PROCEEDINGS OF THE
FOURTH ANNUAL
UNIVERSITY OF WISCONSIN-EAU CLAIRE
STUDENT RESEARCH DAY

April 22-23, 1996

Center of Excellence for Faculty and Undergraduate Student Research Collaboration

Office of University Research
The UWEC Student Research Day is supported by funds from the UWEC Foundation. Grants supporting Faculty/Student Research Collaborations are made possible through funds provided by the Undergraduate Initiative of the University of Wisconsin System, the UWEC Foundation, and the University of Wisconsin-Eau Claire.

Center of Excellence for Faculty and Undergraduate Student Research Collaboration

Office of University Research
Abstracts are published unedited as submitted by student presenters.
# Schedule of Events

## Monday, April 22, 1996

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<td>7:00 - 10:00 am</td>
<td>Students Set Up Posters</td>
<td>Council Fire Room</td>
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<tr>
<td>9:30 - 10:00 am</td>
<td>Judges Orientation</td>
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<td>10:00 - Noon</td>
<td>Judging</td>
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<td>Noon - 1:00 pm</td>
<td>Judges Luncheon</td>
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<td>Noon - 8:00 pm</td>
<td>Poster Session Open to University Community</td>
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<tr>
<td>3:30 - 5:00 pm</td>
<td>Annual Faculty/Academic Staff Grants Reception</td>
<td>Dulany Inn</td>
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<td>(Student Research Day Presenters are invited to attend beginning at 4:00 p.m.)</td>
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<tr>
<td>4:30 pm</td>
<td>Announcement of UWEC Student Research Day Awards</td>
<td>Dulany Inn</td>
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## Tuesday, April 23, 1996

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Arts and Humanities

Art

Michael Bass (84)
Faculty Adviser/Collaborator: Christos Theo
Title of Research Project: The UW-Eau Claire Children's Center: Environmental Graphics Project

The interior and exterior environment of the UWEC Children's Center was observed and photographically documented. These observations served as a basis for establishing imagery, the appropriate software, and design processes required to create a distinctive visual identity in and around the center. Various color palettes and graphics designed to stimulate the visual and cognitive development in children were analyzed and included in the presentation. The result will be a center which creates an exciting learning environment for children as well as an attractive landmark for the UW-Eau Claire campus.

Aaron Michaelson, Deb Grimm, Julie Miller (85)
Faculty Adviser/Collaborator: Bobby Pitts
Title of Research Project: The Effects of Additive Light from Backlit Displays

We will demonstrate principles of Additive Light through the use of a backlit display(s). The images will demonstrate the principles of Additive Light which incorporates a different set of primary colors than Subtractive Light.

Foreign Languages

Carolyn Borst, Holly Elmer, Sara Erpelding, Tomas Chitic (88)
Faculty Adviser/Collaborator: Roma Hoff
Title of Research Project: A History of CAMPUS (Central American Program for Undergraduate Scholarships) at the University of Wisconsin-Eau Claire and a Directory of CAMPUS I, III, V, VIII, IX: 1986-1996

The research project, entitled "A History of CAMPUS (Central American Program for Undergraduate Scholarships) at the University of Wisconsin-Eau Claire and A Directory of CAMPUS I, III, V, VIII, IX: 1986-1996", is a book written by Dr. Roma Hoff, Carolyn Borst, Holly Lynn Elmer, Sara J. Erpelding, and Gonzalo Norori. This book describes the role of CAMPUS at UW-EC during an important period of increased diversity, remarkable growth in Spanish enrollment, growing interest in Latin American Studies and the coming inauguration of a Study Abroad Program in Costa Rica. It begins with a history of CAMPUS 1986-1996. Then, it continues with profiles of the 47 CAMPUS graduates who studied at UW-EC and the 26 who are presently enrolled and will graduate in 1996 and 1997 by focusing on family, activities and experiences at Eau Claire, past studies and work experiences, post-graduate employment, and plans for the future.

Holly Lynn Elmer (89)
Faculty Adviser/Collaborator: Cheryl Riess
Title of Research Project: Crossing Boundaries: The Definition of Identity in Narrative by Latin American Women Writers

The literary analysis project examines how narrative by Latin American women writers deals with the increasingly complex, changing definition of female identity in Latin American society. By examining several contemporary works by Latin American women writers, it is possible to explore and appreciate the evolution of a woman's identity based on self-definition rather than a definition imposed by the society at large. The research includes both analysis of primary texts, short stories by women from eight Latin American countries, and an extensive review of the literature already published about Latin Ameri-
can women's narrative. This study contributes to the dialogue about Latin American women's literature, and introduces new topics into it. In literature, the question of Latin American women's identity has, until recently, been primarily addressed by men. Writing by Latin American women was not widely disseminated until the 1970s, so the study of this literature is a contemporary phenomena. Latin American women's self definition has changed in the twentieth century and this project furthers that study.

Journalism

Akira Hangai (87)
Faculty Adviser/Collaborator: Jan Larson
Title of Research Project: Communication and Journalism Web Site Study

This project seeks to determine the feasibility of developing and launching a Department of Communication and Journalism Web site through review of existing Web sites related to the field and through analysis of technology and expertise required to construct and maintain such a site. The project also seeks to develop a rationale for implementing and maintaining a Web site as a resource for students, faculty and communication and journalism professionals. If deemed feasible, project participants will begin initial stages of Web site development.

Melissa Matczak, Kari Thoe (86)
Faculty Adviser/Collaborator: Jan Larson
Title of Research Project: Integrating Computer-Assisted Reporting into Journalism Curricula

Past research has highlighted the value of employing computer-assisted reporting techniques and detailed specific problems of introducing computer-assisted reporting experiences in journalism programs. This project examines some of the methods journalism faculty around the country use to integrate computer-assisted reporting into their curricula. In so doing, the researchers sought to develop a primer of techniques and approaches which may offer solutions to other faculty seeking to overcome obstacles to teaching computer-assisted reporting.

Sociology and Anthropology

Rochelle Frounfelker (90)
Faculty Adviser/Collaborator: Melissa Pflug
Title of Research Project: Seneca Socio-Religious Movements as Cyclical Ritual Process

This paper examines the Seneca's socio-religious movement in the early 1800s. The movement, spawned by Handsome Lake, enhanced tribal unity to counter pressures associated with Europeans. Understood as a ritual rite-of-passage, Handsome Lake's movement achieves "communitas," or breaks down traditional societal structure and creates tribal solidarity. Handsome Lake's movement becomes cyclical in structure: it begins with tribal disunity in the face of negative extrinsic forces; culminates in internal tribal unity achieved through communitas; and, results in the re-entrance into interaction with external forces with a renewed sense of personal and tribal self.
Behavioral and Social Sciences

Computer Science

Bradley Phelps (93)
Faculty Adviser/Collaborator: Susan Harrison
Title of Research Project: Paper Verses Online Newspapers: A Comparison of User Performance

The desire to access information in the "Information Age" drives us toward a different source of information—the World Wide Web. By using the World Wide Web, not only can one access information, one can also share information with others around the globe. A question arises: Is it more efficient to gather information from the World Wide Web than using print media? To help answer this question, a version of a student print publication was created for the World Wide Web. With the two versions—the Web Version and the Print Version—user performance and user preferences were then compared.

Economics

Danielle Alberg (25)
Faculty Adviser/Collaborator: Rose-Marie Avin
Title of Research Project: The Changing Trade Relationships Between Latin America and the European Union: A Comparative Analysis of Brazil and Argentina

It is generally argued in the trade literature that the commercial relations between Latin America and the European Union have been difficult and have deteriorated relatively since the Treaty of Rome was signed in 1957. Given that Latin America exports primarily agricultural commodities, critics argue that the restrictive trade policies of the Union have hurt the region. The purpose of this project is to study to what extent two of the largest traders with the Union - Brazil and Argentina - have been affected by the Union's trade policies. Through the analysis of economic policies and trade data during the period 1960-1990, we intend to identify the trends in the relationship, the factors which have influenced it over the years, and the factors which are likely to influence it in the future.

Jeff Bilot, Kelley Pahl (31)
Faculty Adviser/Collaborator: Jan Hansen
Title of Research Project: Price Index for Regional Economies

Economic data, especially on price changes, are not readily available for small metropolitan areas like Eau Claire. This project is undertaken to help fill part of that void by developing a local index to measure price changes.

Developing an index to measure regional price changes requires several steps. First, a market basket of goods representing the spending pattern of typical families in the area must be assembled. Next, each item in the market basket must be weighted according to local spending patterns. Representative sampling sites for collecting price data must be selected and personnel at the sites must be briefed on their responsibilities. And finally, a computer (spreadsheet) program must be selected and prepared in order to run the data and to calculate and display the price index information.

The index will provide the business community, regional economic planners and regional economists with more current local economic data for analyzing changes occurring in their specific markets and in the regional economy. This should, in turn, provide a better base from which to plan.
Travis Myren (32)  
Faculty Adviser/Collaborator: Edward Young, Jan Hansen  
Title of Research Project: Regional Economic Development Efforts in West-Central Wisconsin and Southern Denmark/Northern Germany

The research project consists of two components. The first is to gather economic and demographic information about the West-Central Wisconsin region and compare that with similar demographic and economic data from Southern Denmark/Northern Germany. The second component of the project consists of gathering information about local development efforts in West-Central Wisconsin. My research will identify the local economic development organizations as well as ask them to respond to questions about how they are organized, how they operate, and how they evaluate their performance. All of this information will be integrated into a comparative paper on economic development efforts in West-Central Wisconsin and Southern Denmark/Northern Germany.

Geography

Chad Bartz, Chad Bergo (38)  
Faculty Adviser/Collaborator: Brady Foust  
Title of Research Project: Redefining the ‘Borderlands’: Ethnicity and Surnames

This project combines traditional field research with new electronic data sources to redefine the American region communally called the ‘Borderlands’. This region is marked by an Hispanic imprint on the cultural landscape and extends into five southwestern states. It has been defined in a number of ways over the past half-century. This project is focused specifically on ethnicity and surnames derived from electronic data sources and mapped using Geographic Information Systems (GIS) techniques. Ethnicity was derived from the 1990 Census and Hispanic surnames were extracted from electronic telephone directories. Field checks were conducted during March, 1996 to provide ‘ground truth’ evidence for the project. Our measures can be compared to other definitions of the Borderlands to derive a complex, multifeature region.

Jay Bohac, Brian Greeler (37)  
Faculty Adviser/Collaborator: Brady Foust  
Title of Research Project: Redefining the ‘Borderlands’: Toponyms

This project combines traditional field research with new electronic data sources to redefine the American region communally called the ‘Borderlands’. This region is marked by an Hispanic imprint on the cultural landscape and extends into five southwestern states. It has been defined in a number of ways over the past half-century. This project is focused specifically on ‘toponyms’ derived from electronic data sources and mapped using Geographic Information Sys-
Toponyms are place names usually given by the original literate settlers. The toponyms were derived Geographic Names Information System (GNIS) produced by the United States Geological Survey. Field checks were conducted during March, 1996 to provide 'ground truth' evidence for the project. Our measures can be compared to other definitions of the Borderlands to derive a complex, multi-feature region.

Paul Hanson, Bill Hodena (36)
Faculty Adviser/ Collaborator: Brady Foust
Title of Research Project: Redefining the 'Borderlands': Socio-Economic Patterns

This project combines traditional field research with new electronic data sources to redefine the American region communally called the 'Borderlands'. This region is marked by an Hispanic imprint on the cultural landscape and extends into five south-western states. It has been defined in a number of ways over the past half-century. This project is focused specifically on socio-economic conditions derived from electronic data sources and mapped using Geographic Information Systems (GIS) techniques. Specific socioeconomic conditions, such as income, education, and occupation, that have been previously identified by other researchers were singled out for study. The data were derived from the 1990 Census and from projections contained in the Conquest Information System as produced by Strategic Mapping, Inc. Field checks were conducted during March, 1996 to provide 'ground truth' evidence for the project. Our measures can be compared to other definitions of the Borderlands to derive a complex, multi-feature region.

Kent Marcelle, Karolyn Tamke (35)
Faculty Adviser/Collaborator: Brady Foust
Title of Research Project: Redefining the 'Borderlands': Patterns of Language

This project combines traditional field research with new electronic data sources to redefine the American region communally called the 'Borderlands'. This region is marked by an Hispanic imprint on the cultural landscape and extends into five south-western states. It has been defined in a number of ways over the past half-century. This project is focused specifically on language patterns derived from electronic data sources and mapped using Geographic Information Systems (GIS) techniques. The maintenance of Spanish as a 'mother tongue' has always been a hallmark of the Borderlands. All data were derived from the 1990 Census. Field checks were conducted during March, 1996 to provide 'ground truth' evidence for the project. Our measures can be compared to other definitions of the Borderlands to derive a complex, multi-feature region.

Lisa Theo (33)
Faculty Adviser/Collaborator: Brady Foust
Title of Research Project: United States Urban Structure: Rank Size 1790 - 1990

Urban geographers have long studied city growth and development by determining city rank. Current studies include United Stated Census data through the 1980 census. This project updated the rank size database in the geography department to include the 1990 census data. SPSS and AGIS statistical and mapping software programs helped to create a series of maps and charts analyzing the change in city rank from the first census to the present.
Lisa Theo (40)
Faculty Adviser/Collaborator: Sean Hartnett
Title of Research Project: The Economic Landscape: Billboards and the Interstate

Global Positioning Systems (GPS) technology helped to locate the position of billboards along Interstate 94 between the cities of Madison and Eau Claire, Wisconsin. This locational information, along with information about the type and distance to the advertised feature, became the database for this study. SPSS, Maptitude, and AGIS statistical and mapping software programs assisted in analyzing the frequency and distribution of billboards along the interstate.

Lisa Theo, Mark Westphal (39)
Faculty Adviser/Collaborator: Brady Foust
Title of Research Project: Redefining the 'Borderlands': Patterns of Religion

This project combines traditional field research with new electronic data sources to redefine the American region communally called the 'Borderlands'. This region is marked by an Hispanic imprint on the cultural landscape and extends into five southwestern states. It has been defined in a number of ways over the past half-century. This project is focused specifically on patterns of religion derived from electronic data sources and mapped using Geographic Information Systems (GIS) techniques. The maintenance of Spanish as a 'mother tongue' has always been a hallmark of the Borderlands. All data were derived from the 1990 Census and from “Churches and Church Membership” database produced by the Roper Center for Public Opinion Research in 1990 and made available in electronic form. Field checks were conducted during March 1996 to provide ‘ground truth’ evidence for the project. Our measures can be compared to other definitions of the Borderlands to derive a complex, multi-feature region.

History

Lisa Theo (91)
Faculty Adviser/Collaborator: James Oberly
Title of Research Project: Student Research Promotes Economic Development

Tourism promotion in Wisconsin has long been dependent on print and television marketing. Advances in computer technologies have created an entirely new type of advertising medium. This project explored the potential for computer-based tourism information for the State of Wisconsin. Information was compiled from other states to determine the extent of current computer-based data. This included interactive computer applications on-site and websites on the Internet. Research about past tourism promotions in Wisconsin and current computer-based promotions in other states will be used to recommend a course of action for the Wisconsin Department of Tourism.

Housing

Matthew Corso, Mike Nettekoven, Heather Tomter, Jennie Schwarz (92)
Faculty Adviser/Collaborator: Jennifer Lee
Title of Research Project: How the Media Affects the Habits of College Students at UWEC

The idea for this project came from a concern for the effectiveness of the recycling program in the residence halls at UWEC. Our group conducted a trash audit where we measured the amount of recyclables in the normal trash by actually extracting them from the trash bins. The purpose of this project is to determine if an aggressive ad campaign will affect recycling habits of the residents of Putnam Hall. Our research will cover a three week period where periodic measurements of recyclables are taken in Putnam Hall and our
control hall, Katherine Thomas Hall. During the second week we will conduct an ad campaign and measure its influence on recycling habits. Finally, we will compare the results and determine the overall effectiveness of the media campaign.

Journalism

Joseph Gunderson (34)
Faculty Adviser/Collaborator: Karen Kremer
Title of Research Project: Experimenters' Age Differences Compared to Subject Responses

The number of people aged 55+ is growing rapidly. As more young people are doing research with older subjects, it is increasingly important to clarify some methodological issues. This study will examine age difference of experimenters as a predictor of subject responses and extend journalistic agenda-setting theory that explores consumers’ attitudes about a health issue. With a 2 x 2 factor design and regression analysis, the researchers will focus on attitude difference in subject responses after controlling for subject age, experimenter age, and advertisement stimuli.

Political Science

Alison Deneka, Donald Dudley, Matthew Fannin, Jennifer Kothbauer (42)
Faculty Adviser/Collaborator: Ernest Morgan
Title of Research Project: Teaching the Vietnam War: Evaluation of Two Types of Source Materials

This study has examined the issue of noncooperative states, sometimes referred to as "outlaw" states, in the international community. These states are ones that violate established international norms (e.g. nuclear weapons proliferation, human rights standards, etc.) on a regular basis. This study used the Democratic People's Republic of Korea (DPRK) as a case study. This state is viewed as an outcast from the international community based upon the repressive nature of its authoritarian government, its past violations of international sovereignty, and its communist ideology. While other "outlaw" states are involved with many international organizations, economic and political, the DPRK is precluded from the important international organizations, such as the International Monetary Fund, because of its communist ideology. Therefore, the DPRK's only significant interaction with the international community comes through general purpose organizations. This study has explored the relationship of the DPRK with the United Nations, a general purpose organization. This relationship has been analyzed using the issue areas of economic development, human rights, and nuclear proliferation. The information gathered for this study is being used in an attempt to develop a model for predicting behavior of the DPRK and other noncooperative states as the world moves into the 21st century.

Kristin Krueger (41)
Faculty Adviser/Collaborator: Leonard Gambrell
Title of Research Project: Teaching the Vietnam War: Evaluation of Two Types of Source Materials

Research project involving 1 student and 1 faculty member in collaborative development of a manuscript on the comparative value of the perspectives of Vietnam combat veteran authors (novels and memoirs) and professional textbook writers on the Vietnam War. Project makes direct use of work previously completed by students applying formal content analysis to 6 works by combat veterans (1993-1994) and 3 textbooks (1994-1995). Research will focus on whether scholars can (or
should) make use of both types of literature when teaching courses on the Vietnam War, American Foreign Policy, National Security, etc. Furthermore, research will determine how much does it matter, and why.

Psychology/Counseling Services

Heather Crosby, Tanya Clow, John Congemi, Melanie Huber, Wyatt Jirsa, Natlie Kinkel, Stacey Kolar, Evan Stanelle (43)
Faculty Adviser/Collaborators: P.J. Kennedy, Dennis Greene, Allen Keniston
Title of Research Project: A Survey of College Student Time Management Practices and Correlates

A cover letter, copy of The College Time Management Survey, scantron sheet and return envelope were mailed to a 10% random sample of UWEC students. The survey instrument contains questions about time management practices and factors that may be related to time management (e.g., stress level, predicted GPA). Survey results will provide a description of time management practices and instrument norms for this campus. Results will also provide an indication of the relationship between time management practices and both academic success and the experience of stress. Results may aid in the design of future experimental studies, and may help indicate whether provision of Time Management Skill Training to UWEC students would be a meaningful use of resources.

Cindy Schaller, Trish Burgess, John Fetterer, Amy Frazier, Sarah Henkenius, Corrine Peters (44)
Faculty Adviser/Collaborator: Allen Keniston, Dennis Greene, P.J. Kennedy
Title of Research Project: A Survey of the Correlates and Consequences of College Student Stress

This is a study of college students’ experience of stress. The work will assess the degree of stress UWEC students undergo and how stress impacts their performance, and will help us to understand an increase in student failures in recent years. The study involves: (a) development of a “life stress” scale based on surveys of students during the Fall 1995 term; (b) administration of the scale to a convenience sample of 100 UWEC students for item and reliability analyses; (c) administration of a refined scale to a 10% random sample of UWEC students. The analysis of the results will describe the nature and frequency of the stressors encountered by students, the levels of the stressors, and the correlations of stress with G.P.A., gender, year in school, and the number of hours students work.

Psychology

Kelly Gonske, Tamilyn White (45)
Faculty Adviser/Collaborator: William Frankenberger, Human Development Center
Title of Research Project: Long-Term Effects of Methylphenidate on Academic Achievement from First to Fifth Grade

The objectives of the current study were to identify the long-term effects of Methylphenidate (Ritalin) on cognitive ability and academic achievement. A retrospective/longitudinal design was utilized in the study with the following dependent measures: (a) achievement score from the Iowa Tests of Basic Skills (ITBS), (b) Wisconsin Third Grade Reading Test, and (c) cognitive ability scores measure by the ITBS. The study originally included 17 experimental subjects who were identified with ADHD and placed on Methylphenidate between first and second grade. For each experimental child, a control child without ADHD was matched based on gender, Verbal IQ score, and family structure. In the current study, however, only 14 paired subjects were used due to children moving out
of the school district. The Methylphenidate and Contrast groups' 1st, 2nd, and 5th grade achievement and cognitive scores were compared. Results contrasted previous research findings that Methylphenidate improves academic skills; although it may have occasional fleeting effects, overall performance seemed to decrease longitudinally. In the time span from first to fifth grade, there was no indication on any of the measures that children on medication had increased their achievement levels to the point that they were catching up to the children in the Contrast Group. In fact, there were significant differences that indicate that children in the Methylphenidate group were falling further behind.

Sarah Hausmann (46)
Faculty Adviser/Collaborator: Blaine Peden
Title of Research Project: A Content Analysis of Graphics in Psychology Textbooks

We performed a content analysis of the numerical graphics in a sample of introductory and advanced psychology textbooks. Preliminary results indicated that: (a) a narrow range of graphical presentations of data appear in psychology textbooks, bar graphs tend to be overrepresented in introductory books and underrepresented in advanced texts, and scatter plots tend to be underrepresented in introductory books and overrepresented in advanced texts. Our findings have implications for instructors who must decide what graphic skills to teach and where in the psychology major to teach them.

Kimberly Kalupa, Tamilyn White (47)
Faculty Adviser/Collaborator: Damian Vraniak, Human Development Center
Title of Research Project: Voice from Within: Challenges and Needs of the Lac du Flambeau Community as Voiced by its Families

Ninety-four Ojibwa families residing on the Lac du Flambeau reservation completed a survey designed to allow family members to voice the challenges they have faced this year and the needs they anticipate for each member of the household. To ensure completion of the surveys, interviews were conducted by staff from the Family Resource Center at the reservation. Descriptive analyses were done on the data to assess the nature and prevalence of challenges faced and needs anticipated by Lac Du Flambeau families. An inclusive coding schema was developed to identify domain (problem type), setting (where the problem occurred), interaction (number of people involved), relationship (nature of the exchange) and specific (detailing the problem). Specific needs and challenges were clustered and nonparametric analyses such as frequency analyses and contingency tables were conducted. Challenges and needs varied by age, with a prevalence of emotional issues throughout all age groups. Though many interesting patterns were noted, one of the most significant was the progression through the domains as a function of age. Preschool concerns (0-4) were largely emotional, school-age children (5-12) had emotional and educational issues, adolescents (13-19) faced mainly social and emotional concerns, while adults reported physical and emotional challenges. Results will be used in the on-going development of a community program to address the concerns as voiced by the community.

Corrine Peters, Son Nguyen (96)
Faculty Adviser/Collaborator: Karen Roper
Title of Research Project: Keypecking Preferences of Pigeons in Autoshaping

Autoshaping or sign-tracking procedures involve the conditioned stimulus (CS) followed by an unconditioned stimulus (US). With numerous pairings of CS (a lighted response key) and US (grain food) a reliable key-pecking response can be established to the CS in pigeons. An experiment compared the acquisition of the autoshaping response of pigeons
exposed to either a random presentation of three key light locations or successive presentation of a single key location. Eight White Carneaux pigeons were maintained at 80% of their free-feeding weight throughout the experiment and were arbitrarily assigned to one of three groups. Two pigeons received a random key presentation of the autoshaping procedure (center, left, and right keys were presented in random order across trials followed by a food reward). The remaining birds were assigned to one of two successive key-training schedules. Some birds were autoshaped first to the center key, then to the left and finally, right key. Other birds received center, then right, and finally left key presentations during autoshaping. A bird was transferred to each key location after reaching a criterion of 25 out of 30 possible pecks per session. A similar baseline was used to examine the acquisition of the autoshaping response for the random presentation group. Between-group comparisons assessed the number of sessions until birds pecked each key location to criterion. Results from this study may provide evidence concerning the optimal autoshaping procedure to be used with pigeons. One mechanism for this may be foraging to a specific food source is more desirable than having to locate a food source with other competing sources.

Matthew Welch, Jason Anderson (95)
Faculty Adviser/Collaborator: Karen Roper
Title of Research Project: Match-to-Sample Procedure as a Precursor to a Directed Forgetting Investigation of Animal Memory

Eight white Carneaux pigeons were autoshaped to peck at an illuminated stimulus key. After successful autoshaping, pigeons were trained in a match-to-sample (MTS) procedure. MTS consisted of the presentation of a red or green center sample key. After 20 pecks to the sample (FR20), both (comparison) side keys (red and green) were illuminated. A single peck to either key resulted in termination of the sample and the start of a 10 sec. intertrial interval (ITI). Only pecks to the matching key resulted in reinforcement. After a criterion of 90% correct MTS performance was obtained for two consecutive days, delays were inserted between sample and comparison stimuli (delayed-match-to-sample technique, DMTS). DMTS has been extensively used to investigate animal memory. In the current DMTS procedure, a directed forgetting technique was implemented, such that one of two conditional cues was presented during the delay interval between sample and comparison stimuli. Presence of a remember cue (R-cue) indicated that memory for the sample would be tested on that trial; presence of a forget cue (F-cue) indicated that there would be no test. Animals were later tested for memory of the sample following a F-cue on expected "probe" trials. Accuracy on these probe trials was later compared to performance on R-cue trials. Differences in memory test accuracy were used to explore active memory processes in animals. Such examination of active memory through directed forgetting is the end-goal of the current MTS procedure.

Sociology and Anthropology

Hwa Ji Shin (94)
Faculty Adviser/Collaborator: Helaine Minkus
Title of Research Project: Analysis of Cultural Adjustment and Readjustment

This research is the anthropological analysis of cultural adjustment and readjustment with special reference to Japanese and American exchange students. Despite the fact the number of exchange students is increasing every year, the study about their cultural adjustment and readjustment has not proportionately developed along such a tendency. Although few studied their problems and patterns of cultural adjustment and readjustment, many ex-
change students in both countries certainly face and suffer similar or dissimilar types of problems and follow certain patterns of adjustment and readjustment. Reviewing the literature related to this topic, analyzing the data from Japan in the past five years, and observing an actual subjected population at UW-EC, we try to seek the variables of their problems and patterns of cultural adjustment and readjustment. We endeavor to provide help to students who are eager to gain international experience in the future. We would also like to give some sense of adjustment to their own culture for those who come back with very valuable experience from abroad.

Business and Professional Studies

Adult Health Nursing

Vicki Berg, Jill Hellenbrand, Kim Kalupa, Christi Moritz Skamfer, Christa Richmond, Heather Sarauer (51)
Faculty Adviser/Collaborator: Joan Stehle Werner
Title of Research Project: Living and Coping with Cancer: Women's Experiences

Purposes of this exploratory and phenomenological study are to explore and describe the experiences of living and coping with cancer in women with breast or gynecological cancer. At least ten women with various diagnoses are being interviewed using open ended questions centered on the topics of stress, coping, support received, spirituality, meaning, and quality of life. Interviews are being audio-taped and confidentially transcribed for analysis purposes. Participants are being sought through three methods of convenience sampling: typical case sampling, snowball sampling, and opportunistic sampling. Eleven standardized open-ended interview questions guide the interviews. Themes from the data are being analyzed using the methods described by Miles and Huberman (1994).

Nicole Combs (49)
Faculty Adviser/Collaborator: Sheila Smith
Title of Research Project: The Use of Computer Technology in Qualitative Research

The computer program, “Martin,” was very useful in organizing qualitative interview data. In this particular project, “Martin,” was used to help organize interview data from nursing research involving women's sex and gender experiences. Organizing data in this manner was an initial step in the process of finding major themes and patterns in the research interview data as a whole. It allowed the researcher to view the interview data in a format that was already organized into common groups.

Heidi Deininger, Nicole Earnhart, Deb Podrez, Pat Hardwick-Smith (50)
Faculty Adviser/Collaborator: Sue Peck
Title of Research Project: Pain and Functional Ability in Elders with Arthritis

The purpose of this experimental study is to determine the effectiveness of Therapeutic Touch (TT) and progressive muscle relaxation (PMR) for pain and functioning in elders with arthritis. One hundred thirty noninstitutionalized subjects, age 55 or older, with degenerative arthritis, were randomly assigned to PMR or TT treatments. Subjects served as their own control for four weeks, and then received six treatments, at one week intervals. Instruments used were the Visual Analogue Scales (VAS), McGill Pain Questionnaire (MPQ), and the Arthritis Impact Measurement Scale-2 (AIMS-2). Measurements were taken on admission and week three of the control time, and with the first, third and last treatments. Subjects recorded pain medications used daily.
Descriptive statistics will describe the sample and assess distributions. Demographic data will be analyzed for comparability of groups. Differences between groups will be treated as covariates in subsequent multivariate analysis. Pain medication data will be analyzed using individual regression in time of dosage. If regression slopes differ significantly, slope will become a covariate. Formal comparisons of data from the VAS, MPQ and AIMS-2 will be done using repeated measures ANOVA. If an overall significant difference is detected between treatment groups, pairwise comparisons will be used to determine if TI is more effective than PMR at specific time points.

**Curriculum and Instruction**

**Allied Health Professions**

Courtney Hahm, Matt Jackson, John Biondi, Jill Juszczyk, Suzanne Peloquin, Shad Cooper, Michael Hogesth, Craig Johnson, Joel Aggerholm, Sarah Anderson, Francisco Nunez (21)
Faculty Adviser/Collaborator: Lee Anna Rasar
Title of Research Project: The Effects of the Arts on Racial Attitudes of Prisoners

This project involved conducting a survey of prisoner’s attitudes about race and hope for the future before and after the prisoners saw a play about the use of theatre in a Holocaust ghetto. After the pre-test was given, UW-EC student cast members from the play Ghetto met the inmates to present a history of the Holocaust prior to performing the play for them. The cast members presented the play Ghetto and returned to meet with the inmates to discuss reactions to the issues in the play. The music therapy student involved in this project used comments and attitudes expressed during this post-play discussion to write lyrics set to the tune of one of the songs the Jews sang to remind them of hope. Inmates and cast members received a copy of this song and inmates discussed and sang it to remind them of hope also. The prisoners that participated in this study were male state inmates housed in the Eau Claire County Jail. However, all but 5 of the inmates that participated were moved out of this jail prior to completion of the post-test. Therefore, no conclusions were made from this study in the area of research, due to lack of complete data. Nevertheless, comments from the inmates and papers written by the UW-EC students involved revealed that the experience had a positive and deep impact on their lives.

Emily Gryskiewicz (60)
Faculty Adviser/Collaborator: Robert Hollon
Title of Research Project: Exploring Elementary/Middle Level Students' Scientific Thinking About Astronomy

In planning and teaching science, it is critical to know and understand students’ thinking of important themes in order for the students to achieve a meaningful understanding of the topics. This astronomy research project is a continuation from 1995. Students were shown examples of important astronomy concepts followed by open-ended questions and probes. Thirty-two students in grades two/three, six, and eight were interviewed. The interviews were audio-taped for transcribing and were analyzed by constant comparison.

As concepts emerge from the interviews, categories are developed. Pre-findings show that most students in all levels can recite aspects about the planets, but the upper levels do not recite as many specific details about them as do the lower levels. Inconsistencies exist in the grade levels when the students are asked to explain a phenomena, such as how day and night occur or the structure of the solar system, then asked to show what they mean with objects representing the planets. For example,
a student replies that the planets do not move, but later shows that the earth circles the sun. A few students name the planets “in order,” but demonstrate that the planets do orbit the sun, following each other in a single ring around it.

Christa Przytarski (59)
Faculty Adviser/Collaborator: Robert Hollon
Title of Research Project: An Investigation of Middle School Students’ Conceptions of Illnesses and Diseases

An important part of the knowledge base of successful teachers is an understanding of student scientific thinking. The purpose of this study is to explore middle school students’ conceptions of illnesses and diseases. Clinical interviews were conducted with thirty 6th, 7th, and 8th grade students. The interviews included a card sorting task, picture associations, and the use of explanation questioning strategies to reveal students’ conceptions. The interviews were audio-taped and transcribed for analysis by a constant comparison strategy. The process revealed patterns in the students’ responses to the interview tasks. These patterns were linked to conceptual issues about illnesses and diseases. Preliminary findings suggest that even without formal instruction about illnesses and diseases, many students have a great deal of familiarity with these issues. A pattern revealed through these interviews suggests that some students at the sixth grade level equate the transmission of cancer to that of AIDS. Many students are able to explain why they believe smoking is harmful and no students feel that illnesses and diseases can be transmitted through telephone lines. Early findings also show that the disease most unfamiliar to students is diabetes.

Communication Disorders

Joanne Herbenson, Tom Sather (57)
Faculty Adviser/Collaborator: Thomas King
Title of Research Project: AAC Access Method Cosmesis as Determined by Fifth Grade Males

In this study, 5th grade males rated the cosmesis of 13 different augmentative/alternative communication access methods to a speech synthesizer. A normally developing 11 year old male was previously videotaped using these 13 access methods. Five 5th grade males were given score sheets, viewed the videotape, and rated the appearance of each method. Results suggested that access methods containing technological hardware were most appealing and that body location of an access method did not affect cosmetic appearance.

Amy Youmans (58)
Faculty Adviser/Collaborator: Lisa LaSalle, Linda Carpenter
Title of Research Project: Assessing the Effects of Phonological Facilitation on Children’s Fluency

The Covert Repair Hypothesis of childhood stuttering asserts that children who stutter have a slowed-down ability to phonologically encode, which leads to stutterings as by-products of self-repairs. Two studies will be presented here, one involving children who do not stutter, and the other, children who do stutter. It was hypothesized that children would speak more fluently when phonological encoding demands are lower, such as when a monosyllabic word ends with same final consonant or “coda.” In the first study, subjects were 20 boys with normal speech, language, voice and hearing (M age = 56 mos; SD = 10 mos). Two stories with similar syntactic and semantic structures were composed.
Both stories were loaded with 18 monosyllabic words, the “same coda” story (i.e., /n/ coda); the “varied coda” story with codas other than /n/. Each boy retold both stories, with same coda and varied coda conditions counterbalanced. The experimenter told the story and the child retold it three times, using most (14/18) of the target words for each story. Results showed that these children produced significantly more within-word disfluencies and audible sound prolongations in the varied coda story. This supported the hypothesis that increased phonological encoding demands decreases fluency, at least in children who do not stutter. In the second study, preliminary results were obtained from a three-year-old boy who stutters. He did not complete the story retelling task. The task was modified to improve further data collection. It is speculated that higher sensitivity levels in children who stutter account for this between-talker group difference.

Family Health Nursing

Cynthia Bayer (29)
Faculty Adviser/Collaborator: Barbara MacBriar
Title of Research Project: Spouses of Persons with Dementia of the Alzheimer’s Type

Spouses of persons with Dementia of the Alzheimer’s Type are sometimes in the stressful situation of caring for their ill spouse. They must be able to use coping skills effectively to prevent further stress and illness. The purpose of this project is to identify the needs of these spouses and some possible nursing interventions related to their coping strategies. Five spouses of persons with Dementia of the Alzheimer’s Type who are members of a support group were invited to participate in a thirty to sixty minute audiotaped interview. The interviews were transcribed by the researcher and are being analyzed for commonalities. It is hoped that by identifying needs and possible nursing interventions, nurses will be able to assist spouses of persons with Dementia of the Alzheimer’s Type to cope with their difficult situations.

Lynn Cannon (27)
Faculty Adviser/Collaborator: Barbara MacBriar
Title of Research Project: Children’s Perceptions of Hospitalization

Hospitalization and surgery can have adverse psychological effects on children that may be prevented by preoperative intervention procedures. By looking at the views of children’s hospitalization, identification of effective preoperative intervention procedures can be elicited. The purpose of this study was to examine a child’s coping responses and behaviors associated with periods of hospitalization and how hospitalization affects children during various developmental stages. The sample consisted of 5 children (2 girls and 3 boys), ages 6-12. After obtaining parental consent, the children were interviewed on tape regarding their hospitalization experiences. The tapes were transcribed and data analyzed for various topics and themes. By understanding the fears and anxieties experienced by hospitalized children, health care professionals will be more knowledgeable regarding effective preparation interventions. Current literature suggest many interventions that can be elicited to prepare children for hospitalization such as hospital tours, slide presentations, play therapy and drawing.

Allison Deno, Lisa Moilanen (48)
Faculty Adviser/Collaborator: Susan Diemert Moch
Title of Research Project: Alternative Treatments After Breast Cancer: A Pilot Study

The goal of this pilot project was to identify costs of alternative health treatments for
midlife women diagnosed with breast cancer. Six women who were five years post initial treatment for breast cancer were interviewed. Questions from the Use of Alternative Health Therapies Interview Guide developed for this study were used. Information about alternative health treatments used after initial medical treatment was sought. This sample group was a convenience sample of six midlife women who were involved in a previous study on the experience of breast cancer with ten women. All ten were invited to participate. It was discovered that two of the women had died and two did not respond. The interviews were conducted over the telephone and later transcribed for analysis. The women were asked what types of alternative health treatments were used. Costs will be determined based on the current market rate. The data from this study is currently being analyzed.

Jessica Hankes, Kimberly Hertel, Stephanie Roekle-Froehlich (28)
Faculty Adviser/Collaborator: Audrey Bryan
Title of Research Project: Growing as a Couple and Family: Measurement and Data Collection

This project focused on collection of longitudinal data on 147 couples who had participated in the prenatal phase of this study on couple relationships during the transition to parenthood. The follow up study includes data on parent child interaction along with the couple relationship focus. Student researchers developed their role in data collection, including subject recruitment and retention, collection of interview, observational and questionnaire data, data management, and data entry. The use of the standardized questionnaire, open ended questionnaire, interview and observation of parent-child interaction is highlighted. Student experiences in the recruitment, measurement and data collection processes are compared with literature sources.

Suzanne Logan, Jerry Skoug (22)
Faculty Adviser/Collaborator: Kathryn Anderson
Title of Research Project: Continued Analysis and Additional Data Collection in the Family and Illness Stress Project

This study examined the nature of illness demands on 78 families subsequent to diagnosis of a chronic illness. Data were collected by mailed survey two months after the diagnosis in the outpatient setting. The attribution score of the demands of the illness (DOII) questionnaire (Woods, Haberman, & Packard, 1987) was used to measure illness demands. Illness demands, from the chronic illnesses diagnosed in study patients, were examined for the sample families as a whole. Similarities and differences in patient and family member responses with illness demands were also explored. Family illness demands in this sample were found using t-tests to be significantly less than the demands in the normative sample, and were found to be significantly negatively correlated to family quality of life and positively correlated with illness severity. Sample characteristics of early chronic illness demands, such as a focus on physical complaints, alterations in social relationships, and a focus on monitoring symptoms were identified. Implications for research and practice is presented. Study results support the inclusion of family illness demands as an important factor in family illness stress.

Family Health Nursing/Adult Health Nursing

Wanda Schulner (26)
Faculty Adviser/Collaborator: L. Elaine Wendt, Rita Sperstad
Title of Research Project: Excessive Infant
Crying: A Descriptive Study

This pilot study involving five subjects seeks to describe the phenomenon of excessive infant crying. Infants identified by their primary caregiver as crying excessively were recruited from well-baby clinics and by sending flyers to new parents published in the *Eau Claire Leader-Telegram*. Following acquisition of informed consent and a brief interview, the primary caregiver was asked to record for a 2-week period the sleep, wake and crying states of their infant; caregiver emotional status; and interventions. At the end of this period, a second brief interview was conducted. The study remains in the data collection phase. Data analysis will describe the sleep, wake, and cry patterns of the infants; patterns in caregiver emotional status; and analyze interventions.

Management and Marketing

Maja Sever (56)
Faculty Adviser/Collaborator: Chuck Tomkovick, Kathy Ready
Title of Research Project: An Analysis of the Yugoslavian Tourism Industry

The importance of Eastern Europe’s tourist industry is growing. Significant transformation of ownership in the major travel agencies which used to be public property is occurring. Greater specialization, market competition, and higher quality of services are expected to result from this transformation. The purpose of this research project is to identify incumbent management and marketing strategies brought about by this transition from a centralized to a decentralized economy and to highlight key change issues. Additionally, this project will focus on cultural issues as they pertain to major economic and political changes. Finally, the project will compare the tourist industry of Yugoslavia and Eastern Europe to that of the United States.

Mathematics

Lynda Lund (61)
Faculty Adviser/Collaborator: Joan Cohen Jones
Title of Research Project: Connecting Mathematics Concepts to the K-12 Curriculum

This project is developing middle-grades curricular materials that have connections to higher-level mathematics concepts. Three areas of mathematics will be studied: matrices, group theory, and transformations. The curricular materials developed can be used in middle school or high school mathematics classes. Our project may be used as a prototype for a capstone experience for secondary mathematics majors.

Nursing Systems

Ann Arnold, Theresa Dachel, Erika Radloff (52)
Faculty Adviser/Collaborator: Karen Witt
Title of Research Project: Development of Outcome Measures for the Self-Care Cold Clinic

The focus of the project was to develop outcome measures to assess the effectiveness of the Self-Care Cold Clinic. It is one component of a collaborative activity undertaken by the UWEC School of Nursing, the UWEC Student Health Services and UWEC Student Nurses Association (ECSNA) to develop a Self-Care Cold Clinic. The project involved literature review, communication with other universities who have established student self-care clinics, delineation of anticipated outcomes, development of data collection tools, and criteria for measurement of outcome achievement.
Mary Johnson (53)
Faculty Adviser/Collaborator: CeCelia Zorn
Title of Research Project: Religiosity in Noninstitutionalized Elderly Women

Spirituality is recognized as an important component of health care practice with the elderly. Yet, discussion of the role it plays on a day-to-day basis with elderly women is minimal and it is frequently not addressed in the quality of life studies in this population. The purposes of this study were to describe the level of religious well-being and selected characteristics of religiosity in a sample of 114 noninstitutionalized, largely rural elderly women (M age = 75), as well as to identify the relationship between selected factors and the level of religious well-being. Descriptive research revealed a high level of religious well-being among the participants and significant positive correlations between religious well-being and the variables of social support and hope (p < .001). Using stepwise multiple regression, hope emerged as the single significant predictor of religious well-being (p < .001), explaining 31% of the variance in the dependent variable. The majority of respondents reported regularly participating in religious activities, highly rated the value or influence of religious beliefs in their lives, and identified that religious beliefs become increasingly important with age. Conducting a comprehensive assessment and implementing focused interventions associated with religious well-being will strengthen the scope of health care practice for elderly women.

Nicole Rozek, Kara Janke, Kirsten Flaa (54)
Faculty Adviser/Collaborator: Marjorie Oleson
Title of Research Project: Psychometric Assessment and Refinement of the Quality of Life Index-Nursing Home Version

This study assessed psychometric properties of and refined an instrument to measure quality of life of older (age 65 and older) nursing home residents. As part of a larger study, the generic version of Ferrans' and Powers' (1985) Quality of Life Index was modified based on an extensive literature review, determination of content validity (Oleson, 1990), and a pilot study. The modified instrument was tested with a sample of 60 mentally competent residents (mean age = 83.8; 73.3% female) in four nursing homes in the Midwest. Findings supported internal consistency reliability of the total Quality of Life Index-Nursing Home Version (alpha = .94) and of the four subscales (Health and Functioning, alpha = .90; Social and Economic, alpha = .77; Psychological/Spiritual, alpha = .89; Family, alpha = .71). Convergent validity was supported by strong correlations between the Quality of Life Index-Nursing Home Version and Cantril's (1965) Self-Anchoring Life Satisfaction Scale (r = .73) and Bradburn's (1969) Affect Balance Scale (r = .67).

Social Work

Ka Vang, May Vang, Maneela Moua, Mee Moua (55)
Faculty Adviser/Collaborator: Don Mowry
Title of Research Project: Post-Graduate Experiences and Reflections of UWEC Hmong Alumni

This project will survey all Hmong graduates of UW-Eau Claire to date to determine their post-undergraduate employment, career path, and personal experiences. Alumni will be questioned about their ability to balance roles and expectations from the traditional Hmong culture with demands of the majority culture, including the area of gender differences. In addition, alumni will be surveyed regarding their willingness to serve on an ongoing basis as mentors and employment network contacts for undergraduate Hmong students.
Sociology and Anthropology

Tonya Leholm (30)
Faculty Adviser/Collaborator: James Williams
Title of Research Project: The Red Cedar State Trail: A Two Million Dollar Impact? What Trails Mean to Recreationalists, Communities, and Businesses

The Red Cedar State Trail stretches along 14.5 miles of historic railroad bed, and is used by about 40,000 walkers, bikers, skiers and nature lovers annually. This project required the development of a 25 question survey which was mailed to 1,200 annual pass holders. In a combination of open-ended, close-ended and Likert scale questions, information such as prime trail usage, economic impact, user needs, and user demographics was gathered. An Alpha Four data base was used to analyze the 553 valid responses. The results were presented to the City of Menomonie Tourism Commission, and the final written report was printed as a UWEX Cooperative Extension document. This profile of the Red Cedar State Trail Annual Pass Holders will be useful to businesses in the Menomonie area that serve trail users and to potential businesses that may want to address identified unmet user needs. Promotional and advertising campaigns can use the profile information to better market the trail.

Natural and Physical Sciences

Biology

Kirsten Cahow (98)
Faculty Adviser/Collaborator: David Brakke
Title of Research Project: Chemical Conditions in Seepage, Drained and Drainage Lakes on the Chippewa Moraine, Chippewa and Rusk Counties, Wisconsin

A series of lakes on the Chippewa Moraine were sampled during 1994 and 1995 to examine the relationship between the concentrations of algal nutrients and major elements, and lake type (drainage = inlets + outlet, drained = no inlet but having an outlet, or seepage = no surface inlets or outlet). Larger (> 100 ha) drainage lakes tended to have the highest nutrient concentrations, while Pine Lake, a large seepage lake (100 ha), had the lowest concentrations and as a result the highest water column transparency. Pine Lake also had lower nutrient concentrations and higher transparency than did a series of small (4-10 ha) seepage lakes. Water color was lowest in Pine and Macdonald Lakes, intermediate in the seepage lakes and highest in the larger drainage lakes. In this complex landscape mosaic on the moraine, position in the landscape and lake type both appear to regulate concentrations of nutrients, major cations and water transparency.

Kristi Holmes (99)
Faculty Adviser/Collaborator: Paula Kleintjes
Title of Research Project: Effects of Temperature and Precipitation on Balsam Twig Aphids and Their Predators in a Balsam Fir Christmas Tree Plantation

We evaluated the effects of temperature and
precipitation on the population growth of the balsam twig aphid (Mindarus abietinus) and its aphidophagous predators (syrphid flies, and coccinellid beetles) in a balsam fir Christmas tree plantation, 1994-1995. Aphid populations significantly increased with warmer temperatures, and the associated development of new growth on balsam firs. Predator populations exhibited a lag time response to the aphid populations. Rapid declines of aphid numbers were attributed to heavy rainfall, increases in numbers of predators, and to the maturity of the aphid lifecycle.

Chemistry

Faculty Adviser/Collaborator: Scott Hartsel  
Title of Research Project: Making Biological Silicon (and Gold) from Beef Soup: A New Method to Purify Bacteriorhodopsin

A photosynthetic protein, bacteriorhodopsin, isolated from a salt-loving bacterium Halobacterium halobium is of considerable commercial and scientific interest. It is a rugged purple protein located in the Purple Membrane (PM) of this bacterium. It can act as a sensitive light activated molecular switch making it possible to use it as a biological component for optical computer memory or for an artificial retina in a working artificial eye. Such information storage applications would require extremely pure PM.

We have developed and tested a new, simple, potentially easily automated method for isolating this membrane, differential centrifugation. The yields and purity obtained are very high and comparable to the current complicated, expensive and messy method of sucrose gradient purification. We have compared these preparations using electrophoresis and spectroscopic analysis. Our raw material and labor costs for this pilot study, including the bacterial growth medium (similar to salty beef soup), are estimated to be $200 for the production of 135 mg of pure protein. In contrast, the retail value of this quantity of high purity PM is $6,360, a potential profit of over $6,000.

Sonia Chadha (18)  
Faculty Adviser/Collaborator: Warren Gallagher  
Title of Research Project: Detection of Transferrin and Beta 2-Transferrin in Patient Cerebrospinal Fluid Samples

Capillary Zone Electrophoresis (CZE) is a versatile microanalytical technique that has gained much attention, particularly with respect to its potential for clinical applications. Its appealing characteristics include high sensitivity and ability for automating the rapid electrophoretic separations of low-volume samples in a reproducible manner with relatively short analysis times. This study involves the detection of a transferrin-variant, Beta 2-transferrin, which functions in transporting iron and may play a significant role in protection of the Central Nervous System (CNS). Furthermore, this protein variant holds the key to identifying CSF leakage, for it is found only in CSF, not in any other body fluids such as blood serum, saliva, mucus, or tears. Current analytical techniques may take up to 8 hours in detecting Beta 2-transferrin. Thus, the primary purpose of this study is to achieve greater clinical usefulness by developing a rapid clinical assay using CZE in order to efficiently, rapidly, and with high-sensitivity detect Beta 2-transferrin in order to determine CSF leakage.
Xi Chen, Jennifer Brandt (19)  
Faculty Adviser/Collaborator: Jack Pladziewicz  
Title of Research Project: Electron Transfer Reactions of Tetraisopropylhydrazine

Marcus Theory for outer-sphere single electron transfer reactions relates the reorganization energy leading to the electron transfer transition state to the activation free energy for electron transfer. In this study we have measured the activation free energies for a series of reduction reactions of tetraisopropylhydrazine radical cation to the neutral hydrazine by a variety of reducing agents. We find the theory to be remarkably effective in correlating the rates of these organic electron transfer reactions in spite of the reactions involving molecules with great variation in structural, steric and electronic properties. The measured activation free energies and theory are used to extract a self-exchange electron transfer rate constant for tetraisopropylhydrazine that is in good agreement with direct measurement by NMR techniques. These results demonstrate the utility of Marcus Theory for treating organic electron transfer reactions accompanied by large structural changes.

Marcel Grdinic (23)  
Faculty Adviser/Collaborator: Leo Ochrymowycz  
Title of Research Project: Synthesis of Conformationally Constrained Macrocyclic Nitrogen Containing Thioethers-Ligand Models for Copper Enzymes

This study relates to a long-standing collaboration between our group at UW-EC and Dr. David B. Rorobacher at Wayne State University, Detroit, Michigan. Our ultimate objective is to build a series of Copper ion complexes from macrocyclic ligands containing a mixture of nitrogen and sulfur donor atoms. Such complexes biomimic a variety of copper containing enzymes. By varying donor atom mix and rigidity of the macrocyclic framework we hope to learn what factors in our synthetic complexes best model the reactivity behavior of copper enzymes in electron-transfer reactions. While we have constructed and studied many such complexes, our system has continually frustrated our best efforts most likely due to steric constraints. This system involves the trans-fused diamino cyclohexyl unit in a 14-membered macrocyclic ligand shown below. Our strategies for the synthesis of such ligands will be presented.

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Teresa Salazar (24)  
Faculty Adviser/Collaborator: Leo Ochrymowycz  
Title of Research Project: Study of Ring Substituent Effects in Mass Spectrometry Fragmentation of Methyl Benzoates

The quantitative measurements of how remote substituents can effect the rate or equilibrium of bond cleavage in chemical reactions, a fundamental premise of chemistry, has long been possible through what is known as the Hammett correlation. This is particularly feasible when molecular structure provides conjugated molecular orbital pathways for transmission of the substituents' electronic character to the remote reaction sites. However, conventional wisdom dictates that for very high energy bond cleavage processes, substituent effects on such processes will be only incidental and unlikely to be observed. Electron-impact mass spectrometry involve such very high energy bond cleavage processes in the gas phase and little effort has been made to correlate substituent effects by El mass spec. However, we have demonstrated that the known quantitatively assigned substituent electronic constants can be correlated in mass
spec Hammett treatment of substituted methyl benzoates. Our correlation supports the expected transition state mechanism for the presumed dominant bond cleavage. The study will be described in detail.

Jessica Scott, Tracy Ruckwardt, Christine Cook (17)
Faculty Adviser/Collaborator: Scott Hartsel
Title of Research Project: The Source of Kidney Toxicity of Amphotericin B?

Amphotericin B remains one of the most important drugs against serious fungal infections which due to AIDS, transplant drugs and cancer chemotherapy are becoming tragically frequent. Its use is hampered by its severe immediate and chronic side-effects. One of the most devastating effects is the serious and sometimes permanent kidney damage. It is known that a structure in the kidney called the thick ascending limb of the loop of the nephron is selectively damaged by Amphotericin B but the mechanism is not known. We have observed that in model membrane systems, modest osmotic gradients across membranes greatly increased the activity of Amphotericin B. The ascending section of the loop of the nephron is also under high osmotic stress and this could be the reason that it is heavily damaged by Amphotericin. In a related observation by other researchers, a simple derivative of Amphotericin B, Amphotericin B methyl ester (AmE), has shown much less kidney toxicity but the reason was not clear. We will show, using absorption spectroscopy, that AmE and AmB behave significantly different when bound to model membranes in our laboratory. This difference could be responsible for the lower kidney toxicity. These observations could lead to a simple test for new and improved preparations and could guide the search for even more effective drugs.

**Computer Science**

**Christopher Plate (65)**
Faculty Adviser/Collaborator: Jack Tan
Title of Research Project: **Performance Analysis of a Fault-Tolerant B-Tree ATM Switch**

In recent years, Asynchronous Transfer Node (ATM) has become the subject of intense interest across all segments of the telecommunications and computer industry. State-of-the-art multiplexing and switching technologies form the basis of ATM's ability to deliver different types (e.g., voice, data, radio, video, and graphics) of information at gigabit speeds. ATM networks rely heavily on the efficiency and speed of their switching fabrics. In the last few years, heavy research has been conducted in the design of new ATM switching fabrics. In our paper, we will examine the B-Tree fault-tolerant ATM switch, acknowledged to be one of the most efficient ATM switches. We will prove that it has several shortcomings in that it does not resolve internal conflicts of data packets. In our study, we will 1) extensively study the B-Tree switch, 2) analyze the different buffering methods that would be suitable for our design, 3) analyze the different traffic models to reflect real-time traffic, 4) exploit the information from above to design a more fault-tolerant switch, and 5) conduct extensive simulation to prove the efficacy of our design.

**Trevor Williams (64)**
Faculty Adviser/Collaborator: Jack Tan
Title of Research Project: **Intelligent Query Optimization Using Parallel Processing**

Intelligent query optimization is a powerful concept in database query matching; however, even this matching technique can be inherently slow given a very large working memory and knowledge base. Because of this speed problem, many techniques have been
used to try to speed up the matching process. In this research we propose a matching algorithm called QuickPIQS (Paralleled Intelligent Query Search), an algorithm which utilizes the power of both intelligent query optimization and parallel processing. By forming a tuple joining tree from rules containing similar tuples, we will see how the working memory and, consequently, the knowledge base can be subdivided into tree clusters that can be run simultaneously on separate processors. Once the working memory has been successfully subdivided, a maximum joining level on the tree clusters can be calculated, giving us the approximate average processing time for a tuple-binding space matching algorithm to run on parallel machines. By using the QuickPIQS Matching algorithm, we are allowed to utilize the joining capability of left-hand-side rules and the speed of distributed processing on parallel machines.

**Geography**

**Paul Hanson, Chad Bergo (100)**
Faculty Adviser/Collaborator: Sean Hartnett
**Title of Research Project:** Assessing the Accuracy of GPS Technologies

To compare and contrast the accuracy of Trimble's Pathfinder Plus and Pro-XI GPS units before and after post-processing.

**Dan Schafer, Kent Marcelle (101)**
Faculty Adviser/Collaborator: Sean Hartnett
**Title of Research Project:** Lake Monitoring and Mapping Silver Birch Lake with GPS

Assisting the DNR, this project uses global positioning systems to accurately monitor lake depths, ice thickness, oxygen levels, and temperature of Silver Birch Lake in Pepin County. We also used GPS to map the perimeter of the lake. From this GPS data coordinates, we created a useful data base and corresponding maps that will help the DNR accurately monitor Silver Birch Lake for many years to come.

**Geology**

**Kristie Franz, Jeffrey Schels (9)**
Faculty Adviser/Collaborator: Kent Syverson
**Title of Research Project:** Glacial Geology of the Chippewa Moraine Ice Age National Scientific Reserve, Wisconsin

Students enrolled in Glacial Geology (GEOL 420) at the University of Wisconsin Eau Claire have mapped the surficial glacial deposits in and around the Chippewa Moraine Ice Age National Scientific Reserve, Wisconsin, at a 1:24,000 scale. Geomorphology; topographic map, aerial photograph, and soil survey interpretations; and field work during Fall 1995 were used to map sediments in the 73 km² field area. This study was undertaken to create quality interpretive materials for the new park Interpretive Center and to aid the National Park Service with exhibit development.

The Laurentide Ice Sheet advanced south of the Chippewa Moraine Ice Age Reserve retreated prior to 25,000 yr BP. This event deposited dark, reddish-brown till of the Lincoln Formation, found on rolling uplands west of the Reserve. Later, ice of the Chippewa Lobe flowed southward out of the Superior lowland approximately 25,000 yr BP into the vicinity of the Reserve. The Late Wisconsin ice margin briefly extended 1 to 2 km west of the present-day Chippewa Moraine front, but then the margin retreated and stabilized at the Chippewa Moraine position.

Permafrost conditions caused thrusting of large volumes of sediment up to the ice surface near the stable glacier margin. Variations in the supraglacial sediment thickness caused differential melting, topographic reversal, and
formed the moraine morphology characterized by hummocks and kettles. Hummocks contain yellowish-red diamicton and sandy gravel of the Copper Falls Formation. Many kettles in the Chippewa Moraine contain lakes or bogs. Lake sediment of the Copper Falls Formation is found in high plains in the moraine, sometimes surrounded by a distinct outer rim ridge. These plains, called ice-walled-lake plains, formed in lakes completely surrounded by glacier ice. As the moraine formed, glacial meltwater flowed southwest away from the moraine. These streams deposited gravel and sand in a southwesterly sloping outwash plain west of the Chippewa Moraine. A pitted outwash plain marks the maximum extent of the Late Wisconsin Chippewa Lobe.

Steve Frieseke, Steve Peterson (69)
Faculty Adviser/Collaborator: John Tinker
Title of Research Project: Ground Conductivity Surveys to Locate Contaminant Plumes from Septic Systems

Contaminant plumes from septic systems are long and narrow (Robertson et al., 1991 and Shaw et al., 1993), which makes it expensive to determine their location by the installation of monitoring wells. Therefore, a Geonics EM-34 ground conductivity system is used at two conventional, septic-system sites to identify the location of possible contaminant plumes.

The septic system at the first site is a trench system approximately five years old. The absorption field is in Chetek sandy loam developed on glacial sediment which overlies the Mt. Simon Formation at an unknown depth. The depth to the water table is approximately 10 feet with groundwater flow toward an adjacent wetland. The ground conductivity data for this site does not conclusively suggest the presence of a contamination plume.

The septic system at the second site is a trench system approximately twenty years old. The absorption field is in Menahga loamy sand developed on glacial outwash of the Wissota Terrace. The depth to the water table is approximately 30 feet with groundwater flow toward Lake Wissota. The ground conductivity data for this site suggests the presence of a contaminant plume.

Additional sites need to be studied, but preliminary data suggests that ground conductivity surveys may identify the location of a contaminant plume and may help reduce costs of locating contaminant plumes for groundwater monitoring purposes. Also, additional surveys may help define the factors which influence the ground conductivity readings at septic systems.

Heather Golding (13)
Faculty Adviser/Collaborator: Martin Miller
Title of Research Project: Compositional Variations in Fault Gouge, Death Valley National Park, California

Fault gouge from the Badwater Turtleback fault in Death Valley, CA shows many features which indicate ductile flow. To understand the nature of this flow, we are estimating the degree of mixing in the gouge zone between the hangingwall and footwall rocks. This estimation is possible because the hangingwall (fanglomerate) and footwall (mylonitized pegmatite, gneiss, and marble) are compositionally distinct. Therefore, volcanic rocks in the gouge must be from the hangingwall and pegmatite clasts come from the footwall.

At two locations the gouge showed a high degree of mixing. Clast sizes, which generally ranged from 2 to 12 centimeters in length and reaching extremes of 50 centimeters, show a distribution in the zone which indicates mobility. Larger clasts (5-12 cm) typically lie near the bedrock on either side of the zone, while the smaller and more mobile clasts (2-4 cm) trend to lie near the center of the zone. Furthermore, numerous volcanic clasts (from
the hangingwall) lie closer to the footwall bedrock than many pegmatite clasts.

**Harrison Griffin, Jeff Paddock, Gretchen Peters, Chad Underwood (14)**
Faculty Adviser/Collaborator: Martin Miller
Title of Research Project: **Stress Orientations of the Black Mountain Turtleback Fault Zone, Death Valley National Park, California**

The Badwater turtleback fault in Death Valley, California separates Precambrian metamorphic rocks of the Black Mountains from the fanglomerate of the valley floor. Its fault zone ranges in thickness from 2 to 10 meters and contains within it many smaller subsidiary faults. We examined these subsidiary faults to gain information on the fault zone as a whole. Specifically, we plan to detail the movement history of the main fault zone by looking at the orientations of minor faults, the range of striation orientations on the minor faults, and our estimation of the orientation of the maximum principal shear stress ($\sigma_1$). Preliminary findings suggest that deformation within the fault zone reflects a nearly vertical $\sigma_1$ orientation.

A nearly vertical $\sigma_1$ is consistent with down-dip striations on the main fault surface. It differs, however, from results from a similar study of high angle faults in the footwall which do not indicate a steeply plunging fault. It also appears inconsistent with the oblique-slip nature of the active frontal fault. These inconsistencies may be explained by either 1) a shortage of-data, or 2) strain partitioning where the principal fault zone behaves differently from the footwall.

**Douglas Hallum (2)**
Faculty Adviser/Collaborator: Brian Mahoney, Robert Hooper
Title of Research Project: **Geochemical and Petrographic Analysis of Challis Group Volcanic Rocks, South-Central Idaho**

The Challis Volcanic Field is an extensive volcanic belt exposed throughout the northwestern United States and southwestern Canada. Volcanic activity began approximately 51 Ma (million years) ago, and was characterized by extrusion of intermediate to mafic lavas and emplacement of shallow level intrusions. This investigation seeks to document the petrology and geochemistry of a previously uncharacterized portion of the Challis Volcanic Field in the western Hailey 1° x 2° quadrangle, north of Ketchum, Idaho. Specimens for this study were collected during regional mapping north of Ketchum in 1986-87, and consist of extrusive volcanic rocks and intrusive porphyritic rocks. These rocks contain large quantities of fine-grained groundmass, and petrographic characterization and naming based on mineral assemblages does not accurately portray the true composition of the units. Geochemical analysis using the new X-Ray Fluorescence Spectrometer in the Department of Geology permits precise evaluation of the geochemical composition of the samples. X-Ray Fluorescence Spectrometry is a very precise and accurate method of characterizing major and trace element chemistry in fine-grained volcanic rocks. Preliminary results indicate that petrographic characterization generally underestimates silica content, and therefore a combination of geochemical and petrographic analysis is necessary to properly characterize volcanic rocks. Detailed petrographic and geochemical analysis of these rocks will facilitate comparison with more well characterized Challis Group volcanic rocks to the cast.

**Brian Hennings, Reno Walsh, Todd Myse, Aaron Walczak (15)**
Faculty Adviser/Collaborator: Martin Miller
Title of Research Project: **The Badwater Turtleback fault, in the Black Mountains of Death Valley National Park, California**
Numerous high-angle normal faults exist at the footwall of the Badwater Turtleback in the Black Mountains of Death Valley National Park. We are studying their geometry’s by evaluating orientations and slip directions to determine Δ1 (principle stress axis). Furthermore, these studies will allow us to evaluate the role of normal vs. strike-slip faulting in the uplifting of the Black Mountains. Most of the faults measured were high-angle faults with normal separations. These faults cut rough, platy carbonate, as well as gneiss and pegmatite. The majority of the faults strike between N30W and N30E, dip westward, and have north-plunging striations. The striation data indicate a strong right-lateral oblique component to the faulting. Therefore, it appears that uplift in the Black Mountains may reflect regional shear stresses imposed by the nearby strike-slip faults. In addition, poles to “movement planes” (defined as planes normal to the fault surface but parallel to the slip direction) show a wide distribution of orientations. Their dispersal may indicate a variable Δ1 orientation.

Mark Holmes (8)
Faculty Adviser/Collaborator: Kent Syverson
Title of Research Project: Permafrost History of Eau Claire and Chippewa Counties, Wisconsin, as Indicated by Ice-Wedge Casts

Seven new ice-wedge cast sites were found in surficial, pre-Late Wisconsinan host sediment near Albertville and Chippewa Falls, Wisconsin. The host sediment is stratified gravelly sand and sandy gravel that displays weathering horizons and reddish pedogenic clay accumulations to depths of > 2.5 m. Wedge-shaped ice-wedge casts are 1 to 2 m high, 0.5 to 2 m wide, spaced at regular intervals 3 to 30 m apart, and are filled with light-colored, well sorted sand weathered to depths of 1 to 1.5 m. One ice-wedge cast filling contained a pebble with a 2-cm long c axis, implying that the former void space was at least this wide. Polygonal networks of ice-wedge casts have not been observed. Host sediments surrounding ice-wedge casts display upturned bedding and other minor folding features.

The ice-wedge casts are located in surficial sediment that is pre-Late Wisconsinan in age. Thus, the ice-wedge casts may have formed during pre-Late or Late Wisconsinan time. Based on the more intense weathering profiles observed in the host sediment relative to the sediment in the ice-wedge casts, it appears that the ice-wedge casts are quite young (probably Late Wisconsinan in age). We continue to look for ice-wedge casts buried by pre-Late Wisconsinan sediment (either till or loess) as evidence for permafrost conditions in western Wisconsin at times other than during the Late Wisconsinan Glaciation.

Steve Jenson, Chad Underwood (105)
Faculty Adviser/Collaborator: Robert Hooper
Title of Research Project: Variations in Chemistry Across a Midcontinent Rift-Related Dike Below Lake Wissota Dam, Chippewa Falls, WI

Previous work on the chemistry of a basaltic dike at Lake Wissota Dam in Chippewa Falls,
WI shows evidence of reverse zoning. A normally zoned dike commonly displays a Mg-rich margin and is progressively enriched in Fe near the center. We have taken several rock samples from two transects across the dike for chemical analysis. Major element analysis will be performed using X-Ray Fluorescence (XRF) spectrometry. From XRF we can assess changes in the major element content throughout the dike. These results will then be compared to the one transect done previously by Meyers (1980). Sampling sites were selected to assess both lateral and longitudinal zoning patterns. A petrogenetic model will be presented to explain the zoning pattern.

**Ann Marie Melby (1)**
Faculty Adviser/Collaborator: Robert Hooper
Title of Research Project: Examination of Glauconite in the Eau Claire Formation

An outcrop of the Eau Claire Formation located in Strum, Wisconsin contains abundant amounts of green Glauconite pellets in the sandstone layers. However, the interbedded shale layers do not appear to contain the green Glauconite pellets. Glauconite is a green marine clay common in sedimentary rocks from Cambrian to present. Present thought is that it is formed by fecal matter from worms. Typically it is used as an indicator of very slow sedimentation. Therefore, theoretically Glauconite would be expected to be found in shale as well as in sandstone. This theory is consistent with the majority of the Glauconite found today.

We are comparing the outcrop of the Eau Claire Formation to an outcrop of the Lone Rock Formation located in Menomonie, Wisconsin. The Lone Rock Formation also consists of layers of interbedded sandstone and shale similar to the Eau Claire Formation. The majority of the shale layers in this outcrop, however, contain abundant Glauconite. By comparing the two outcrops we are trying to determine why Glauconite is not present in the shale layers of the Eau Claire Formation and the significance of the depositional system. In order to determine whether the pellets formed authigenically or were collected as fecal matter, we are using chemical analysis and electron microscopy to interpret the formation of the glauconite pellets. Preliminary findings suggest both generations of pellets. This has been suggested due to chemical differentiation as well as different shapes and colors found in several pellets at the same location.

**Gretchen Peters (102)**
Faculty Adviser/Collaborator: Karen Havholm, Brian Mahoney
Title of Research Project: The Eau Claire—Wonewoc Contact at Menomonie, WI: Is It Conformable?

The Upper Cambrian Eau Claire Formation is a thin-bedded, fine-grained sandstone with shale interbeds, displaying a Planolites trace-fossil assemblage as well as brachiopod, trilobite, and hyolithid fossil debris. The fine grain size and hummocky cross-strata indicate that it was deposited on a marine shelf below wave-base. The Upper Cambrian Wonewoc Formation is a thick-bedded, medium to coarse-grained sandstone with intervals of high-angle cross-strata and a Skolithos trace-fossil assemblage with primarily brachiopod fossils. Medium- to coarse-grained sandstone and high-angle cross-strata suggest that the Wonewoc Formation was deposited in shallow, nearshore marine conditions. The Eau Claire Wonewoc Formation contact has previously been interpreted as being disconformable due to the truncation of beds below the contact and the presence of mud rip-up clasts and a basal conglomerate above the contact. However, recent research near Colfax, WI suggests that the contact is gradational and therefore conformable in this area. Detailed
study of two exposures in Menomonie, WI that span from the upper Eau Claire Formation to the lower Wonewoc Formation confirm a conformable contact in this area as well. Sediment grain size coarsens upward in an 8-meter transitional zone. In this zone, strata alternate between fine-grained, swaley cross-stratified and medium-grained sandstones with higher angle cross-strata. The fine-grained beds decrease in thickness upward in the section; the medium-grained beds increase in thickness over the same interval. This pattern indicates a gradual transition from a deep water to a high-energy, shallow water environment.

Gretchen Peters (3)
Faculty Adviser/Collaborator: Robert Hooper
Title of Research Project: Formation of Felsic Pegmatite Dikes in the Mellen Gabbro, Mellen, WI

The Mellen Gabbro is composed of three different mafic layered intrusions stacked vertically in the vicinity of Mellen, WI. It forms a 60 mile long, and 5 mile thick sill between Precambrian Keweenawan rocks and other older Precambrian rock. Several felsic pegmatite dikes cut the intrusion in a small quarry northwest of the town of Mellen. The object of this project is to determine the origin of these pegmatite dikes. Samples of the gabbro and pegmatite dikes were collected from a fresh quarry surface. They are being analyzed using petrography, x-ray fluorescence spectrometry, and x-ray microanalysis to determine the chemistry of both the minerals and the whole rocks. Major and trace element chemistry should indicate whether the dikes are the result of differentiation of the cooling intrusion or result from some other geologic process.

Steve Peterson, Jason Ryczerz (4)
Faculty Adviser/Collaborator: Robert Hooper
Title of Research Project: A Comparison of Clay Mineralogy with Evaporite Precipitation in Death Valley, CA

Extensive research on evaporate mineral precipitation, precipitation sequences, and zonation exists for the Death Valley salt pan (Hunt and Mabey, 1966). However, little published information is available on the compositional changes of clay minerals deposited along the course of the Amargosa River. We propose there is a change in clay mineralogy along the course of the river that reflects sequential precipitation of evaporate minerals. Therefore, clay minerals deposited near the terminus of the river in Death Valley should have a different composition than clay minerals deposited closer to its source.

Thirteen samples were collected from various sites along the Amargosa River. Each sample will be prepared using standard clay preparation procedures. Through the use of x-ray diffraction analysis, clay mineralogy will be determined for each site. The determined clay mineralogy for the samples will be compared to one another along with previous known evaporate mineralogy to find any correlation between clay mineralogy and evaporate precipitation.

Heidi Rantala, Nicholas Loomis (5)
Faculty Adviser/Collaborator: Brian Mahoney, Robert Hooper
Title of Research Project: Assessment of Heavy Element Distribution in Contaminated Stream Sediments, Coeur d’Alene River, Idaho

The Coeur d’Alene River Valley in northern Idaho is the site of severe heavy element contamination due to the introduction of sulfide-contaminated mine tailings from the Bunker Hill Mining District to the river system over
the past 109 years. Mine tailings contain high amounts of lead, iron, manganese, zinc, cop-
ner, silver, cadmium, arsenic, antimony, and mercury. Direct dumping of mine tailing ceased in 1968, but tailings stockpiles continue to wash into the river during flood season. The mechanics of heavy element redistribution in a fluvial environment are poorly understood.

The U.S. Geological Survey assumes that sul-
fide minerals are physically transported downstream from tailings piles, and oxidize (i.e. begin to breakdown) following periodic flood events that remove sediment from the river bottom and deposit it in the oxidizing environment of the floodplain. Grain size analysis indicates that heavy metals are preferentially concentrated in fine-grained sediment. Scanning electron microscopy (SEM) and X-Ray diffraction (XRD) demonstrates that bedload, floodplain, and swamp sediments contain few sulfide minerals, indicating that the sulfide minerals are oxidized prior to or during transport to the sample sites. Heavy metals are contained within amorphous iron-manganese oxides that coat most mineral grains. A microwave sequential extraction technique was employed to determine the distribution of heavy elements within individual sediment samples to determine the mobility of heavy metals under surficial conditions. Recoveries of heavy metals utilizing this technique range from 42-86% of the total metallic composition. Sequential extraction of lead and zinc from bulk samples indicates that the majority of the heavy metal fraction (up to 78%) initially becomes mobile upon introduction to a slightly acidic medium, such as the organic rich soil of a floodplain or swamp. A smaller, but significant, quantity of heavy metals is organically bound, and is presumably released upon oxidation of the organic material. Minor percentages of the total heavy metals are released through simple ionic exchange, under anoxic conditions, or are essentially not mobile under surficial conditions.

Preliminary results of this investigation indicate that the majority of heavy metals in fluvial sediment of the Coeur d'Alene River are easily mobilized under surficial conditions due to their incorporation in labile iron-manganese oxides. This makes the heavy metals readily bioavailable, increasing the threat posed by the downstream contamination.

Jenna Tobias, Jeremy Miller, Mark Kiessling (103)
Faculty Adviser/Collaborator: Brian Mahoney
Title of Research Project: Student Experience in Mapping Mesozoic Strata of the Methow Basin North-Central Washington

The primary objective of this project was to provide three (3) undergraduate geology students from the University of Wisconsin-Eau Claire with field experience in geologic mapping and stratigraphic studies. The students assisted with a multi-faceted investigation of Jurassic and Cretaceous volcanic rocks and sedimentary strata exposed along the eastern flank of the North Cascade Mountains of Washington state during July-August, 1995. A multidisciplinary team of geologists from the Department of Geology at the University of Wisconsin-Eau Claire and the United States Geological Survey (USGS) conducted detailed regional mapping of Jurassic and Cretaceous strata along the eastern flank of the Cascade Range. Mapping was conducted at a 1:24,000 scale by 2-member teams consisting of one geologist from either the University of Wisconsin-Eau Claire or the USGS and one undergraduate student. Teams mapped in adjacent, overlapping areas, and the students rotated within the teams to provide a varied field experience for each of them. Students were involved in all aspects of the study, including both supervised and independent geologic mapping, detailed stratigraphic studies, geochemical and paleontologic sampling, and map compilation. Students participated in all
aspects of field research, and gained valuable experience in the organization and execution of a complex field project, in addition to developing practical field mapping experience. This collaborative university-government research program is an excellent example of the cooperative research agreements that will typify U.S. government research efforts for the foreseeable future.

Chad Underwood (16)
Faculty Adviser/Collaborator: Martin Miller
Title of Research Project: Evidence for Probable Grenville Deformation from Faults in Western Wisconsin

A thrust fault at Wissota Dam in Chippewa County, Wisconsin cuts a rift-related basaltic dike. Orientations of subsidiary faults and movement-plane data indicate that defoliation accompanied an ENE-trending $\sigma_1$. Stress orientations and probable timing of slip suggest an origin related to the Grenville Orogeny prior to about 1 Ga. The fault zone contains two main subparallel fault surfaces which dip about 25° SSW and numerous subsidiary faults. The main fault surfaces are subplanar and exhibit striations which plunge predominantly towards the ENE and WSW. Combined with approximately 5 meters of left-lateral separation of the dike, striation data indicates the fault is a left-lateral thrust. Data from conjugate subsidiary faults suggest that $\sigma_1$ was subhorizontal and trended N56°E.

Although the north-trending Grenville Front lies more than 600 km to the east, Grenville compression at about 1080 Ma possibly terminated or closed the Mid-Continent Rift (Cannon, 1994, Geology). This thrust fault, and others like it, postdate rifting but predated Paleozoic sedimentation and therefore formed within the correct time interval. Although horizontal, $\sigma_1$ for the fault at Wissota Dam and others in Western Wisconsin are oblique to both the rift and the Grenville Front, and may reflect a component of regional strike-slip.

Tony Viavattine, Heidi Rantala (11)
Faculty Adviser/Collaborator: Robert Hooper
Title of Research Project: Mineralogy of Complex Pegmatites at Little Falls, Eau Claire, Wisconsin

Complex pegmatites differ from simple pegmatites because they contain interesting structures, textures, and unusual minerals, and are economically important because they often contain rare earth elements and high concentrations of incompatible elements (including Be, B, Li, U, Sn, etc...). The objective of this project is to determine the mineralogy of a complex pegmatite exposed at Little Falls in Eau Claire County, Wisconsin. The pegmatite is known to contain quartz, feldspars, and beryl in hand sample examination, but other minerals occur in concentration too small to be determined in hand sample. Due to limited exposure of the pegmatite we are assessing the mineralogy of the larger body by using trace elements and micro mineralogy sampling. Analyses for minerals are being done in thin section using optical and scanning electron microscopy x-ray microanalysis.

Tony Viavattine (10)
Faculty Adviser/Collaborator: Martin Miller
Title of Research Project: Calcite Marble Deformation in a Ductile Shear Zone, Death Valley, CA

The footwall of the Badwater Turtleback in Death Valley exposes a ductile shear zone where calcite marble and quartz feldspar gneiss are complexly folded together. This study addresses the transport directions in the calcite marble and behavior differences be-
tween the marble and gneiss. After studying contact relations in the field, we are presently looking at microscopic features in thin section. Preliminary findings suggest that the calcite marble shows top-to-northwest sense of shear and behaved more ductilely than the gneiss. Furthermore, unlike the gneiss, the marble tends not to show grain-shape fabrics.

Aaron Walczak, Andrew Kennedy (6)
Faculty Adviser/Collaborator: Robert Hooper
Title of Research Project: Geobarometry of Anorthosite Xenoliths at Wissota Dam

Below the dam at Lake Wissota in Chippewa Falls WI, there is a spectacular exposure of a diabase dike. Anorthosite xenoliths in the Wissota diabase dike represent samples brought to the surface during dike formation. Aluminum content in pyroxenes in the Xenoliths will be used to determine the depth of origin of the rocks. The goal of the project is to determine the temperature and pressure at which the pyroxenes equilibrated. The crystal chemistry in pyroxenes is a function of temperature and pressure (Ian D. Macgregor). Using crystal chemistry, percentages of aluminum will be determined using the scanning electron microscope and energy dispersive x-ray microanalysis. From this study we expect to determine the equilibration pressure and temperature of the magma chamber.

Kristin Weaver, Jenna Tobias (7)
Faculty Adviser/Collaborator: Robert Hooper
Title of Research Project: Chemistry and Mineral Composition of the “Green Rocks” at Darwin Falls, Death Valley National Park, CA

The Darwin Falls area is located on the western edge of Death Valley National Park, CA, and is made up of mainly carbonate rocks that are overlain and intruded by Quaternary basalts. The “green rocks” of Darwin Falls are situated next to the carbonates and are also overlain by the basalts in an unknown relationship. The purpose of this project is to determine the chemical and mineralogical composition of the “green rocks” and to determine how they relate to the regional geology. We are analyzing these rocks in three different steps. First, we are studying the mineralogy and textural relationships by petrographic analysis on thin sections. Second, we are determining the mineralogy by another method using the scanning electron microscope (SEM) to verify our findings from the thin sections. Finally, we are using x-ray fluorescence (XRF) to determine the whole rock composition. These analyses will tell us of what minerals the “green rocks” are made, and therefore give us insight as to what their relationship is with the surrounding region.

Kristin Weaver (12)
Faculty Adviser /Collaborator: Martin Miller
Title of Research Project: Sense-of-Shear Around Small Scale Folds in a Ductile Shear Zone on the Badwater Turtleback, Death Valley, CA

The Badwater Turtleback is a large ductile shear zone which played a key role in extending the Death Valley region during the late Tertiary. Miller (1992) estimated top-to-the-northwest sense-of-shear in this zone, but also noted local reversals in the sense-of-shear. One possible explanation for these reversals is shortening normal to the shear zone, indicated by postmylonitization folding.

The purpose of this project is to study the sense-of-shear indicators on folds in mylonitic gneisses of the Badwater Turtleback, Death Valley, California and to determine whether they developed before or during folding. The study is centered on the variability of sense-of-shear indicators around small scale folds in the ductile shear zone and will examine
folding as the primary cause of the variability. Samples were collected from a variety of locations on the Turtleback in January of 1996 and have been thin sectioned for microscope study. In order to determine the sense-of-shear on different limbs of the folds, asymmetric porphyroclasts and grain-shape indicators in the thin sections are being studied. Preliminary data suggest top-to-the-northwest sense-of-shear. Also, thin sections cut perpendicular to the lineations indicate some shortening perpendicular to the zone.

Sarah Weaver (106)
Faculty Adviser/Collaborator: Karen Havholm
Title of Research Project: Surficial Dune Processes and Migration of Run Hill Dune, Bodie Island, North Carolina

On Bodie Island, a barrier spit on the coast of North Carolina, a large active sand dune, Run Hill, is encroaching Nags Head Woods Ecological Preserve. Run Hill, one of several such large, active dunes in the area, acts as a barrier to salt spray providing a protective setting for a coastal maritime forest. In order to predict Run Hill’s future behavior as the Nature Conservancy develops management plans for Nags Head Woods, an understanding of dune history and current dune processes is needed.

Monitoring the rate of sand movement for the past year and a half relative to trees on the base of the lee slope has indicated a rate of dune migration to the south of up to 1.6 meters/year. Further evidence for the southward migration of the dune is the re-exposure on the upwind side of the dune of tree stumps from the forest that has been covered by the migrating dune. In June 1994 stakes were placed on the dune to monitor monthly accumulation and deflation of sand. These data show sand accumulation on the eastern sides of north-south trending ridges, suggesting migration of the superimposed ridges to the east across the dune. Stake data has also shown deflation on the eastern part of the dune. This may be attributed to development to the north which limits sand supply. It may also be a result of the inability of the sand to return to the dune once it has been lost over the eastern scarp that was created by sand-mining on the dune in the 1980’s. Wind data from Duck Pier, approximately 23 km north of Run Hill, have been collected through the Internet since June 1994 and used to calculate predicted monthly sand flux over the dune. Comparison of the calculated sand-transport data with actual monthly observations of sand accumulation and deflation at individual stake locations is in progress.

Geology/Computer Science

Scott Lehmann (104)
Faculty Adviser/Collaborator: Brian Mahoney, Susan Harrison
Title of Research Project: Computer Developed Map of Wisconsin For Use in Geological Education-Ultima Geology

During the 1995-96 school year, Scott Lehmann, a Computer Science Major has developed a piece of computer software in conjunction with Dr. J. Brian Mahoney of the Department of Geology and Dr. Susan Harrison of the Computer Science Department at the University of Wisconsin-Eau Claire. The computer research/development project entitled, “Ultima Geology,” has involved the creation of a user-friendly, Macintosh-based computerized geological map and database of Wisconsin that students and teachers of secondary education can use in the classroom. The reasoning behind the development of this interactive geological program is that awareness of the geology and geography of Wisconsin is essential to developing an understanding of water, land use and environment problems within the state. This product will also help
students gain an appreciation for geological time, landscape development and other features of our earth. The program will integrate well with a teacher’s lesson plans or may be used as a stand-alone educational tool by individual students to enhance their knowledge of the geology of Wisconsin. The program opens by displaying the entire state of Wisconsin divided into regions from which the user can then further delve, via the developed computer interface, into a variety of geological topics including maps, rock formations, fossil data and state sources of geological information. The project has been state funded by the Office of University Research at UWEC and is constructed in a Macintosh atmosphere with the use of a multimedia design tool entitled “Supercard”. Thus far, the Northwest and West Central Sheets of Wisconsin have been developed. Demonstrations and interactive sessions were held at an area secondary school and with several college-age students, thus allowing student and teacher feedback to be incorporated into the product. It will be sent to the Wisconsin Geological and Natural History Survey after being demonstrated interactively at the UWEC Student Research Day on April 22, 1996 for review to determine further development. The ultimate goal is to make this geological program and teaching tool available to state schools through the education programs of the Wisconsin Geological and Natural History Survey.

Mathematics

Anthony Bault (63)
Faculty Adviser/Collaborator: Gwendolyn Applebaugh
Title of Research Project: What are the Odds?

The poster will depict computer simulation of various game strategies.

Annette Chelmo, Mark Heck, David Hedberg (62)
Faculty Adviser/Collaborator: Gwendolyn Applebaugh
Title of Research Project: The Number One City in America

Based on a quality of life ranking of 77 United States cities with populations above 200,000, which reflect each city’s population density, cultural diversity, education, climate, air quality, unemployment, income, infant mortality, and crime rate Arlington, Texas, is one of the best metropolitan places to live in, and New York City one of the least desirable.

Anne Davey, Dan Keller, Kacy Erickson (67, 68)
Faculty Adviser/Collaborator: John Drost
Title of Research Project: Tessellations of the Plane in the Spirit of M.C. Escher

Mathematics behind the 17 crystallographic groups illustrated in the Spirit of M.C. Escher.

Cory Evans (66)
Faculty Adviser/Collaborator: Gwendolyn Applebaugh
Title of Research Project: Probability of Plinko

The poster will deal with the game played on the Price is Right. The game Plinko uses a Galton Board and forms a uniform distribution.

Jun Gu (73)
Faculty Adviser/Collaborator: James Walker
Title of Research Project: Wavelet Analysis

Wavelet analysis is an important new tool for analyzing signals. This project consists of writing and testing computer code for doing wavelet decompositions of signals. This code will be used for generating compressed ver-
Compressing signals plays an essential role in telephone transmission as well as many other areas of data transmission and storage. A comparison will be made of wavelet compressions versus Fourier series compressions (Fourier series compression is a commonly used method of compression).

Eran Guse (70)
Faculty Adviser/Collaborator: Gwendolyn Applebaugh
Title of Research Project: How Does Your Food Taste?
How statistics are used to develop and evaluate new food products.

Kathryn Hickman, Steve Wall (107)
Faculty Adviser/Collaborator: Marc Goulet
Title of Research Project: Predicting Extreme Values
We consider and implement on Mathematica algorithms for estimating the expected maximum value of a time series for a period in the future given past observations. This is a "midrange" problem in which the long term asymptotics of extreme value theory do not apply. There are essentially two approaches, estimating an "extremal index" and the "Poisson clumping heuristic." Variations on these methods are tested with simulated Gaussian data.

Kenneth Kiesow (74)
Faculty Adviser/Collaborator: Brian Bansenauer, Barbara Bansenauer
Title of Research Project: Models R Us: Analysis of a Nonlinear Model for Three Species Surface Deposition
This project involves modeling a set of 3 nonlinear differential equations in order to study the deposition of Gallium atoms on a surface. In order to do this, we use a mathematical model to find the equilibrium points for this system. Using various software packages such as Derive and Mathematica we analyze the model of the system to discover "appropriate" model parameters for measured data. This system is currently under investigation in the Chemistry Department.

Trichia Ott, Wendy Honadel, Lisa Johnson (75)
Faculty Adviser/Collaborator: Veena Chadha
Title of Research Project: Higher Order Adjoint of Matrix
Theory of matrices and this concept is used in applications ranging from Archaeology to Economics. Associated with every square matrix is a useful tool used in many branches of mathematics, science, and engineering. Also, the adjoint of a matrix is used in a formula for finding the inverse of a matrix. An attempt is made to find some meaningful physical interpretation to the adjoint of a matrix. Though the matrix adjoint is used in an inefficient algorithm for finding the inverse of a matrix, it has meaningful applications in the theory of tensors. The computation for the adjoint of a matrix is quite tedious. This project is establishing a relation between the adjoint of a matrix, inverse of a matrix, and solving systems of equations. Some new results and formulas for higher order adjoints of a matrix are established. This formula ties a relation between the higher order adjoint of a matrix and the value of the determinant of the original matrix.

Melanie Ann Thomforde (71)
Faculty Adviser/Collaborator: Gwendolyn Applebaugh
Title of Research Project: Check Out the Vital Stats on Polio
In 1954 a medical experiment was conducted to find a vaccine for polio. The experiment used the observed control approach and the
placebo control approach. The placebo control approach was based on randomization. The experiments proved that the Salk vaccine was an effective vaccine for polio.

Kendra Zillmer (72)
Faculty Adviser/Collaborator: Gwendolyn Applebaugh
Title of Research Project: Cómo Se Encuentra?: Student Attitudes in Spanish 101

The poster will display graphs which compare the opinions of students taking Spanish 101 that have never had Spanish before and those students that have had Spanish before.

Physics and Astronomy

Terry Krueger, Chris Hawes, Shawn Patrick, John Stupak (20)
Faculty Adviser/Collaborator: Kim Pierson
Title of Research Project: Low Energy Ion Bombardment of Multicomponent Alloys

This physics project concerned changes induced in the surface of metal alloy samples that were subjected to ion bombardment. This investigation has applications in the manufacture of microelectronic integrated circuits. The polished surface of a room temperature Ag/Cu (60/40% atomic) alloy sample was bombarded by varying doses of normally incident 600 eV argon ions. The changes that occur in the surface topography due to ion bombardment progressed through various stages. First, for low doses, selective erosion of the Ag grains caused them to become recessed. For low to moderate doses, conical features began to develop on the surface of the Ag grains. For moderate to high doses these cones covered the Ag grains, but no cones were evident on the Cu grains. For high doses the entire surface of the sample becomes densely covered with cones. These changes in surface topography will have important effects on the deposition of thin films from multiphase alloys.

Graduate Entries

Adult Health Nursing

Jayne Brown, Deanna Germain, Sandy Weiland (111)
Faculty Adviser/Collaborator: Winifred Morse
Title of Research Project: Elderly Hmong’s Perception and Understanding of Chronic Illness and Diabetes

The Hmong population is a significant Southeast Asian refugee population that has settled in several areas in the United States. It is important to understand their concept of health and illness in order to provide optimal health care. This study builds on a previous study related to Hmong perceptions of nutrition and health. The purpose of this study was to gain an understanding of elderly Hmong’s beliefs and understanding of chronic illness, diabetes, and associated health care practices.

Through the use of a Hmong interpreter, interviews were conducted using a semi-structured question format to uncover perceptions of respondents as well as to gather information on traditional and non-traditional health care beliefs and practices which promote an improvement in health care provided for the Hmong population.

Biology

Matthew Chorley (113)
Faculty Adviser/Collaborator: David Lonzarich
Title of Research Project: Implications of Habitat Fragmentation Upon the Prevalence of Microbial Agents
Diseases and parasitism have long been known to cause significant levels of mortality in small mammals (Elton 1942) and may at times cause local extinctions (Lechleitner et al 1962). Among the factors that can influence the spread of a disease is host density. High densities can lead to (1) increased contact between infected and non-infected individuals, and (2) increased physiological stress (Hansen and di Castri 1992). These stressors can be intensified by habitat fragmentation, which leads to patchy environments (mosaics). Patches can create changes in terrestrial small mammal populations during times of high density (Wilson 1984) which can intensify this stress. Such changes can include but are not limited to: home range overlap (Pickett and White 1985), increased resource competition (Hansen and di Castri 1992) and direct confrontations such as fighting (Hansen and di Castri 1992) all of which directly (actual touching) or indirectly (sniffing or examining scent markings, robbing caches, etc.) affects contact amongst individuals. It is possible that this contact could be further increased as patches get smaller. Smaller patches should contain higher densities than large patches, due to limited emigration, (Glicwicz 1980) resulting from habitat homogeneity. This increased contact amongst individuals could affect the prevalence of a viral agent in smaller patches.

Rodney Cook (112)
Faculty Adviser/Collaborator: David Brakke
Title of Research Project: Genetic and Morphological Divergence Among Four Discrete Populations of Pyganodon grandis (Bivalvia: Unionidae) Found in Wisconsin

Due to the extensive variability in shell shape and form commonly found within many species of freshwater bivalve mollusks, the systematic relationships of these animals are rather poorly understood. This study examined the phylogenetic relationships of four morphologically variable populations of Pyganodon grandis found in Wisconsin. Collection sites included the Popple River, Red Cedar River, Half Moon Lake, and a gravel quarry in Chippewa Falls. Individuals from each population were morphologically evaluated by height index (HI). Height index is simply the height to length ratio of the shell X 100. In addition, restriction endonuclease analysis of polymerase chain reaction (PCR) amplified products of the 16SrRNA region of mitochondrial DNA (mtDNA) was performed on individuals from each population. Height index data revealed that the Half Moon Lake population is morphologically different than the other three populations studied. In addition, the restriction endonuclease Rsal revealed a diagnostic restriction site polymorphism among the four populations. Although 13 of the 18 restriction endonucleases used successfully found restriction sites, no other fragment polymorphisms were found. The morphological and genetic data obtained here supports the current taxonomic classification of each population examined to consist of environmentally induced forms of Pyganodon grandis.

John Ford (114)
Faculty Adviser/Collaborator: David Lonzarich
Title of Research Project: Over Winter Survival and Habitat Use of Juvenile Coho Salmon (Oncorhynchus kisutch) in Lake Superior Tributaries

Little is known about the factors that limit stream populations of coho salmon (Oncorhynchus kisutch) that were introduced into tributaries of the Great Lakes. Although this species has been intensively studied in its native range of the Pacific Northwest, it is unclear if knowledge of these pacific populations can be applied to manage Great Lakes populations. Regional differences in climate, especially as they affect winter stream flows
and water temperatures, suggest that the factors limiting coho in Great Lake tributaries may differ substantially from Pacific streams. In an effort to help clarify how the freshwater residency affects overall productivity of coho salmon in Lake Superior, I: (1) monitored habitat use by coho salmon during the overwinter period and (2) estimated overwinter mortality of juvenile coho in Whittelsey and the Onion River of the Lake Superior drainage. All coho salmon bearing pools were mapped in both streams. Population estimates were conducted using snorkeling techniques during pre and post winter time periods. Habitat use during the overwinter period was monitored by fin clipping several salmon according to two types of habitat complexity (simple and complex), and recording their activity during this time period. These findings should provide much needed insight into the early life history of coho salmon in Lake Superior tributaries and aid in efforts to manage their populations.

Colleen Matula (116)
Faculty Adviser/Collaborator: Wilson Taylor
Title of Research Project: Growth Rate, Pattern and the Effects of Harvest of Lycopodium obscurum in the Lake Superior Region

The genus Lycopodium has attracted the attention of botanists because of its primitive structure and great antiquity. Studies of the species are lacking for much of the genus. One species of concern is Lycopodium obscurum. This species is harvested for use in floral arrangements. Certain National Forests and state agencies are in the process of drafting plans concerning the collection of club mosses and other plant species. It is difficult to develop meaningful guidelines for protection and sustainable collection because the growth rates, density and recovery rate are not known. A study investigating these factors began in May of 1994 in the Chequamegon National Forest in northern Wisconsin. Distribution, growth rates and patterns, and post harvest recovery are being examined. Some questions addressed are: How quickly do populations recover after harvest? How might harvest limits for a given site be determined? Are there differences in growth rates between varieties?

Matthew Solensky (115)
Faculty Adviser/Collaborator: Terry Baldwin
Title of Research Project: Distribution, Productivity and Breeding Habitat of Taiga Merlins (Falco columbarius columbarius) in Northcentral WI

Merlins have historically bred in Wisconsin (Sindelar and Jacobson 1981; Wilson 1985; and Doolittle 1992). Merlins found in Wisconsin today appear to be a recovering population. The purpose of this study is to initiate an inventory of the Taiga merlin in the Northcentral region of Wisconsin. Breeding merlin pairs were found by playing a tape of a merlin call and locating individuals when they responded. When it was determined that a pair had been found, the location was noted on a map. Pairs were subsequently checked throughout the breeding period to note phenology. Chicks were banded by climbing the nest tree, lowering the chicks to the ground to be banded, then returning them to the nest. Success of an individual site was evaluated by observations at or near fledging of the chicks. Macrohabitat analysis was achieved by analyzing the area directly surrounding the nest tree. Twenty-one active pairs were found in 1995, 14 of which were known to be successful in fledging chicks. Fifty-three chicks were fledged from the successful nest, and 38 were banded.
Kristin Zuzek (117)
Faculty Adviser/Collaborator: Lloyd Turtinen
Title of Research Project: Can Cytomegalovirus Protein US29 Bind Tumor Necrosis Factor?

Cytomegalovirus (CMV) has been clinically shown to cause immunosuppression in healthy individuals. After infection, CMV prevents normal functioning of the immune system by inhibiting the action of tumor necrosis factor (TNF). It has been proposed that US29, encoded by CMV, acts as a receptor for TNF based on similarities with tumor necrosis factor receptor (TNFR) P55 and p75, as well as other members of the nerve growth factor (NGF)/TNFR families.

Protein analysis and sequence data support the hypothesis that US29 is a distant member of the TNFR family. Hydrophilicity plot of US29 reveals it is a transmembrane protein. Extracellular and cytoplasmic regions are structurally similar to that of TNFR family members, having approximately the same number of amino acids in each domain. Although the characteristic cys-x-x-cyx-x-cys motif of the family is absent in US29, there are cysteine residues conserved in other areas. Hypothetical folding of the proposed US29/TNF binding site resembles that of the TNFR1 crystal structure. This domain is composed of elongated strands of residue held together by the ladder of disulfide bonds. Investigation of the TNF binding site located on TNFR1 and the proposed US29/TNF binding site shows similar characteristics, however biological studies must be completed before determining the role of US29 in TNF inhibition.

Communication Disorders

Roxanne Kearney, Mary Peterson (119)
Faculty Adviser/Collaborator: Thomas King
Title of Research Project: Evaluation of Four Access Methods to the RealVoice™ AAC Device: A Comparative Analysis of Rate, Accuracy and Error Types

Four standard access methods to the ACS Technologies RealVoice™ speech-output device were compared in terms of input rate and accuracy, as well as percentage and frequency of error types. Access methods included row-column scanning, direct selection with optical head pointer, two switch Morse code, and direct selection with built-in QWERTY keyboard. Subjects included twenty-two literate, developmentally-normal adults (five male, seventeen female). Printed output from each subject and access method was analyzed for rate, plus types and frequency of errors. Comparison data across methods and subjects were summarized as were considerations for clinical practice.

Amy Krob (122)
Faculty Adviser/Collaborator: Larry Solberg
Title of Research Project: Speaking Fundamental Frequency and Pitch Sigma in Four Speech Tasks

The purpose of this study was to determine the influence of speech task on measures of speaking fundamental frequency (SFF) and pitch sigma in males and females with normal voices. Results indicated that there was a significant difference in SFF by task for the females but not for the males. No significant difference in pitch sigma values was found among tasks for either group of subjects. Implications of these results for clinical application will be discussed.
Holli Radant (123)
Faculty Adviser/Collaborator: Lisa LaSalle
Title of Research Project: Effects of Ritalin on the Speech Rate and Fluency of Individuals with Attention Deficit Hyperactivity Disorder (ADHD)

Individuals with Attention Deficit Hyperactivity Disorder (ADHD) display overactive, hyperkinetic, inattentive, and impulsive behavior when unmedicated. Although there is a considerable amount of research concerning the stimulant drug Ritalin as a medical intervention for individuals diagnosed with ADHD to treat their hyperactive behaviors, there has been little or no research on how Ritalin effects the speech and language of individuals with ADHD. The speech rate and fluency of 10 individuals (9- to 21-years of age) with ADHD were examined in two conditions, when medicated with Ritalin (“On Ritalin”) and when unmedicated (“Off Ritalin”). It was hypothesized that the individuals would speak more disfluently and rapidly when unmedicated than when medicated. The 10 individuals as a group did not produce significantly more disfluencies or speak more rapidly when unmedicated, suggesting that Ritalin does not tend to affect speech rate and fluency.

Laurie Schomisch (120)
Faculty Adviser/Collaborator: Linda Carpenter
Title of Research Project: Acquisition of Non English Languages

The purpose of this study was to review research documenting the linguistic characteristics of four non-English languages as well as development of those languages as a first language. The four targeted languages were Hmong, Spanish, Chippewa (Ojibwa), and Black English. Implications of this information will be discussed for future research needs and clinical application.

Curriculum and Instruction

Stuart Dodge (118)
Faculty Adviser/Collaborator: Michael Lindsay
Title of Research Project: Empowering Middle School Teachers and Administrators

This project investigated concepts and processes related to educational change, teacher empowerment, collaboration, and integrated curriculum in order to improve the Whitehall School District’s middle-school programs and to forge stronger articulation both with the elementary and high school curricula, on the one hand, and between the middle school and the parents and community, on the other hand. The students generated data by participating in various study teams and then reported their findings at the November 1995 annual conference of the National Middle School Association. Another presentation will be made at the April 1996 annual conference of the Wisconsin Association for Middle Level Education, after UWEC Student Research Day.

Findings underscore the critical need for teacher empowerment and substantiated other research which emphasizes the expanded time needed for successful and enduring change to occur in schools and in other organizations. Importantly, this research contributes to the growing knowledge base of educational change in middle schools, including especially to needs for clearer articulation across school levels, greater involvement of parents and community, enhanced identity for the middle school, and altered roles for students, teachers, and administrators. Project findings also contributed to a collaborative article on educational change that Professor Lindsay and Whitehall educators wrote for the December 1995 Wisconsin School News.
Our goal was to define co-dependent behaviors in secondary youth, identify teaching strategies that contribute to the dependency profile of co-dependent youth, and identify existing teaching strategies that counter co-dependent characteristics. After researching, we discovered that teachers should use caution when labeling students "co-dependent." Instead, teachers should focus on identifying specific student behaviors. Some students tend to display an inappropriate set of behaviors that can develop into destructive or dependent lifestyles. Most current teaching strategies can counter co-dependent behaviors if teachers are aware of the behaviors, respect students, encourage student responsibility, and foster a caring environment.

James Martin, Brian Galvin (79)
Faculty Adviser/Collaborator: Roger Tlusty
Title of Research Project: Showing Connections: Applications of Digital Technology in Historical Inquiry

This poster presentation depicts how a collection of digitally stored historic resources can be used to display, in multiple ways, the interconnectedness of individuals within a community to surrounding events both locally and beyond.

English

Richard Barribeau (76)
Faculty Adviser/Collaborator: Barbara Emmel
Title of Research Project: Portfolios. Portfolios. Portfolios: An Examination of the Three Initiatives for Portfolio Use at UWEC

In order to produce an overview of portfolio assessment at UWEC, we propose to examine the three different levels of portfolios currently being adopted (for the baccalaureate degree, for departmental majors, and for individual courses) and to examine their different uses and methods of evaluation. To complete our report, we will study available portfolio assessment plans to determine how each plan defines portfolios, develops procedures to teach the use of them, and outlines methods to evaluate them. In addition, we will synthesize information from other Wisconsin universities and the existing literature on portfolios. Since over twenty programs plan to use portfolios in the immediate future, a report that defines the different kinds and uses of portfolios will help facilitate communication about the role and effectiveness of portfolio assessment at UWEC. A graduate student will be involved in the research and the writing of the report. We will use three different channels to disseminate an easily accessible, thorough report: 1) a presentation by the graduate student, 2) a report to the university, and 3) an article in a journal.

Dawn Remsing, Bee Lee, Ken Lee (77)
Faculty Adviser/Collaborator: August Rubrecht
Title of Research Project: Hmong Folklore: The Art of Storytelling

The Hmong have managed to preserve their culture for more than 4,000 years despite being driven from their homelands throughout history. Folk tales are crucial tools for main-
taining traditional culture. Folklore provides entertainment, education, and an oral history of the culture and its people. Through folklore, elders teach children the values that define their culture. Hmong folklore came to the United States when nearly 60,000 Hmong refugees fled Laos and came to the United States after communist soldiers seized Vientiane. In the United States, many Hmong children have begun to reject traditional ways as they try to assimilate into American culture. Already, there are Hmong youth who do not know how to speak Hmong and who are unfamiliar with certain cultural aspects and traditions. With time, traditional folk tales, like language, will begin to disappear. The long history of Hmong folklore is in jeopardy in the United States.

To assist with preservation efforts, students collected 12 Hmong folk tales from storytellers residing in St. Paul, Oshkosh, and Eau Claire. The stories were recorded on audio and video tapes and will be archived in several libraries. The stories also have been transcribed and translated into English. The performances of three of the storytellers will be featured in a two-part Hmong folk tale series, “Hmong Folklore: The Art of Storytelling,” to air in May and June on Eau Claire Public Access Community Television. In addition, a Hmong storyteller from St. Paul performed for a group of 350 Eau Claire school children March 1 as part of the group’s project. The collected folk tales will be the basis for a master’s thesis on Hmong folklore.

Meredith Weber (109)
Faculty Adviser/Collaborator: Wilma Clark
Title of Research Project: Course Assessment: Effects of English 405 Advanced Technical Writing on Former Students Now in the Workplace

This study assesses the effectiveness of the course English 405 Advanced Technical Writing by surveying former students now in the workplace. Following a 1990 sabbatical internship as a technical writer at 3M, Wilma Clark developed a version of English 405 that provides students with workplace experience. Students complete writing projects, one independently and one collaboratively, for real clients in various UWEC offices and in non-profit organizations in the Eau Claire community. This course has been offered five times, once each spring in 1991, 1992, 1993, 1994, and 1995. In May 1995 questionnaires were sent to students who had taken the course from 1991 to 1994. Students from the 1995 class were not surveyed because they would not have had time for experience in the post-graduate workplace. The questionnaire asked the former students to rate numerically and then to comment on the helpfulness of seven course elements in preparing them for the workplace:

- Writing for real clients
- Producing documents for real users
- Group project-collaborative writing
- Solo project-independent writing
- Reviews and revisions
- Desktop publishing
- Project management

The questionnaire also invited respondents to describe their job experience and to suggest improvements in the English 405 course and in any aspect of the UWEC technical writing program. As an option, respondents were invited to submit their names and address information for an English Department file of contacts for current students wishing to set up inquiry interviews with professionals now in the field. In May, 74 surveys were mailed, and in June, 46 were returned (67% return rate). Thirty-five of the respondents (47% of those surveyed) gave permission to be contacted by current students during career planning. A complete transcription and analysis of both the objective and subjective parts of the survey are included in this report. Conclusions and recommendations are given.
Human Development Center

Marla Aspenson (82)
Faculty Adviser/Collaborator: William Frankenberger
Title of Research Project: Use of Stimulant Medication to Treat Children with ADD: A National Survey of LD Teachers

The incidence of students taking stimulant medication to control Attention Deficit Disorder (ADD) has increased dramatically. In the current study, teachers of Learning Disabled (LD) children were surveyed in four states occupying different geographical areas of the United States. Three-hundred and twenty-two teachers of students with LD provided information about students in their classes who were identified as having ADD and receiving medication. Results of national survey revealed that 20% of elementary students, 23% of junior high students, and 16% of high school students in LD classes were co-diagnosed as having some form of ADD. Furthermore, 16% of elementary, 16% of junior high, and 10% high school students in LD classes were receiving stimulant medication to treat their ADD.

LD teachers believe that there has been an increase in the number of students diagnosed as ADD in the past few years. In addition, the teachers indicated that stimulant medication effectively reduced behavior problems within the classroom, but they were less convinced that the medication positively affected children’s standardized achievement test scores or classroom test scores. Results of the survey also provided information about types of medication employed to treat ADD and typical dosage levels.

History

Kurt Kortenhof (80)
Faculty Adviser/Collaborator: James Oberly
Title of Research Project: Timber Cruiser, City Booster and Practical Prankster: The Life and Legacy of Eugene S. Shepard, 1854-1923

Eugene S. Shepard is remembered for his humor as it relates to Rhinelander and lumbering. His most famous accomplishment was the popularization of the Hodag, a fictional lizard-like beast “captured” near Rhinelander, Wisconsin in 1896. Surprisingly, accounts of Shepard and his Hodag are extremely brief, incomplete, and often inconsistent. The capture and ensuing legend of the Hodag has not been investigated and evaluated in a detailed fashion. In addition, other aspects of Shepard’s biography have been widely ignored.

This biography of Eugene Shepard focuses on three distinguishable but interconnected themes. The little studied, but yet paramount role of the timber cruiser and/or the resident land speculator as the pine stands of northern Wisconsin, Minnesota, and Michigan were harvested comprises the first theme. The second theme relates to the development of Rhinelander as a logging boomtown and its perpetuation as a regional industrial center. This development is studied within the context of the significant role Shepard played in the city’s development through active participation in local government and extensive involvement in voluntary booster organizations. Rhinelander offers an interesting case study of the process of industrial diversification as the city was faced with the rapid decline of the lumber trade. Shepard’s personality, and in particular his creativity and humor, comprises the third theme and serves to tie the first two together. He employed these abilities in his work as a timber cruiser/businessman, and in his endeavors to promote Rhinelander. Furthermore, these traits prospered on their own account and resulted in Shepard’s weighty contribution to lumberjack lore.
US relations with Latin America have historically played a major role in US foreign policy, and continue to occupy a place of great importance. This study focuses on US relations with one Latin American nation, Venezuela, during the formative national period of both countries. Though this investigation does chronicle the development of US diplomatic relations with Venezuela, it primarily looks at relations from 1845 to 1849, the tenure of Chargé d'affaires to Venezuela Benjamin Grover Shields. Drawing heavily from official diplomatic despatches, this study investigates Shields' ability to represent the interests of the United States as would be expected from a bureaucrat in his position. The evidence suggests that Shields' hostility toward high ranking Venezuelan officials not only jeopardized US relations with the Latin American republic but ultimately led to his dismissal from his post. An investigation of such a controversial representative of the US is not only fascinating, but also extremely helpful to scholars interested in nineteenth century US diplomatic history.

**Psychology**

**Traci Jasperson (83)**  
Faculty Adviser/Collaborator: Beverly Dretzke  
Title of Research Project: *A Comparison of Solution-Finding and Memorization Approaches to Problem Solving*

The purpose of this study was to investigate the effectiveness of different approaches to solving analogical reasoning problems. College students were assigned to one of three training conditions: solution-oriented individual, solution-oriented group, or memorization. Memorization students were asked to memorize solutions to the training problems, whereas students in the two solution-oriented conditions were asked to attempt to generate a successful solution to each problem. Preliminary analyses indicate that the solution-oriented students who worked, in groups did as well as the solution-oriented students who worked alone. In addition, memorization students excelled on a recall test of training problem solutions, but were equal to the students in the two solution-oriented conditions with respect to their performance on finding solu-
tions to new, but similar, analogical reasoning problems.

Special Education

Kathleen Van de Loo (110)
Faculty Adviser/Collaborator: Vicki Snider, Donald Crawford
Title of Research Project: Action Research: Implementing Connecting Concepts

This study was a school/university partnership in Bruce, Wisconsin to provide information prior to a district-wide adoption of a new mathematics basal. Students' performance in two fourth-grade classrooms was compared. One classroom used a traditional math basal textbook published by Scott, Foresman and the other used an innovative textbook, Connecting Math Concepts (CMC). The CMC group scored significantly higher on both standardized and curriculum-based measures. As a result of this study, five additional teachers in the district are piloting CMC in their classrooms.
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