what difficulties, if any, had he to overcome in order to achieve them?) to the technical (what may be learned about his creative process by analyzing the musical structure of selected sections from the compositions?). In conclusion, by observing the composer at work through his musical materials, we increased our historical knowledge about him and the music he created.

LEAD AND CESIUM DATING OF BIG LAKE SEDIMENTS

Kurt A. Haberyan, Biology Dept., July 14, 2004

Previous research had indicated that Big Lake, Missouri, has existed for at least 1800 years, but concerns over the accuracy of the data necessitated further study. The current grant provided \$2300 for additional dating of the lake's sediments. Initial sampling revealed two pieces of wood that were appropriate for AMS radiocarbon dating, a method which is both more economical and more accurate than lead/cesium in these circumstances. With approval from Dr. Rohs and Ms. Baxter, these two wood samples were submitted for AMS dating in March of 2004.

The wood from 7cm down in the core is less than 50 years old, while the wood from 79cm down in the core is approximately 340 years old. These results indicate that the core does not, in fact, span from 900 to 1800 years ago, but rather spans from 0 to 340 years ago. According to Dr. Harlan (U.M.-Columbia), the lake basin actually contained the Missouri River during Lewis & Clark's expedition (1804-1806) and was not mapped until some two decades later. It seems likely, therefore, that the Missouri River has wandered greatly over the floodplain, and may have abandoned and re-occupied this particular channel several times.

FOLLOWING THAT STREETCAR TO THE ARCHIVES: EXAMINING TEXAS VARIANTS OF WILLIAMS'S MOST FAMED PLAY

Jeffrey Loomis - 2003-2004

My Summer 2004 research experience, at the University of Texas—Austin’s Harry Ransom Humanities Center archives, was *especially* productive. My goal for this particular investment of time was to read all the manuscripts of Tennessee Williams’ A Streetcar Named Desire that were located in that Texas archival repository. I completed that task with surprising speed, especially considering how much insight still resulted from the researches. I have now prepared for publication “From Romp to Grief: Williams’ Evolving Treatment of Sexuality in His A Streetcar Named Desire Manuscripts.”

I have also been able to prepare another critical essay, “Sad Damsels, Rogue Brothers, and Cages of Glass: Tennessee Williams Muses on Woolf, on Escapes from Restraint, and on Rooms Without Candles,” because I found time, while at Texas last summer, to complete analysis of Williams’ drafts for The Glass Menagerie. My scholarly labor with those manuscripts had begun and continued during several previous years.

Finally, I was able in July to examine some new-to-me drafts of Williams’ drama Sweet Bird of Youth. I might, therefore, even be able to complete an essay on the manuscripts for that play before I return to Texas again.

A PRELIMINARY REPORT ON THE USE OF VIDEO TECHNOLOGY IN ONLINE COURSES

Phillip Heeler, Carolyn Hardy, Computer Science Dept. Fall 2004

ABSTRACT

Online courses are fast becoming an accepted means of instruction in several different areas. However, most online instruction involves text-based communication. This paper describes the use of video-based communication in teaching two graduate level computer education courses. The authors report on a research project that they conducted to investigate the effectiveness of using video-based conferences in these courses.

The overall goal of the research project was to investigate the use of video technology in an online course and to determine what part video technology could play in enhancing learning. Specifically, there were two objectives: 1) The students and teachers were to learn how to use video technology, including the software and hardware to communicate in an online course, and 2) The students and teachers were to learn how to effectively incorporate video technology into online course instruction, including developing and employing appropriate teaching methods, and developing and employing appropriate teaching materials and assessment methods.

During the 2004 fall session, while teaching the Advanced Applications in Computer Education core computer education course, the first author conducted a project to investigate using video technology in web conferences. Since not every student in this class had access to a web camera, research funds were procured to purchase web cameras for each of the fifteen students in the class. These web cameras were then made available for each student to use in presenting their educational technology projects, to be returned upon completion of the course.

Each student presentation lasted for about 15 minutes with very few dropped connections, or system freeze-ups. However, other system complications occurred. For example, transmission delays varied from three seconds to 60 seconds. The three-second delay was not problematical and the participants adjusted to that. However, the sixty-second delay was very difficult for both the student presenter and the participants. This significant delay eliminated any reasonable interaction during the presentation.

Based upon these research objectives, the project was a success. Every student was able to use the video cameras and Centra software. And both the professor and students did interact as part of the course using the available video technology. This research project has shown that video technology can be used to conduct web conferences that increase the interaction and include video, audio, and text-based communication.

The next step in enhancing online instruction is to investigate other ways to use the video conferencing software. Some of the additional utilities available in web conferencing systems need to be explored to determine their feasibility in demonstrating software, monitoring student progress in laboratory activities, and in using alternative assessment methods that allow the professor to view the student.

Haberyan, April & Kibler, Jackie (Assistant Professors in the Department of Psychology, Sociology, and Counseling) “Survey of Adolescent Health Behaviors.” Fall 2004.

This study investigated adolescent physical violence in a dating relationship in a Midwestern college student population. An adolescent health behavior questionnaire, adapted from the United States Youth Risk Behavior Survey (2003), was administered to college freshman enrolled in a Freshman Seminar course. There were 511 participants, including 315 females and 196 males. A total of 302 participants (188 females and 114 males) reported coming from a rural community (10,000 people or less), while 209 participants (127 females and 82 males) reported coming from an urban background (more than 50,000).

As part of the questionnaire, participants were asked whether they had experienced physical violence in a dating relationship during high school. Analysis of the responses indicated that 22% of college freshman reared in a rural environment and 23% of college freshman reared in an urban environment reported experiencing physical violence in their adolescent dating relationships. While not statistically significant, more males (25%) than females (21%) reported experiencing physical violence in their dating relationships. This pattern was observed for adolescents raised in both rural and urban settings.

These findings provide insight regarding the prevalence of physical violence in the dating relationships of both rural and urban adolescents. The frequency with which physical dating violence occurs with adolescents is a significant concern. The current study's data indicate that almost 1 in 4 college freshman have experienced physical violence in a dating relationship. This finding elucidates the need for college programming that assists students in the development of healthy dating behaviors. Many prevention efforts target females as the recipients of physical violence and exclude males. As demonstrated by this study, it is important to consider the needs of both males and females in prevention efforts.

Town, Stephen (Professor of Music in the Department of Music). “Observations on the Creative Processes of Parry and Stanford vis-à-vis their Autograph Manuscripts’: A Presentation for *The College Music Society*.” Fall 2004.

Throughout the last ten years, Dr. Town conducted archival research [funded by the NWMSU Faculty Research Committee and the Carthusian Trust of Godalming, England] at The British Library (St Pancras, London), the Royal College of Music Library (South Kensington, London), and the Oxford University Bodleian Library (Oxford) on the voluminous autograph manuscripts of, among others, Hubert Parry, Charles Stanford, and Ralph Vaughan Williams. This presentation focused on the creative processes of Parry and Stanford, which emerged through the study of their holographs, while centering on *The Vision of Life* by Parry and *The Three Holy Children* by Stanford. The choice of works reflects their historical importance, their significance

in the *oeuvres* of the composers, and their pertinence after a thorough examination vis-à-vis the autograph manuscripts.

Using photocopies obtained from the reproductions offices of the libraries, Dr. Town and the members attending the presentation viewed the sketches and drafts that led to the published works. Questions considered in the presentation, as the composers were compared and their efforts were summarized, ranged from the general and particular (why did they compose and how did they compose; what were their compositional goals, and what difficulties, if any, had they to overcome in order to achieve them?) to the technical (what may be learned about their creative processes by analyzing the musical structure of selected sections from the compositions?). In conclusion, by observing the composers at work through their musical materials, we increased our historical knowledge about the composers themselves and the music they created.

Easterla, David A. (Distinguished University Professor of Biology) “A 24 Hour Snap-shot Survey of Bird Migration on the Southern Border of California.” Fall 2004.

From 29 April – 4 May 2005, a survey was conducted of migratory (permanent resident species were also present but could not be positively separated) avian species by five ornithologists in the two southern tier counties of San Diego and Imperial, California. Concentration centered on San Diego County because of its greater diversity in geographic habitats. Scouting was intensive until the date of 1 May 2005, which was selected as the day of the 24 hour (midnight to midnight) snap-shot survey of bird migration on the southern border of California in San Diego County.

At midnight the survey began in the Pacific coast marshes of Guajome, then east to the mountains at Mt. Palomar State Park and Lake Henshaw. At predawn (and dawn) we were in the eastern foothills/desert at Anza Borrego, Scissors Crossing, and Butterfield Ranch. Turning west, we returned to the mountains at William Heise County Park (near Julian) and Lake Cuyamaca. Continuing westward we dropped down into the chaparral habitat at Kitchen Creek, then the lower foothills at Lindo Lake and Mission Trails. By evening we were on the Pacific coast at Pt. Loma, South Bay, Silver Strand, Mission Bay, and La Jolla. With two hours remaining (10:00 p.m.), we drove east to the Ramona grasslands to climax our survey with two additional species.

This survey set a United States (world?) record of recording 217 bird species within a single county during a 24 hour period! An estimated 10,000 total birds were observed. The greatest concentration of migrants was in the desert “traps” (oases of concentrated vegetation – usually around water), and along the coast where isolated marshes and mudflats occurred. Best weather conditions for northward migration involved a warm (70°F or warmer), clear night with a fairly strong southerly wind (5-20 mph; over 20 mph seemed detrimental). However, for ideal human documentation of such aerial migrants (via sight and calls/songs), a sudden strong (over 20 mph) northerly wind/storm with overcast skies moving south prior to dawn forced migrants to the ground where they could be recorded. Although weather conditions were good on 1 May 2005 for our survey, we believe on 28 April 2005 weather conditions were even better for avian migration, and higher numbers could have possibly been recorded. A factor that also might have added birds to our survey was the flooding in southern California the previous fall and winter. This additional water (especially in desert areas) added oases that undoubtedly attracted more birds than usual.

On 3 May 2005 we conducted another 24 hour snap-shot survey of bird migration in adjacent Imperial County, California, and recorded 127 species and approximately 3,500 individuals. Weather conditions were similar to our previous count, but this county's geography lacked the diversity that occurred in San Diego County; the main difference was no sea coast or mountains (only foothills and desert including Salton Sea, some 226 feet below sea level). Another factor accounting for the lower number of birds was the more limited scouting for this county. Surprisingly, the migrant traps (oases) in the desert here, were usually small ranches or villages where lawns or parks were watered which attracted great concentrations of migrants. In fact, we recorded for the first time a Hooded Warbler (an Eastern United States warbler) at Salton Sea.

It is unknown whether our surveys during May 2005 were typical for these two counties on the Mexican border; only future surveys will reveal such information. A database has now been established, and it is highly recommended that such spring surveys of avian migrants for this area continue.

USING REMOTE SENSING TECHNOLOGY TO MONITOR TEMPORAL CHANGES IN CROP HEALTH AND GROWTH AT THE R.T. WRIGHT UNIVERSITY FARM

Dr. Ming-Chih Hung, Assistant Professor, Geology/Geography

Dr. Jamie Patton, Assistant Professor, Agriculture

Duration of the Project

One academic year, 2004 – 2005, with one extension to 2006

Project Summary/Conclusion

Using satellite images purchased with research funding, we were able to detect differences in crop health status using NIR (near infrared) reflection from the corn field studied. Soil samples collected during the growing season provided insight into temporal and spatial variability in crop fertility, pest and soil conditions affecting the observed differences in NIR reflectance (crop health status). Because the collected soils information was for specific locations within the field (point data), further detailed and complex spatial interpolations of the data are needed to establish the correlation between soil test results and crop health and performance. Challenges faced when interpolating and extrapolating soil point into meaningful surface data will be addressed in our next research project.

In addition to satellite photography, high resolution aerial photographs taken approximately 20 feet above the land surface were also evaluated as to their effectiveness in remotely sensing plant health. Unfortunately, these photographs were taken in the visible light range and did not detect nor show variations in the crop health like the NIR images.

In conclusion, we were able to detect differences in crop health status using satellite NIR images. Soil sample analysis and crop scouting data confirmed crop health differences detected with NIR images were due to nutrient deficiencies, improper pH levels, and insect damage. The use of remotely sensed crop health data has the potential to not only improve crop yields through the early identification and resolution of fertility and pest problems, but also save a large number of man-hours currently necessary to scout fields from the ground level.

Town, Stephen (Professor of Music in the Department of Music). "Observations on the Creative Processes of Parry and Stanford vis-à-vis their Autograph Manuscripts": A Presentation for *The College Music Society*." Fall 2004.

Throughout the last ten years, Dr. Town conducted archival research [funded by the NWMSU Faculty Research Committee and the Carthusian Trust of Godalming, England] at The British Library (St Pancras, London), the Royal College of Music Library (South Kensington, London), and the Oxford University Bodleian Library (Oxford) on the voluminous autograph manuscripts of, among others, Hubert Parry, Charles Stanford, and Ralph Vaughan Williams. This presentation focused on the creative processes of Parry and Stanford, which emerged through the study of their holographs, while centering on *The Vision of Life* by Parry and *The Three Holy Children* by Stanford. The choice of works reflects their historical importance, their significance in the *oeuvres* of the composers, and their pertinence after a thorough examination vis-à-vis the autograph manuscripts.

Using photocopies obtained from the reproductions offices of the libraries, Dr. Town and the members attending the presentation viewed the sketches and drafts that led to the published works. Questions considered in the presentation, as the composers were compared and their efforts were summarized, ranged from the general and particular (why did they compose and how did they compose; what were their compositional goals, and what difficulties, if any, had they to overcome in order to achieve them?) to the technical (what may be learned about their creative processes by analyzing the musical structure of selected sections from the compositions?). In conclusion, by observing the composers at work through their musical materials, we increased our historical knowledge about the composers themselves and the music they created.

Mammals from the Chico Springs locality, Torrejonian (lower Paleocene) of San Juan Basin, New Mexico

By Dr. Peter Kondrashov, Fall 2004

Abstract

Paleocene era to me is the most interesting period of mammalian history. During this period most mammalian orders known today appeared on the earth. When studying the fossils from that period we can find ancestors for most of the recent groups of living mammals. Unfortunately terrestrial fossil-bearing deposits of the Paleocene age are rare on all continents and if found usually provide lots of interesting new finds. San Juan Basin, located in the northern part of the state of New Mexico, is well known for its Paleocene fossil sites. Many important specimens of fossil mammals, reptiles and bony fishes were collected here. The recently discovered fossil locality in the northern part of the San Juan Basin, Chico Springs, has proven proved to be one of the richest Torrejonian mammal localities in North America.

As the result of this study I discovered several poorly known mammal species at Chico Springs locality including an almost complete (first known to science) skeleton of an enigmatic Paleocene mammal *Tetraclaenodon puercensis*. This animal was long considered an ancestor for odd-toed ungulates (Perissodactyla), but the postcranial morphology of the new specimen is more of a climbing mammal similar to coati or a primitive squirrel. The evidence comes from the structure of the humerus, shape of the ulna and radius and also from the pelvic and femoral morphology. This might exclude *Tetraclaenodon* from possible ancestors for the order Perissodactyla. Other interesting mammals have been discovered at Chico Springs as the result of my research. They include: *Ptilodus trovessarianus*, *Catopsalis fissidens*, *Protictis haydenianus*, *Psittacotherium multifragum*, *Goniacodon levisanus*, *Triisodon quiverensis*, *T. crassicuspis*, *Dissacus navajovius*, *Chriacus baldwini*, *Tricentes subtrigonus*, *Deuteronogonodon montanus*, *Mioclaenus turgidus*, *Ellipsodon inaequidens*, *Promioclaenus acolytus*, *P. lemuroids*, *Protoselene opisthacus*, *Tetraclaenodon puercensis*, *Anisonchus sectorius*, *Haploconus angustus*, *Periptychus carinidens*, *Deltatherium deandrei*, *D. fundaminis*. The faunal composition is extremely rich and diverse, especially its archaic ungulates that compose the majority of mammalian species at this locality. The dental morphology of the found species is more primitive than from the other Torrejonian localities in the San Juan Basin which indicates that Chico Springs fauna is one of the oldest Torrejonian assemblages in the area.

Specimens studied for this project were used in peer-reviewed article: Kondrashov P.E. and Lucas S.G. 2006. Early Paleocene (Puercan and Torrejonian) archaic ungulates (Condylarthra, Procreodi

and Acreodi) of the San Juan Basin, New Mexico. New Mexico Museum of Natural History Bulletin 34. P. 84-97.

Reese, Joseph F. (Associate Professor in the Department of Geology and Geography) and Gary R. Lowell (Department of Geosciences, Southeast Missouri State University, Cape Girardeau, MO)
"The Hawn Park Gneiss, Mesoproterozoic St. Francois Terrane, Southeastern Missouri: A Deformed Migmatized Xenolith." Fall 2004

The Hawn Park Gneiss (HPG), located in the St. Francois Terrane (SFT) of southeastern Missouri, is a penetratively deformed, migmatized mega-xenolith enclosed in 1.48-Ga Butler Hill Granite. The HPG is compositionally and texturally heterogeneous at outcrop scale, ranging from granodiorite to gabbro and exhibiting schistose, gneissic, and diktyonitic/patch migmatitic fabrics. Cumulate textures are not present.

The HPG exhibits petrographic evidence of dynamic recrystallization including rounded quartz and feldspar porphyroclasts, deformation lamellae, and kink bands. Optical alignment of elongate quartz and feldspar grains, preferred orientation of biotite and hornblende, and differentiation of felsic and mafic phases define a prominent S-surface. Mafic selvages and multiple generations of quartz, feldspar, biotite, and hornblende suggest partial melting and subsequent melt-residuum reaction.

Previous U-Pb zircon dating of the HPG yielded an age of 1500 ± 30 Ma which we consider suspect due to the heterogeneity of the HPG and potential for mingling of zircons representing leucosome, melanosome, mesosome, and younger veinlets of host granite. Results of recent Nd data indicate that SFT granites were sourced from juvenile (~1500 Ma, Nd TDM age) Mesoproterozoic crust along the southeastern Laurentian margin. We suggest that the HPG is a large deformed and migmatized fragment of this older crust transported surfaceward by anatectic melts that formed the host granite. This interpretation is contrary to that of previous workers who considered the HPG to be a coeval/cogenetic mafic cumulate related to fractionation of ~1.48 Ga SFT granitoids. Though possibly linked to convergent-margin tectonic processes, timing and cause of migmatization and deformation of the HPG remain speculative.

MINERALOGY AND PETROLOGY OF DIABASE INTRUDING THE SILVERMINES GRANITE IN SOUTHEAST MISSOURI

C. Renee Rohs, Geology/Geography Dept., NWMSU, Fall 2004

A 1.3 m-wide diabase dike intrudes the Silvermines granite along the St. Francois River in SE Missouri. Thin section analyses across the dike indicate that the primary mineral is plagioclase (~60%) with opaque minerals ranging from 17-19%. X-ray diffraction indicated An_{25-45} for the plagioclase and magnetite and ilmenite as opaque minerals. Other minerals were chlorite, serpentine, quartz, calcite, and pyrite. Textures are variable including changes in grain size from the chill zone to the interior. An unusual texture observed is the presence of small spherical structures (0.5 to 1 mm). These features are rimmed with magnetite crystals and have interiors with a finer-grained texture than the surrounding matrix. Near the chill margin, the spheres are smaller and get larger toward the center. Abundance of the spherical structures varies with the highest occurrence about 0.3 m from the granite contact. Approximately 30% of these spheres contain fine-grained calcite at the core according to laser ablation and acid testing. Other spherical structures were igneous in composition but enriched in Ti as reflected by higher amounts of ilmenite. There are three possible explanations for the presence of these structures.

First, the spheres may represent droplets of an immiscible liquid during the later stages of cooling. Secondly, the spheres may represent xenoliths from the surrounding rock with significantly lower melting temperatures that were preserved as droplets. Finally, the spheres may represent secondary mineralization of void spaces by hydrothermal fluids. Based on U-Pb isotopic dating, the dike was emplaced 1474 ± 7 million years ago, a similar age to the surrounding granite. Two anomalously low ages (344 to 375 m.y.a.) were also obtained and may be related to a later hydrothermal event. Depleted mantle model ages, as determined by Sm-Nd isotopes, were also similar to the surrounding granite at 1520 to 1540 m.y.a.

Easterla, David A. (Distinguished University Professor of Biology) “A 24 Hour Snap-shot Survey of Bird Migration on the Southern Border of California.” Fall 2004.

From 29 April – 4 May 2005, a survey was conducted of migratory (permanent resident species were also present but could not be positively separated) avian species by five ornithologists in the two southern tier counties of San Diego and Imperial, California. Concentration centered on San Diego County because of its greater diversity in geographic habitats. Scouting was intensive until the date of 1 May 2005, which was selected as the day of the 24 hour (midnight to midnight) snap-shot survey of bird migration on the southern border of California in San Diego County.

At midnight the survey began in the Pacific coast marshes of Guajome, then east to the mountains at Mt. Palomar State Park and Lake Henshaw. At predawn (and dawn) we were in the eastern foothills/desert at Anza Borrego, Scissors Crossing, and Butterfield Ranch. Turning west, we returned to the mountains at William Heise County Park (near Julian) and Lake Cuyamaca. Continuing westward we dropped down into the chaparral habitat at Kitchen Creek, then the lower foothills at Lindo Lake and Mission Trails. By evening we were on the Pacific coast at Pt. Loma, South Bay, Silver Strand, Mission Bay, and La Jolla. With two hours remaining (10:00 p.m.), we drove east to the Ramona grasslands to climax our survey with two additional species.

This survey set a United States (world?) record of recording 217 bird species within a single county during a 24 hour period! An estimated 10,000 total birds were observed. The greatest concentration of migrants was in the desert “traps” (oases of concentrated vegetation – usually around water), and along the coast where isolated marshes and mudflats occurred. Best weather conditions for northward migration involved a warm (70°F or warmer), clear night with a fairly strong southerly wind (5-20 mph; over 20 mph seemed detrimental). However, for ideal human documentation of such aerial migrants (via sight and calls/songs), a sudden strong (over 20 mph) northerly wind/storm with overcast skies moving south prior to dawn forced migrants to the ground where they could be recorded. Although weather conditions were good on 1 May 2005 for our survey, we believe on 28 April 2005 weather conditions were even better for avian migration, and higher numbers could have possibly been recorded. A factor that also might have added birds to our survey was the flooding in southern California the previous fall and winter. This additional water (especially in desert areas) added oases that undoubtedly attracted more birds than usual.

On 3 May 2005 we conducted another 24 hour snap-shot survey of bird migration in adjacent Imperial County, California, and recorded 127 species and approximately 3,500 individuals. Weather conditions were similar to our previous count, but this county’s geography lacked the diversity that occurred in San Diego County; the main difference was no sea coast or mountains (only foothills and desert including Salton Sea, some 226 feet below sea level). Another factor accounting for the lower number of birds was the more limited scouting for this county.

Surprisingly, the migrant traps (oases) in the desert here, were usually small ranches or villages where lawns or parks were watered which attracted great concentrations of migrants. In fact, we recorded for the first time a Hooded Warbler (an Eastern United States warbler) at Salton Sea.

It is unknown whether our surveys during May 2005 were typical for these two counties on the Mexican border; only future surveys will reveal such information. A database has now been established, and it is highly recommended that such spring surveys of avian migrants for this area continue.

The results of this research will be published in the July/August 2006 issues of *Birding*, published by the American Birding Association. This research partially supported by Northwest Missouri State University Faculty Research Grant #122350.

**“Further Work in Northeastern U.S. Repositories of Tennessee Williams Manuscripts:
Completing Several Searches for Variants”
Jeffrey B. Loomis, Fall 2005**

I worked at Harvard University for three days, at Columbia University for six, at Princeton University for three, and at the University of Delaware for five. My ambitions to “complet[e]” my researches in these venues was not achieved, for I shall need to return. However, I can testify that I found a number of enlightening materials:

- at Harvard, an evocative early prose draft of the story behind Williams’ play Period of Adjustment, a manuscript through which I can see that Williams tended, more often than one might wish, to see the description “nursing the needs of the world” as synonymous with the assuaging of persons’ sexual desires;
- at Columbia, a key Battle of Angels draft in which the character Cassandra prates a bit stridently about sexual liberation,
as well as
some Night of the Iguana drafts in which the revisions increasingly ‘sexualize’ the thematic focus;
- at Princeton, intriguing Baby Doll manuscripts in which (in contrast with the mss. already mentioned above) I can detect a stronger Williams clarion of *protest against social inequities*;
and,
- at Delaware, a large collection of Iguana scripts, by means of which one can perceive how regularly Williams modified the tone of one basic text in order to fit the views he was obsessing over at a particular period (for instance, making Iguana into something like a Japanese Noh play, during the last decade of his life when he was influenced by such Asian drama).

Later in the summer I went to the University of Texas and read more Baby Doll manuscripts, noting that there exists, in the total collection of inscriptions of this drama, the usual Williams dialogue (or is it war?) between *protests about social inequity* and *focusing on the sexual tensions within human beings*. As has been the case for the last few years, I will prepare a conference paper on the Baby Doll drafts I saw in the summer and submit it for presentation to the Comparative Drama Conference, which meets annually in April at

California's Loyola Marymount University (I am secretary of the Conference's board, and have read papers at thirteen consecutive Conference meetings).

2. "The Year's Work in Hopkins Studies/2005-2006"

Jeffrey B. Loomis

During my week of evenings at Delaware, I worked in the library on tracking down materials written on Gerard Manley Hopkins during 2005-2006. I read a total of fifteen scholarly articles, and compiled my commentary on them for the annual column "The Year's Work in Hopkins Studies," which I write for the journal Victorian Poetry. This was the first year in the thirteen since I began writing this column when I have actually only had scholarly articles, and no books, to peruse. Hence, the review essay which resulted was shorter than usual.

EVALUATING SOLAR OVENS IN THE "REAL WORLD"

Mike Bellamy, and David Richardson. Fall 2005

Dr. Richardson and Dr. Bellamy received \$3,700 last year to design, construct and test solar ovens. Solar oven designs were made. However, as the project developed it became clear that clean water is a more urgent need in developing countries than energy for cooking. It also became clear that the solar oven design for this project could be modified to make a system that could use solar energy to heat water to pasteurization temperatures. Again, since poor water quality is a major health issue in developing countries it seemed to be better to provide a system that was optimized to heat water to make it potable rather than a system optimized to heat food.

The main difference between our approach and most attempts to produce potable water in developing countries is that our system is meant to be constructed and maintained by the end user in developing countries. This means that there is essentially no labor costs involved with production of the system. In addition, if the system is constructed by the end user they can scale the system to meet their daily water needs.

Dr. Richardson and Dr. Bellamy have designed, constructed, and tested the three components of a solar water pasteurizer: (1) collection of heat energy from sunlight, (2) valve to release water at the correct temperature, and (3) a heat exchanger to transfer the heat from pasteurized water to the next batch of incoming untreated water. Each of the three components was tested independently. Students are currently assembling the three components of the prototype into a working prototype in the laboratory. Only evaluation of the performance of the final system remains. This will consist of setting the system out in the sun and measuring the volume of pasteurized water that is produced period of a couple of months. Once the output of water is known then the startup cost and the long range operating cost of the system will be calculated. The Department of Energy has calculated the cost of disinfecting water in developing countries with various technologies and has set goals for the price of disinfecting water via solar energy. Consequently, our results will be compared with DOE calculations. The system will be evaluated in May and June of 2006 when there is enough sunlight. Hopefully we will be able to submit our results for publication in the summer of 2006. Once the performance of the system has been verified, the plans to construct the system will be posted on a dedicated website and made available to anyone who desires to implement the technology in developing countries.

"THE UNKNOWN LOUIS POMEY"

In addition to the works cited in my proposal, I was able to review a large number of other sources, including:

- Beum, Robert. Nineteenth-century French poets. London: Gale, 2000.
- Braun, Sidney David. Dictionary of French Literature, S. D. Braun, ed. Greenwich: Fawcett Publications, 1964.
- Fétis, François-Joseph, ed. Biographie universelle des musiciens et bibliographie générale de la musique. Paris: Firmin-Didot et cie, 1881.
- Rubenstein, Antoine. Neuf Lieder sur des Poésies Russes des Kolzoff, Op. 27. Paris: Ancne Maison Meissonnier, 1883.
- Schumann, Robert. Chansons espagnoles (Spanisches Liederspiel), op. 74, Spanische Liebes Lieder, op. 138, (avec texte allemand et paroles françaises par Louis Pomey). Paris: Durand, 1874.
- Viardot, Pauline, École Classique du Chant. Paris: Ancne Maison Meissonnier, 1861, et.
- . Les cavaliers, duo pour deux voix d'après les Danses hongroises de Joh. Brahms. Paris: J. Hamelle, 1890-1899(?).
- . Tes yeux (transcription for vocal duet of a waltz by Franz Schubert). Paris: J. Hamelle, 1890.
- . Three Mazurkas. Leipzig: Breitkopf and Härtel, 1865(?).

I was unable to find any information about the life Louis Pomey, but I learned that he was a more active translator and poet than I had previously thought. I discovered a large wealth of music with translations by Louis Pomey. In addition to numerous songs and transcriptions, Pauline Viardot used translations by Pomey extensively in her work as an editor. Viardot edited a series of works for the Parisian publisher Ancne Maison Meissonnier starting in the 1860s. Her publication, École Classique du Chant, contains six volumes of vocal works by various composers, most with French texts by Louis Pomey.

I also discovered compositions by another composer with French translations by Louis Pomey. These works were also published in Paris: Anton Rubenstein's Neuf Lieder sur des Poésies Russes des Kolzoff, Op. 27 and two song cycles by Robert Schumann, his 's Spanisches Liederspiel, Op. 74 and Spanische Liebeslieder, Op. 138.

DISSEMINATION OF THE INFORMATION: My findings are included in an article entitled "Reverse Transcription: Pauline Viardot's Vocal Transcriptions of Chopin Mazurkas." This article has been accepted for publication by Clavier magazine, the primary piano journal in the United States, and is slated for fall 2006. I have also developed a lecture recital that incorporates my findings and have submitted proposals to present my research at three national conferences.

Town, Stephen (Professor of Music in the Department of Music). "An Examination of the Autograph Manuscripts of Flos Campi by Ralph Vaughan Williams." Spring 2006.

During the summer of 2006, Dr. Town conducted archival research at the British Library (St Pancras, London) on the autograph manuscripts of *Flos Campi* by Ralph Vaughan Williams. A NWMSU Research Grant (Spring 2006) funded his round-trip flight to England and a College of Arts and Sciences Research Assistance Award (Spring 2006) defrayed some of the costs for room and board. For a period of ten days, he examined the sketch and the (recently

rediscovered) autograph full score of *Flos Campi* (1925), a suite for solo viola, small wordless chorus, and small orchestra in six movements, each of which is headed by a Latin quotation from *The Song of Songs*. Rapt, intense, yet ultimately serene, this is among Vaughan Williams's most imaginative achievements.

Because the British Library is the repository of Vaughan Williams's manuscripts, it was necessary for Dr. Town to travel to England to conduct an in person examination of the *Flos Campi* material, for none of RVW's manuscripts have been published in any form (holographic reproduction, etc.) and archival research is the only recourse for those who wish to view a composer's constant revision, development, and refinement of ideas. The act involves cataloguing the details of a manuscript, or checking the work done by another scholar, while studying the calligraphy and emendations (among other things) of a composer for evidence of his creative process, compositional procedure, and working methods. Rarely does such archival work provide a truly momentous discovery but, in the case of *Flos Campi*, Dr. Town's perusal revealed several significant differences in the autograph full score from the published edition, which he recorded in the paper documenting his research. Finally, the work that Dr. Town conducted for the grants will be featured in his book, *Essays on British Choral Music*, which will be published by Ashgate Publishing Ltd.

Applied Research Project Grant Final Report
Researchers: Dr. Rebecca Belcher and Dr. Max Fridell

“A Study of Faculty Perceived Satisfaction with Principals' Servant Leadership and Non-Servant Leadership Styles” (Spring 2005)

Abstract

Recognizing the need to maintain the definition of school success as centered on student learning, this study sought to determine if the current principals in elementary, middle school, and high school exercised an operating talent of servant leadership (even if the term itself was unknown) and whether or not such a self-perceived leadership style indicated student achievement according to state sponsored, standards-based assessments. A research study of elementary, middle, and high school principals in a three state Midwestern region was conducted to compare the principals' self-perceived leadership style with the students' results in reading and math on the statewide assessment. The percentage of students scoring in the top two levels on a 5-point scoring scale or in the top level on a 4-point scoring scale of the statewide assessments for each building was entered into data files for statistical analysis by state and region. The student test scores were compared to the self-perceived leadership style of the principal as servant-leader or traditionalists to identify any statistical significance between the students' test scores and the principals' perceived leadership style. The demographic data was analyzed to identify any potential statistical significance between the demographic data, principal leadership style, or students' test scores. Based upon the statistical analysis of data for the three states there was not any significant correlation between the principal's leadership style and students scoring in the top levels on the state assessment for reading or math. Correlations between demographic data and student test scores were not significant at the region level. Although at the single state level the data showed a significant correlation, in one state, between the gender of the principal and higher reading and math test scores. For this state, if the elementary principal were a female then the students scored higher in reading and in math. At the individual state level there was a significant correlation between leadership style and the

number of years that a principal served as a teacher. The longer the person had served as a teacher the more likely the person was to become a Traditional principal and the shorter the person had served as a teacher the more likely the person was to become a Servant-Leader principal.

**Gibson, Dr. Chris, Associate Professor of Music “Solo Clarinet Music of Carl Baermann.”
Fall 2006**

Research Question:

Would the solo clarinet music of Carl Baermann, long out of print, be a valuable addition to the pedagogical literature available to undergraduate clarinet students at Northwest?

Rationale:

Baerman’s technical studies are still widely used in pedagogy, but his solo compositions, are at currently not performed because most are out of print. If these pieces were determined to be of value for undergraduate students, it would be a significant contribution to the pedagogical repertoire.

Preliminary Research:

Before submitting this request, I identified titles of many of Baerman’s pieces by tracing citations in journal articles, bibliographies, publishers’ catalogs, and correspondence, and by searching the Lending Library Catalog of the International Clarinet Association as well as the Internet.

Methodology:

I obtained a total of 28 pieces through inter-library loan, the Lending Library of the International Clarinet Association, and from international libraries (*see attached listing*). The majority of these works are long out-of-print, although a few are still available for purchase.

Each piece was analyzed in terms of technical requirements and musical elements, and the technical difficulty level was assessed and compared to current standard repertoire in order to determine the suitability and practicality of each piece as a pedagogical tool.

Conclusion:

My analyses show that Baerman’s solo pieces are of difficulty levels ranging from intermediate (typical high school level) to lower-level professional. While a few seem to be primarily suited to exercise material, many of his works would indeed be significant additions to the current repertoire for students at Northwest, as well as at other institutions.

Most of these pieces are in out-of-date notational style and could benefit from careful editing and perhaps even arranging. I plan to do this at some point in the future, at which point the pieces will be readily available to students, teachers, and performers.

Presentation:

I compiled analyses of several of these pieces into a Lecture Recital, which was selected through blind review to be included in the International Clarinet Association Meeting held in August of this year in Atlanta, Georgia.

This recital was also presented, with a few changes, at Northwest Missouri State University on September 25, 2006. My accompanist for both presentations was Dr. Anthony Olson.

Town, Stephen (Professor of Music in the Department of Music). “An Examination of the Autograph Manuscripts of *The Soul’s Ransom: A Psalm of the Poor* by Hubert Parry.” Fall 2006.

During the summer of 2007, Dr. Town conducted archival research on the autograph manuscripts of *The Soul’s Ransom: A Psalm of the Poor*, a through-composed “sinfonia sacra” for soloists, chorus, and orchestra, by Hubert Parry (1848-1918), an English composer who was one of the architects of the English Musical Renaissance. Because the Royal College of Music (London) and the Bodleian Library (Oxford University) are the repositories of the autograph manuscripts of this work, Dr. Town traveled to England to undertake his examination.

The examination of autograph manuscripts is the only method by which a scholar can trace a composer’s ideas, from their original conception through their development and revision. The act of examination involves cataloguing the details of a manuscript, or checking the work done by another scholar, while studying the calligraphy and emendations of a composer for evidence of his creative process, compositional procedure, and working methods. Parry’s manuscripts to *The Soul’s Ransom* – sketches, piano-vocal score, and full orchestral score – range from extremely messy and almost illegible to neat and very tidy; and they reveal a number of features common to all of his autographs---pencil annotations and emendations (concerning changes to notes or rhythms and conductor performance indications prior to a concert presentation). And physical additions (measures and pages) via pastedowns. In the final analysis, the examination was very helpful in providing additional information about Parry as a composer and it produced documentation upon which others might build.

Dr. Jackie Kibler, Assistant Professor of Psychology, and Dr. April Haberyan, Assistant Professor of Psychology

“Assessment of Health Behaviors using the National College Health Association Web survey (NCHA-Web)” 2005-2006

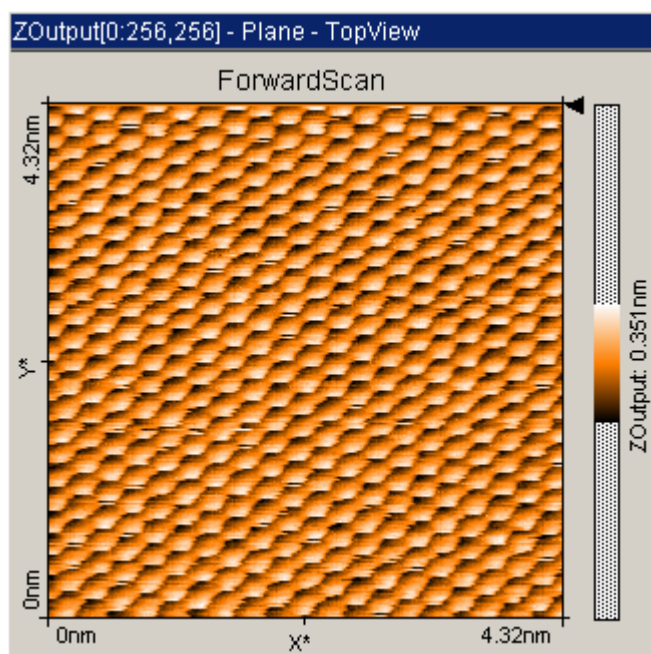
The purpose of the National College Health Association-Web (NCHA-Web) survey was to assess student health in order to provide better services and support for Northwest students. The survey asked students about their health perceptions, behaviors and habits. A total of 475 students participated in the survey. The participants’ rates of alcohol, tobacco and other drug use, mental and physical health, weight, nutrition, exercise, personal safety and violence, sexual health, and impediments to academic success were consistent with national averages. Rates of experiencing a sexually abusive relationship (2.1%) and driving after having 5 or more drinks in the last 30 days (6.8%) were slightly higher for Northwest students when compared to the national averages (1.5% and 4.5% respectively). In terms of Northwest participants’ general health, 54.4% reported allergy problems, 1.3% reported anorexia, 12.6% reported anxiety disorders, 10.2% reported asthma, 2.1% reported bulimia, 15.9% reported depression, 6.6% reported high blood pressure, 5.9% reported repetitive stress injury, 6.4% reported seasonal affective disorder, 2.1% reported substance abuse problems, 55.9% reported back pain, 6% reported broken bones, 10.6% reported bronchitis, 13.2% reported ear infections, 41.1% reported sinus infections and 17.4% reported strep throat. Data from this study reinforces the need for mental health interventions that address anxiety disorders, depressive disorders

Title: Introducing Nanotechnology in Undergraduate Laboratories

Authors: Eichler, Bellamy, Richardson, Jones, Lucido, Toomey

Through an applied research grant and departmental funding an E-Line Scanning Tunneling Microscope (STM) was purchased along with system control and image processing software. The STM allows for the surface features of conductors and semi-conductors to be resolved down to a scale on the order of single atoms ($\sim 0.1\text{nm}$.) Electrons in the materials have to be allowed some freedom of motion to allow them to flow into the STM's tip. Thus insulators cannot be probed by an STM.

Within a day of arrival, initial scans of the surface of graphite had been produced. Graphite is made of carbon arranged in thin layers of atoms connected to three neighbour carbon atoms. This produces a well-known hexagonal pattern of carbon atoms in each layer of graphite. It is a semi-conducting material which means the electrons in the material are not free to move anywhere in the material but are restricted to regions around the atoms in the material. The STM was able to detect the presence of the electrons and map their locations on the graphite surface. The resulting image matched exactly the known hexagonal structure of graphite.



The images of graphite then led to several media outlets becoming interested in our nanotechnological capabilities. Interviews were done with KQ2 news in St Joseph as well as three articles in the St Joseph News-Press (one of which was the cover story of the Business section), and a cover story of the Northwest Newsletter.

Once this attention had died down, the STM became employed in laboratories in General Chemistry 2 lab. Students were able to use the instrument to image the surface of graphite. This allows the students to see the structure of graphite for themselves as well as manipulate the STM and understand the workings of the device. They complete a session working with the STM and then complete several exercises based upon what they have seen/learned.

Feedback from students has been unanimous in their desire to see more labs introduced that use the STM. However, future development of these is limited due to only having a single STM.

This may be remedied in the future as the initial work with the STM was used in the preparation of a \$1.2million Federal Appropriations Grant as justification for our purchasing of more STM's (which is still pending approval.)

The STM has also been used in several research projects. Drs Islam and Richardson worked with student Zheng Dong on the characterization of Silver nanoparticles that were produced by a novel method and Zheng presented his findings at the university Culture of Quality meeting. Dr Richardson is also using the STM to perform research to investigate methods by which insulators, which currently cannot be scanned in an STM, may be made scannable. Currently the research is concentrating on using light as a method of aiding the electrons in insulators to break free of their atoms. Such work is being performed with two MASMC students who, if the project is a success, will present the data at the next Missouri Academy of Science meeting. A paper to a peer-reviewed journal will likely follow as well, as this research would dramatically increase the potential uses of all STM's.

Abstract for Applied Research Grant

Title: A Second-Generation Solar Water Disinfector

Authors: Bellamy, Richardson, Lucido

Initial plans were to use modified sand filtration techniques and new ideas using electric and magnetic fields to isolate impurities in water at a high rate.

The first idea was pursued using MASMC students throughout a spring and May session to prepare the sand. It required coating the sand in a series of chemical reactions and then allowing the water to pass through the pipe. Initial tests on the sample were less than satisfactory and the idea was placed on the backburner.

The second approach was actually heavily modified after performing some research. Water is a difficult material to work with electric fields in due to it's high dielectric constant that causes the electric field in the water to be reduced to 1/80 th of it's value in a vacuum. Because of this difficulty, discussions continued to return to UV disinfection which is a proven technology for disinfecting water and major grants have been given to the development of the process.

The idea emerged of using an effect called Sonoluminescence. This effect is produced when water is passed from a small diameter pipe to a larger diameter pipe at a high flow rate. Tiny air bubbles are produced in the water, which then collapse on themselves giving out visible and ultraviolet light. The process similar to an effect called Cavitation, which is air bubbles produced around the propellers of boats when they reach certain speeds. The exact process that produces the light is unknown, but studies have shown that the inside of the bubble reaches the equivalent of 10,000K for short periods of time. (The surface of the Sun has a temperature of 5800K.)

Depending upon the bubble densities and light intensities it was considered that this approach would be an extremely novel approach to disinfecting water using the high flow rate to benefit the process. To test the potential of the technology, necessary Venturi tubes were purchased. These are specially designed to allow the cavitation process to occur above certain flow rates.

An apparatus was built that used a water pump to pass water at varying speeds through two pipes, one containing the Venturi tube and one containing no tube. The water of College pond was used and samples were collected at three different flow rates. One rate was significantly

below the cavitation threshold, one was around the threshold and one speed was above the threshold.

The samples were then taken to the microbiology laboratory where they were cultured to be able to measure the relative quantities of E. Coli and general bacterial growth in each sample. The hypothesis was that the higher flow rate would see significantly less bacteria than the lower flow rates.

The results of the growths were confusing at best. The high and medium flow rates saw some bacterial killing by comparison with the non-Venturi tube samples. However, the low speed sample showed a kill ratio much greater than those of the high speed samples. This is an intriguing result as the mechanism of the bacterial killing is unknown. However, there is also the issue of the samples becoming contaminated during the whole process, which was a very lengthy affair.

Since collection of this data, this approach has been set aside to allow for completion of data taking and paper writing for the first Solar Water Disinfector which has shown quite remarkable output and an upcoming grant proposal will look into the possibility of setting up the disinfector in Haiti for on-site tests. Time allowing, it is intended that we should return to the sonoluminescence approach and take more data to clarify our earlier results.

ABSTRACT

Researcher's Name: Rafiq Islam, Associate Professor, Dept. of Chemistry and Physics

Project Title: A non-radioactive method for analysis of DNA-protein interaction

Type of Grant: Applied Research and Project Grant

Date Granted: March 2006

Amount Approved: \$1645.00

Date completed: July 2007

Findings and recommendations:

Researchers in molecular and biological sciences routinely analyze DNA-protein interaction. The method widely used for such analysis *in vitro* is Electromobility Shift Assay (EMSA). In this method, a labeled duplex primer (called probe) is allowed to interact with purified or nuclear extracts containing binding proteins, followed by separation of the reaction mixture by electrophoresis on a non-denaturing gel. The widely used choice for labeling probes is the radioactive ^{32}P , because of its high sensitivity in detection. However, this high energy gamma-emitter requires user license for on-site use by the institute and special care to work with. To analyze DNA-protein interaction without using radioisotope labeled probe, we attempted probe labeled with Texas Red (non-radioisotope). Following binding reaction with nuclear extracts prepared from HEK 293T cells in the absence or presence of (unlabeled probe as competitor), the reaction mixtures were injected to size-exclusion column (Bio-Silect SEC125) in a HPLC with detection at 595 nm. As expected, the DNA-protein complex was eluted as a peak separate from the free probe. However, this peak was overlapped with the poly dI-dC reagent used in the reaction to suppress non-specific interactions. Thus, HPLC size-exclusion method can be used to separate DNA-protein complex, if no poly dI-dC is used in the reaction.

These data were included in two recent presentations [Aaron Baker: Biotin labeling of DNA probes and DNA-protein interactions (i) Celebration of Quality meeting at Northwest (Mar 10, 2007) and Missouri Academy of Science meeting at Missouri Western State University (Apr 20, 2007)].

The two equipment parts (HPLC column and Plater Reader filter) obtained through this grant were utilized in two Biochemistry lab experiments (Protein Assay and HPLC: size-exclusion chromatography).