Undergraduate Research and Creative Works Symposium

Program and Abstracts of Papers
Volume II

March 31, 2001
F.W. Olin Building

Southwestern University
Georgetown, Texas

March 31, 2001

Members of the Southwestern Community,

On behalf of the symposium committee, I would like to welcome you to the 2nd annual Southwestern University Undergraduate Research and Creative Works Symposium. It is an honor and privilege to have you attend this event.

The Delta Alpha Chapter of the Beta Beta Beta Biological Honor Society organized the first symposium in the spring of 2000. In order to increase the diversity of presentations and to truly give ownership of the symposium to all Southwestern students, Beta Beta Beta made the decision to transfer leadership of the symposium to a committee of students made up of interested members representing all departmental and honor societies. This move was met with resounding approval and has resulted in a vastly improved symposium. This year's symposium features more student presenters representing a greater diversity of disciplines than last year.

Plans are underway to make the symposium committee an official and permanent part of Southwestern University. In order to make this goal a reality we need the support of students, faculty and staff. Research and other "hands on" experiences are essential to the academic development of all students. As exemplified by the diversity and number of presentations in this year's symposium, research and other equivalent experiences are thriving at Southwestern. Unfortunately this fact often leads people to take for granted the tremendous opportunity a Southwestern student has. The types of research experiences you will hear about today are virtually ***unheard*** of at the undergraduate level at most institutions of higher learning. Undergraduate research experiences not only give students a tremendous advantage but often also make significant contributions to the field of inquiry and to the student's academic growth. Let us all make a commitment to support and foster undergraduate research at Southwestern University and continue to give students the immeasurable gift of knowledge.

We think you will find the symposium enlightening. In a true liberal arts fashion, the symposium features more than 14 disciplines and the accomplishments of more than 40 students. The disciplines were intentionally mixed within each session to display the diversity of interests represented by the Southwestern University student body.

We hope you enjoy the symposium.

Sincerely,

Matthew M. Chumchal
Chair, Undergraduate Research and Creative Works Symposium Committee

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2001 Program Agenda

Session I
Location: F.W. Olin Building, Room 105
Moderator: Matthew Chumchal

10:00 a.m. 1. **Bigger is Better: Fitness Advantages for Large Female *Xanthopimpla stemmator.*** Matthew M. Chumchal and Dr. Stephanie Fabritius, Department of Biology, Southwestern University.

10:15 a.m.. 2. **Forging Utopia: Progressive Rock and the Unity of a Subculture.** Robert Lassen, Department of Sociology, Southwestern University.

10:30 a.m. 3. **The Effects of ACE Inhibition on Low Na+ SAD Rabbits.** Kristy Ward, Department of Biology, Southwestern Universtiy.

10:45 a.m. 4. **Toussaint Louverture and the Colonization of Consciousness.** Alan Suderman, Department of History, Southwestern University.

11:00 a.m. 5. **An Experimental Illustration of Euler's Chain Relationship.** Ana A. Alcaraz, Department of Chemistry, Southwestern University.

11:15 a.m. 6. **An Ethnographic Study of Individual Students in the Reading Recovery Program.** Emily S. Walker, Department of Child Study and Language Development, Southwestern University.

11:30 a.m. 7. **Methods for Syntheses of Potential Anti-tumor Benzoquinone Mustard Derivatives.** D.J. Fiterman, Department of Chemistry, Southwestern University.

11:45 a.m. 8. **"What's this got to do with me?": A Narrative of Alcoholism, Identity, and Relationships.** Robyn L. Crummer, Department of Communication, Southwestern University.

Session II
Location: F.W. Olin Building, Room 110
Moderator: Amanda Ackermann

10:00 a.m. 9. **Cyclic Voltammetric Study of p-Aminophenol and Nitro-Aromatic Compounds in a Novel Nonaqueous Eutectic Solvent.** Megan Bourg and Fred Hilgeman, Ph.D., Department of Chemistry, Southwestern University.

10:15 a.m. 10. **The Teacher Tool Kit: An Experience in Software Engineering.** Lindsay Cowart and Nichole Naukam, Department of Computer Science, Southwestern University.

10:30 a.m. 11. **Isolation of Novel Regulators of Enhancer of Split Expression.** Frances Chu and Rebecca Pierce, Department of Biology, Southwestern University.

10:45 a.m. 12. **Impact of the Signs and Symbols of Languages.** Alison Young, Department of Art, Southwestern University.

11:00 a.m. 13. **Nest Site Selection Among Dove Species on the Southwestern University Campus.** Kara Stabler, Department of Biology, Southwestern University.

11:15 a.m. 14. **The European Union in Evolution.** Ingrid Anne Kliewer, International Studies Program and Department of Modern Languages and Literatures, Southwestern University.

11:30 a.m. 15. **Investigation of the Microenvironment Surrounding Model Solutes Randomly Dispersed in poly(dimethylsiloxane).** Wendy Hayter, Department of Chemistry, Southwestern University.

Noon–1:00 p.m.
Break for Posters and Refreshments
Location: F.W. Olin Building, Lobby

String Quartet: Denise Frazier, violin; Todd Hendricks, cello; Ingrid Kliewer, violin; Robert March, viola

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Session III
Location: F.W. Olin Building, Room 105
Moderator: Matthew Chumchal

1:00 p.m. 16. **Wound Healing of the Skin Requires Activation of the ERK1/2 MAPK Signaling Pathway in Keratinocytes.** Amanda Ackermann, Departments of Biology and Chemistry, Southwestern University.

1:15 p.m. 17. **Viral Ki.** Ryan Smith, Department of Art, Southwestern University

1:30 p.m. 18. **Intracellular Protease Activity in Mucor rouxii Under Limiting Peptone Concentrations.** Adam Szafran, Departments of Biology and Chemistry, Southwestern University.

1:45 p.m. 19. **Images of Poverty: Journalistic Construction of the American Poor.** Tricia Mein, Departments of Sociology and Communication, Southwestern University.

2:00 p.m. 20. **Computer Generated Art; An Independant Study Project with Associate Professor Mary Visser. An Exploration of the Tools and Techniques Offered by Various Three Dimensional Software Packages for the Purpose of Constructing a Portfolio of Three Dimensional Models and Animated Shorts.** Nick Sortin, Department of Art, Southwestern University.

Presentation Abstracts

1. **Bigger is Better: Fitness Advantages for Large Female *Xanthopimpla stemmator.***
Matthew M. Chumchal and Stephanie Fabritius Ph.D., Department of Biology, Southwestern University.

Xanthopimpla stemmator, a solitary endoparasitoid of Old World lepidopteran stalkborer pupa, have been shown to skew their sex ratio when presented with pupae of differing sizes. Specifically, more females than expected are produced in large pupae and more males than expected are produced in small pupae. The production of more females in high quality (large) hosts is predicted from theory if a female's fitness is related to her adult size. Female *Xanthopimpla stemmator* were collected at the time of emergence and placed individually in 1-quart jars and were fed a 20% sucrose solution. To determine the potential fitness advantage conferred on females that emerged from large pupa, we provided all females (small and large) with average-sized host pupa on a daily basis. The pupa was left with each female for 24 hours. After this time, pupae were opened and the number of parasitoid eggs were counted under 20x magnification. From this data, we calculated life table parameters for females produced in small and large pupa. Data indicates that females who have developed within large pupa have a higher relative fitness than those that have developed within smaller pupa.

2. **Forging Utopia: Progressive Rock and the Unity of a Subculture.**
Robert Lassen, Department of Sociology, Southwestern University.

My sociology capstone project explores the relatively unknown musical genre of progressive rock and explains how progressive rock listeners identify themselves as a unique subculture. Previous literature analysis includes Simon Frith's book "Sound Effects: Youth, Leisure, and the Politics of Rock 'N' Roll" and Will Straw's article "Characterizing Rock Music Culture: The Case of Heavy Metal." My own analysis first consists of studying progressive rock albums from the 1960s, 70s, and 90s; and exploring the common themes that these albums share. The themes that I look at are science fiction/fantasy cover art and song themes, heavy metal influence (starting in the 1970s), and song structures such as epic songs and concept albums. The second part of my analysis explores the demographics and beliefs of people who consider themselves fans of progressive rock. I created a survey containing both demographic questions (such as age, race, and sex) and questions on musical, political, and religious ideologies. I distributed the survey at a progressive rock/metal booth at the Austin Record Convention at the end of October 2000, and I also posted the questions on a progressive rock message board on the internet. Respondents were largely white, male, and non-religious. Respondents' ages and political preferences tended to vary. In addition, I posted six open-ended discussion questions for respondents on the message board to answer in their own words. Based on these questions, I found that listeners felt bonded to each other based on their similar musical experiences, and they also identified themselves as

opposed to those outside their subculture. Progressive rock listeners are an example of a new kind of subculture that is based on musical and intellectual ideals rather than on physical style and geographic proximity.

3. **The Effects of ACE Inhibition on Low Na+ SAD Rabbits.**
Kristy Ward, Department of Biology, Southwestern Universtiy.

It is well-known that by decreasing an animal's Na+ intake, blood pressure decreases significantly. However, this decrease cannot be directly observed because the renin angiotensin compensates by increasing the levels of angiotensin II in the blood. By injecting Captopril, an angiotesin converting enzyme inhibitor, the production of ang II is blocked and a decrease in MAP is observed. We expected to see this decrease in both the intact rabbits and the sinoatrial denervated rabbits, but this was not the case with the SAD rabbits, suggesting that there must be an alternate mechanism that is compensating for the loss of the baroreflex.

4. **Toussaint Louverture and the Colonization of Consciousness.**
Alan Suderman, Department of History, Southwestern University.

This project is intended to show the complexities involved in the Haitian Revolution. By specifically examining the life, politics and actions of Toussaint Louverture, the first black leader of Haiti, one can see how the ideas of the French Revolution were interpreted by slaves in the colonies and thus get a better idea of what the ideas of the French Revolution were.

5. **An Experimental Illustration of Euler's Chain Relationship.**
Ana A. Alcaraz, Department of Chemistry, Southwestern University.

Few experiments exist in the chemical literature which introduce the student to the usefulness of Euler's Chain Relationship for the manipulation of partial derivatives in areas like thermodynamics and hydrodynamics. This experiment, designed for the undergraduate physical chemistry laboratory, uses the properties of an elastomer, latex, to illustrate the experimental validity of the Chain Rule. Considering the length of an elastomer to be a function of its tension and temperature, one can use Euler's Chain Relationship to show that $(\partial t/\partial T)l(\partial l/\partial t)T(\partial T/\partial l)t=-1$. This is done by measuring each of the terms in the equation and determining their slopes. Within experimental error, the product of these slopes is -1.

6. **An Ethnographic Study of Individual Students in the Reading Recovery Program.**
Emily S. Walker, Department of Child Study and Language Development, Southwestern University.

Reading Recovery is an early intervention program targeting first grade students with reading difficulties. Developed in the 1970s by New Zealand educator Marie Clay, Reading Recovery has since become increasingly popular in American schools. Despite

Reading Recovery's growing popularity, some educators remain critical of this expensive, highly structured program. The current ethnographic study explores the various criticisms of Reading Recovery as well as their counter-arguments. In addition, the current study includes two case studies conducted on Reading Recovery students. The purpose of these case studies was to determine how the progress a child makes in Reading Recovery is reflected through his or her performance in the regular classroom environment. Data revealed that both children did make progress using Reading Recovery testing procedures, although not equally. One child reflected progress in both environments; the other was unable to fully demonstrate his progress in the regular classroom. Concerns discussed include a lack of communication between teachers and the classroom teachers' lack of responsibility for the Reading Recovery students.

7. **Methods for Syntheses of Potential Anti-tumor Benzoquinone Mustard Derivatives.**
   D.J. Fiterman, Department of Chemistry, Southwestern University.

Benzoquinone mustards are relatively new compounds that have yet to be studied in depth, but are known to be potential anti-tumor agents by the process of bioreduction. Tumors contain areas of hypoxia due to poor and inadequate blood flow to the cells of the tumor, therefore bioreduction is becoming increasingly important as a potential anti-tumor treatment. DT-diaphorase is a two-electron reducing enzyme that has been found to be present in higher concentrations in tumor cells than in normal, healthy cells. Due to the two-electron reducing power of this enzyme, the benzoquinone mustards will be completely reduced to its activated hydroquinone derivative. These reduced products can undergo redox cycling and form inactive cyclized products. Functional groups have been proven to significantly affect the reduction and activation of bioreductive molecules. Both the steric and electronic effects of these functional groups can alter the reaction rates, but to what degree has yet to be determined. The effects of steric differences will be observed in various alkyl groups, and electronic differences will be studied in alkyl versus halogenated groups. Detailed structures of these molecules will be presented as well as possible interactions of these mustards with DT-diaphorase.

8. **"What's this got to do with me?":**
   A Narrative of Alcoholism, Identity, and Relationships.
   Robyn L. Crummer, Department of Communication, Southwestern University.

This piece explores how alcoholism has shaped and transformed identity. It illustrates the importance of account making and storytelling in making sense of how alcoholism affects one's life. I weave details of my own life within that of a recovering alcoholic and friend, Caren. I narrate my own lived, emotional experience of growing up in an alcoholic home and my identity struggle with determining if I am an alcoholic. I also explore how Caren's self-disclosure of the painful details of her drinking and past have affected her since the beginning of the research for this project over a year ago. My research has come about in the creation and completion of a larger narrative of a recovering alcoholic and my own struggles with identity and alcoholism. I work from my background knowledge on

alcoholism and interpersonal communication and combine it with study of ethnographic methods of research. The product yields a complex, multi-faceted and by far incomplete rendering of how the alcoholic identity manifests itself in memory, storytelling and basic human interactions.

9. **Cyclic Voltammetric Study of p-Aminophenol and Nitro-Aromatic Compounds in a Novel Nonaqueous Eutectic Solvent.**
   Megan Bourg and Fred Hilgeman, Ph.D., Department of Chemistry, Southwestern University.

This paper discusses the use of a nonaqueous eutectic solvent composed of equamolar amounts of pyrazole and imidazole. The production of a new nonaqueous organic solvent is extremely important to the field of electrochemistry because it increases the number of organic compounds that can be investigated. Another important aspect of nonaqueous solvents is that the temperature range is much larger than that of aqueous solvents, 100° C, and can therefore be used for numerous applications that were not previously possible. The eutectic solvent has been shown to be inert through the reversible redox couple of p-aminophenol and can therefore be used for electrochemical experiments. Through investigations of many compounds, the eutectic has shown to have an affinity for nitro- and amino-aromatic compounds, but does not reveal an electrochemical activity towards non-aromatic nitro and amino compounds. The voltammograms obtained for the respective functional groups each have a characteristic shape, therefore it is thought that it is representative of the electrochemical activity of the functional group. The electroreduction of nitrobenzene in the eutectic is one example of an observed characteristic shape, and it differs from that found in the literature [3]. One possible explanation is that the solvent could posses an ability to sustain intermediates (radical anions) of the reaction mechanism due to its possible aprotic nature [2]. Another explanation is that the eutectic solvent has acidic properties, and can thus allow the reduction of nitrobenzene to phenylhydroxylamine, which can then undergo an acid catalyzed rearrangement to p-aminophenol. The electrochemical applicability of this solvent is unique and could possibly allow for the further investigation of nitrogen containing compounds in the future.

10. **The Teacher Tool Kit: An Experience in Software Engineering.**
    Lindsay Cowart and Nichole Naukam, Department of Computer Science, Southwestern University.

Our software development team (Lindsay Cowart and Nichole Naukam) is using software engineering techniques to produce a software product, fulfilling the Computer Science Capstone requirement. The current status of our project is a demo version of the software product, and a project plan for the further development of the product. The project objective is to create a "tool kit" for teachers, including a grade book program, online student sign-up sheets and Web accessibility to a student grade report. This product will be available to all Southwestern University faculty. The function of the Teacher Tool Kit

is to provide a computer-based package of teaching utilities. The Tool Kit should meet the clients' basic needs, and be extremely user-friendly. Part of the project involves the reverse engineering of an obsolete grade book application which we have instantiated into a modern Windows environment. In particular, the grade book will provide storage for course information, induding student names and IDs, dass assignments and student grades (specific to individual assignments). The program will also give reports on the status of student grades. This includes averaging grades, weighting assignments and dropping specific grades. In addition, the program will give course reports by providing class averages on each assignment and overall course grades. The user can edit all stored information.

11. **Isolation of Novel Regulators of Enhancer of Split Expression.**
Frances Chu and Rebecca Pierce, Department of Biology, Southwestern University.

The Notch pathway is involved in cell specification during development. Homologues of members of the Notch pathway have been identified in many organisms, from nematodes to humans. When Notch is activated in the developing Drosophila melanogaster nervous system, it signals to inhibit the expression of proneural genes by activating the expression of the Enhancer of split (E(spl)) bHLH complex of genes. Although all of these genes in this complex are known to be regulated by the Suppressor of Hairless (Su(H)) protein, the expression patterns differ greatly within the D. melanogaster wing disc. The varied expression patterns lead to the hypothesis that there are proteins, other than Su(H), regulating the E(spl) complex. Through a yeast monohybrid screen, we have found protein interactrs that associate with the upstream regulatory region of the mg gene, one of the genes within the E(spl) complex. The protein(s) may be partially responsible for the limited expression patterns of the mg gene within the D. melanogaster embryo. We will present on the interactors that we have identified.

12. **Impact of the Signs and Symbols of Languages.**
Alison Young, Department of Art, Southwestern University.

My creative work involves the creation of three-dimensional forms that take on the style and presence of a written language. By using various formats associated with writing from different cultures and creating forms that appear to be symbols in a three-dimensional medium, I intend to explore the impact of signs and symbols upon the viewer. The emphasis will be upon the viewer trying to decipher this apparent message, and as they explore the form the three-dimensional qualities of texture, form, spacing and scale will become part of the exploration of meaning for the viewer.

13. **Nest Site Selection Among Dove Species on the Southwestern University Campus.**
Kara Stabler, Department of Biology, Southwestern University.

Three species of dove, Mourning Dove (Zenaida macroura), White-winged Dove (Z. asiatica), and Inca Dove (Columbina inca) currently nest on the Southwestern University campus. The latter two species are relative new comers to the region. We hypothesized that the three species would separate out along several nest site parameters in order to

avoid potential competition. We measured 13 nest parameters for 97 Mourning Dove nests, 42 White-winged Dove nests, and 9 Inca Dove nests. From these parameters we calculated niche breadth and niche overlap. We looked for statistical differences among the species in terms of their nest placement. We also looked at the effects of nest site selection and nest success. Overall, four parameters were statistically significant among the species. These included nest height, proportional nest height, tree species and percent of leaf coverage around the nest. Sympatric populations of these doves do favor different nest site factors.

14. **The European Union in Evolution.**
Ingrid Anne Kliewer, International Studies Program and Department of Modern Languages and Literatures, Southwestern University.

The European Union as it exists today is the continually evolving product of decades of negotiations and compromises, a complex creation resulting from 50 years of political concessions. Its future direction is uncertain, as policy makers from its member states debate over further widening its boundaries or further deepening political, social and economic union. The fifteen member states of the European Union profoundly disagree over the appropriate future direction of the supranational body. The crux of the discussion is whether to focus more on deepening the ties between current member states or on greatly expanding the Union's membership. For either to happen, changes in the current system will be essential to accommodate the increased demands on the organization. As a result, its governing structures, desired influence and even purpose are being called into question. This paper discusses the current structure of the European Union and how it shapes power-sharing within the Community. Attention is given both to the origin of the politically-driven structural framework of the EU and to its potential future direction.

15. **Investigation of the Microenvironment Surrounding Model Solutes Randomly Dispersed in poly(dimethylsiloxane).**
Wendy Hayter, Department of Chemistry, Southwestern University.

Because many fluorescent molecules are sensitive to their local environment, they are an ideal tool for quantifying molecular-level interactions occurring in complex systems. In particular, a fluorescent probe may be used to investigate the behavior of a solute within neat and modified polymers. We have used the steady-state fluorescence of 6-propionyl-2-(dimethylamino)naphthalene (PRODAN) to determine the effects of the addition of both good and theta solvents on a model linear polymer, poly(dimethylsiloxane) (PDMS). The emission spectrum of PRODAN is known to be a measure of micropolarity within a chemical system. In addition, we have measured the fluorescence anisotropy of N,N' bis(2,5,-di-tert-butylphenyl)-3,4,9,10-perylenedicarboximide (BTBP) in order to quantify the microviscosity within our model polymer system. This presentation will focus on how the microenvironment and microviscosity surrounding PRODAN and BTBP randomly dispersed in PDMS is affected by polymer molecular weight, temperature, and mole fraction of added toluene (good solvent) and ethyl acetate (theta solvent).

16. **Wound Healing of the Skin Requires Activation of the ERK1/2 MAPK Signaling Pathway in Keratinocytes.**
Amanda Ackermann, Departments of Biology and Chemistry, Southwestern University.

Wound healing of the skin is a complex process involving changes in the signals received by skin cells (keratinocytes) from the surrounding extracellular matrix. When the skin is wounded, the basement membrane to which the keratinocytes are normally attached is broken, and the cells are exposed to the underlying dermis. When the keratinocytes are activated by the Type-1 collagen found in the dermis, they produce the enzyme Collagenase-1. Collagenase-1 degrades the collagen around the cells so that the keratinocytes can migrate across the wound area, thus closing and healing the wound. The intracellular signaling pathway through which Collagenase-1 expression is activated, however, is currently unknown. Three MAPK (mitogen-activating protein kinase) cascades have been extensively studied thus far: ERK1/2 (extracellular signal-related kinase), p38, and JNK (c-Jun N-terminal kinase). This study involves the use of Western blots to determine which of these cascades are activated in keratinocytes when in contact with collagen. Also, the amount of keratinocyte migration that occurred after addition of specific cascade inhibitors was analyzed. The results of my research support the theory that the ERK1/2 pathway is responsible for turning on Collagenase-1 gene expression in keratinocytes during wound healing.

17. **Viral Ki.** Ryan Smith, Department of Art, Southwestern University.

My ambition concerning the creation of three-dimensional images and animation lies not only in the impact of my work on the viewer, but mainly within the creative process itself. The final project holds my sense of pride and accomplishment, but the steps taken to reach the end are what I truly love. Seldom does the viewer truly understand the power of creation on the producer. I wanted to release the preconception that the final project should singularly influence the viewer. The main object is an abstract human figure, the body parts of which are disconnected, never touching each other. The figure and other objects are located in an empty, yet serene world. The animation depicts a fight between the figure, representing the power of "ki," and a simplistic spaceship, representing mechanical power. Within the fight, objects are destroyed, a figurative destruction of my creation. I'm expressing the idea that the final product is not as important as the creation process. Where as a drawing on paper can be lit on fire, such three-dimensional works on a computer can be torn down from within themselves. This act of destruction gives a sense of release from the work, leaving the only remaining portrayal in the imagination of the artist and the viewer.

18. **Intracellular Protease Activity in Mucor rouxii Under Limiting Peptone Concentrations.**
Adam Szafran, Departments of Biology and Chemistry, Southwestern University.

Previous work in our laboratory demonstrated a degenerative phase during the aerobic growth of Mucor rouxii. This phase is best characterized by a decrease in intracellular

protein concentrations with a concomitant increase in intracellular protease activity. Also observed during this phase is hyphal fragmentation. These events lead to the recycling of proteins for further growth in M. rouxii. I hypothesized that limiting peptone levels induce the degenerative phase of the organism and therefore increase the levels of protease activity. I also hypothesized that the protease activity must be under some form of molecular control. I present evidence that limiting peptone levels significantly increase protease activity. This evidence was found by performing extensive studies in which M. rouxi was grown in YEP (0.3% w/v yeast extract, peptone) media with limiting peptone concentrations and measuring intracellular protease levels with an azocasein substrate. Purification of the 26S proteasome complex was attempted using a series of ion exchange, gel filtration and hydrophobic exchange chromatographies. In addition, DNA primers were developed for the a sub-unit of the proteaseome with the primer pair to be separated by approximately 300 bp. Purification results have given evidence of a large (>500 kDa) protein complex that consists of 60 kDa sub-units and shows chymotrypsin-like activity. Developed primers for the a sub-unit of the proteasome resulted in a PCR amplified segment of the expected size in the M. rouxi genome. In conclusion, appearance of protease activity with limiting peptone levels demonstrates that the degenerative phase is a response to limiting nutrients. The results of the purification and the results of the PCR amplification strongly suggest that one aspect of molecular control of protease activity is a large protein complex similar to the proteasome.

19. **Images of Poverty: Journalistic Construction of the American Poor.**
Tricia Mein, Departments of Sociology and Communication, Southwestern University.

Assumptions about poverty are made by the majority of Americans with virtually no direct contact with the poor, meaning that information regarding poverty is received primarily through secondary sources. The newspaper medium is of particular interest to this study, given the "objective" presentation of poverty, legitimized by a seemingly authoritative figure. Within this objectivity lies the potential for the creation of a metonym: a singular case made to represent the whole. Metonyms are created through newspaper pictures shown and stories told about particular individuals who exemplify a larger category of people. The significance of this strategic imagery lies in the ability of image-producers to manipulate reality, using a particular frame. Using both a quantitative and qualitative approach, this study attempts to answer the question of how American poverty is represented in newspaper articles. The research sample contained 54 articles dealing with American poverty appearing between January 1998 and July 1999, contained in the "Los Angeles Times," "New York Times," and "Washington Post." The primary method used was content analysis. Results conclude that the journalistic construction of the American poor does involve the use of metonyms: 57.4% of articles featured an individual's situation of poverty, with 90% of those articles featuring a quote by someone in poverty. An equally prevalent authoritative voice was that of governmental figures (57.4%). Close to one-third of articles fell in the news type of "legislative/political." The social condition of poverty as presented in the sample of newspaper articles constructs an image of the

poor which is frequently associated with working. Qualitative analysis found evidence of the continual "re-discovery" of poverty. This study sheds light on the issue of the social construction of poverty within the United States. What has emerged in a socially-stratified America is a societal problem not defined merely by a lack of material resources, but also by images — both real and imagined — of those who are labeled "poor."

20. **Computer Generated Art; An Independant Study Project with Associate Professor Mary Visser. An Exploration of the Tools and Techniques Offered by Various Three-Dimensional Software Packages for the Purpose of Constructing a Portfolio of Three-Dimensional Models and Animated Shorts.**
Nick Sortin, Department of Art, Southwestern University.

I have aspirations of continuing on to graduate level study and, eventually, working for a motion picture studio creating special effects and three-dimensional characters. To prepare myself for this, I have spent the last two years in independent study classes devoted to teaching myself some of the techniques and tools of the industry under the guidance of Professor Mary Visser. I am also building on a prior knowledge of art, design, and computer programming courses which I have taken in my undergraduate career. In fact, this field incorporates a knowledge and grounding in several other fields of study including (but not limited to) art, design, math, computer science, architecture, and biology. The application of these programs to the development of character movement requires an understanding of body mechanics and believable movement within a virtual reality designed environment. Just a few years ago, computer-generated three-dimensional work became visible in motion pictures such as Star Wars and Toy Story, and today we can see this in several applications from commercial marketing and advertisement, to television syndicated medical broadcasts or court television, or even network news broadcasts. We tend to think that we can only communicate through the written or spoken word, but the visual language is one of the most powerful ways humans can communicate ideas among each other. My interest in character generation is twofold. One is to learn how to develop believable animated forms and the other has to do with using these characters to communicate my ideas.

Poster Abstracts

21. **Social Justice Issues and Christian Congregations in Texas.**
Angela Bouldin and Laura Hobgood-Oster, Department of Religion, Southwestern University.

What areas of social justice are being addressed by Christian congregations in Texas? This is the question that Angela Bouldin and Dr. Laura Hobgood-Oster are attempting to answer. Each of the researchers has particular interests in mind — Bouldin is examining interfaith and ecumenical dialogue, while Dr. Hobgood-Oster is searching for information on eco-justice and sustainability issues. A survey was distributed to 400 congregations. Angela developed the database, and the randomly selected sample mirrors the population distribution of various Christianities in the state. If the initial phase of the project is successful, we will consider following the same format for a nationwide survey. Funds for the project were provided by a Sam Taylor Fellowship grant.

22. **Analysis of organochlorine pesticides on the shoreline of Town Lake in Austin, TX.**
Christie Au, Department of Chemistry, Southwestern University.

In 1962, Rachel Carson's book "Silent Spring" detailed the effects of organochlorine pesticides on living creatures. Carson's book also documented an incident on January 15, 1961, in which chlorinated pesticides were flushed from the storm sewers into Town Lake in Austin, TX, leading to one of the largest fish kills of the time. To date, however, little is known about the long term effects of this large pesticide spill on the soil surrounding the lake. We have collected soil samples surrounding the emptying site of the storm sewers into Town Lake and have extracted them using the Soxhlet method and ultrasonic extraction. We then used gas chromatography with electron capture detection in order to analyze for several organochlorine pesticides including heptachlor, heptachlor epoxide, aldrin, dieldrin, and para-dichlorodiphenyltrichloroethane (DDT) and its breakdown products. This presentation will discuss the quantification of these pesticide residues in the soils adjacent to Town Lake and the potential impact on local residents.

23. **What's Taxing Them? An Assessment of Occupational Stress.**
Megan Honey and Ashley Rittmayer, Departments of Business and Psychology, and Traci Giuliano, Ph.D, Department of Pyschology, Southwestern University.

Changes in the workplace over the last decade have produced more opportunities, obstacles, and occupational stress; thus, work-related strain has become a popular topic among businesses and researchers alike. Research emphasizes three outcomes of work-related strain: job stress, job satisfaction, and burnout. The purpose of the present study was to examine the sources and outcomes of job stress, satisfaction, and burnout and to explore the interrelationships between these three variables in a sample of government employees. Twenty-nine employees of a county tax office (26 women and 3 men) completed a questionnaire which was designed to explore the nature and extent of stress in the office,

as well as to identify potential predictors of job stress, job satisfaction, and burnout. The most significant predictor of job stress was organizational constraints, which included inadequate help from others, interruptions by other people, and other employees. Job satisfaction was best predicted by co-worker support; and furthermore, was negatively related to job stress. Stressed employees were less satisfied with the nature of the work, supervisors and co-workers, pay and benefits, and operating conditions. Job satisfaction was also determined to be the best predictor of burnout: The more satisfied employees are with their jobs, the less likely they were to report feeling emotionally exhausted. Based on these results, participants' own suggestions, and the lack of consensus as to which approach is more effective, both individual-centered and organizational-centered stress management programs were recommended. Ultimately, regardless of the specific approach taken, it is crucial that both the employers and the employees fully support and participate in the stress intervention program.

24. **Development of a Cytological Method for Determining Male Fitness in Male *Xanthopimpla stemmator*.** Holly Wright, Matthew M. Chumchal and Stephanie Fabritius Ph.D., Department of Biology, Southwestern University.

Xanthopimpla stemmator, a solitary endoparasitoid of Old World lepidopteran stalkborer pupa, have been shown to skew their sex ratio when presented with pupae of differing sizes. Specifically, more females than expected are produced in large pupae and more males than expected are produced in small pupae. The production of more females in high quality (large) hosts is predicted from theory if a female's fitness is related to her adult size. Previous studies have shown that females emerging from large hosts have a fitness advantage over females emerging from small hosts. Few researchers have examined male fitness advantage because it is more difficult to quantify. *X. stemmator* has a haploid/diploid mating system. For this reason, only the diploid offspring are genetically linked to the father. In order to determine male fitness, we will use a cytological technique to compare the fitness of males emerging from large hosts to that of males emerging from small hosts. Currently, we are developing the cytological staining technique using a two-percent aceto-orceine chromosome-staining dye. We have been successful in visualizing chromosomes. Presently, we are working to perfect the technique to be able to differentiate between the haploid and diploid chromosomes. We are working to determine optimal developmental staining time. Eggs must be stained late enough in development so that chromosomes in optimum staining phase can be located yet early enough in development that chromosomes are not so small that they are difficult to visualize.

25. **Water Quality Testing in Derechos Humanos Colonia, Matamoras, Mexico.** Matthew M. Chumchal and Emily Neimeyer, Ph.D., Department of Chemistry, Southwestern University.

With the hrge increase in international trade which is occurring due to the North American Free Trade Agreement (NAFTA), many North American industries previously located in Canada or the United States have relocated to Mexico. Industries have been accused of

moving to Mexico because of the lack of laws and enforcement concerning labor rights and the discharge of hazardous wastes. Industries have been charged with irresponsibly discharging into the environment pollutants potentially harmful to humans and wildlife. The people of the Derechos Humanos colonia, Matamoras, Mexico, have attributed certain illnesses and diseases to the presence of a canal running approximately 25 yards from their community. Chumchal traveled to the colonia in order to collect water samples from the canal. Fumes emitted from the canal are detectable from large distances away and are physically painful to inhale. Preliminary water testing within the canal shows an acidic pH of 5.62, approximately equal to that of black coffee, and a conductivity of 242.6 mS, approximately four times greater than that of sea water. We will test the samples for heavy metals, industrial-related organic chemicals, pesticides and various other quality indicators. People working in the area are confident that if we find known human toxins, the people of the colonia can petition the government of Matamoras, and city officials will take action. There will be a need in the future for more environmental testing in the area as well as investigation by those fluent in Spanish in order to determine the anthropological and sociological impacts of the canal on the people of the colonia and on their quality of life.

26. **Identification of the Neurite Stimulating Factor in Goldfish Brain.** Sarah Boucher, Departments of Chemistry and Biology, Southwestern University.

Members of the neurotrophin (NT) gene family, including nerve growth factor (NGF), NT-3, NT-4, NT-5 and NT-6, have previously been shown to play an essential role in the development and maintenance of the central and peripheral nervous systems. Benowitz and Greene (1979) identified a substance in goldfish brain that stimulates neurite outgrowths on PC-12 cells. Immunological studies led them to conclude that this substance was NGF. They further argued that NGF might contribute to the goldfish's remarkable ability for neural regeneration. The considerable overlap, both in structure and function, existing among NGF and other NT family members caused us to consider whether the neurite stimulating factor in goldfish brain was in fact NGF or perhaps some other neurotrophin. To determine the identity of this factor, we attempted to identify by means of Western Blotting if either NGF or its receptor, TrkA, was present in significant quantities in goldfish brain. Our results do not support the conclusion reached by Benowitz and Greene. Most likely, NGF is not highly expressed in goldfish brain, nor is its receptor. However, we did detect a high molecular weight phosphotyrosine-containing protein in fish brain homogenate. This suggests the existence of a receptor similar to TrkA. Further investigation is needed to uncover the identity of the substance that binds to the receptor we found and its possible role in neural regeneration in the goldfish.

27. **Short-term and Long-term Habituation, and Dishabituation in Cuttlefish (Sepia pharaonis).** Deann Dixon and Ryan Suarez, Department of Psychology, Southwestern University.

Habituation involves the waning of a response to a repeatedly presented stimulus that is not associated with events of biological significance. The evidence for habituation learning

in cuttlefish (Sepia officinalis and Sepia pharaonis) is not convincing. Habituation-like effects were reported by Sanders & Young, 1940; Messenger, 1973; and Messenger, 1977. For each of these studies, the experimental paradigm was the same. A cuttlefish was placed in a tank and presented with prawns that were contained within a glass tube. The cuttlefish would show its species typical attention, position, and attack responses. Strike response rates decreased within and between sessions, and this response was interpreted as habituation. The cuttlefish may have stopped striking the glass because it hurt to do so, not because it habituated to the sight of the prawn. Evidence that striking the glass was painful was demonstrated by Messenger, 1973. Messenger clipped off the two tentacles and presented cuttlefish with prawns held in a tube. Without tentacles, cuttlefish persisted in "striking" the glass for a significantly longer period of time than cuttlefish with tentacles. Still, even with no tentacles, the strike response rate decreased within a session. It is possible that the decrease of the "pseudo-strike" demonstrated habituation. But, it is also possible, that the decrease in striking behavior was attributable to motor fatigue. In light of the lack of evidence for habituation learning in cuttlefish we conducted a study to determine if cuttlefish are capable of habituation learning and to see if they exhibit both short-term and long-term habituation effects. Twenty-four cuttlefish were obtained from the National Resource Center for Cephalopods in Galveston, Texas and then placed in individual tanks. Cuttlefish were maintained in a closed water filtration system and were fed frozen shrimp. Cuttlefish were assigned randomly to one of four groups. Group Fish-Fish received a 25-minute exposure to a one-gallon glass container that contained a small fish. After 25 minutes the container was removed and replaced in the tank for five more minutes. Group Shrimp-Shrimp received a 25minute exposure to a live shrimp. The container was removed and then replaced for five minutes. Group Fish-Shrimp were exposed to a fish for 25-minutes and then the container was replaced for five minutes with a container that held a live shrimp. Group Shrimp-Fish received a 25-minute exposure to a live shrimp followed by five minute exposure to a live fish. Trials were conducted daily for a total of ten days and all trials were videotaped. All groups showed both short-term habituation and long-term habituation effects. In addiion, groups Fish-Shrimp and Shrimp-Fish showed dishabituation effects, though the dishabituation effect for group Fish-Shrimp was stronger than thatshown for Shrimp-Fish. No dishabituation effects were seen for groups Fish-Fish and group Shrimp-Shrimp. The finding that changing the stimulus from fish to shrimp or from shrimp to fish caused the cuttlefish to resume striking the container ruled out explanations based on motor fatigue or pain avoidance and supported our contention that cuttlefish are capable of habituation learning. This is the first time habituation effects have been observed in this species under controlled conditions.

28. **Inoculum Size Effect on the Morphological Development of Mucor rouxii Under Aerobic Conditions.**
John Stewart. Department of Biology, Southwestern University.

Mucor rouxii is a saccharolytic, dimorphic fungus commonly found in the soil. During aerobic development, M. rouxii develops an extensive mycelium. A quorum sensing

mechanism would predict that a greater degree of mycelial branching would occur as the inoculum size increased. The goal of this study was to characterize any inoculum effect in M. rouxii and determine in quorum sensing was a reasonable mechanism. Cultures of M. rouxii were grown aerobically and samples were taken at various time intervals and observed microscopically. The pH and ethanol content of the media were collected for each sample. Dry weight biomass of the cultures was determined. A transfer experiment was performed to observe the effect that the media had on morphological development of varying inocula. The results indicate that quorum sensing is not occurring in M. rouxii. Instead, the high inoculum cultures exhibited a lesser degree of branching and inhibited germ tube formation. Ethanol assays revealed ethanol production occurred under aerobic conditions. The transfer experiment suggests that ethanol may cause the change in morphology as inoculum size in increased. In conclusion, an inoculum size effect did occur in M. rouxii under aerobic conditions, but quorum sensing is not a valid mechanism to explain it.

29. **Adolescent Risky Sexual Behavior and Parental Relationship Quality.**
Katie Kirkendall, Department of Psychology, Southwestern University.

Risky sexual behavior is a common problem among adolescents, and places sexually active adolescents at greater risk for negative consequences. Previous research has demonstrated relationships between specific parenting behaviors (e.g., parental monitoring and discipline) and high-risk behaviors (e.g., sexual risk taking) among adolescents. However, few studies have focused on the possibility that the affective relationship between parents and adolescents might be associated with sexual risk-taking. We hypothesized that the nature of the parental relationships would be associated with adolescent sexual behavior (i.e., a strong bond with the same-sex parent) would be associated with less risky sexual behavior. Participants were 277 adolescents age 12–18 who participated in research at the Pittsburgh Adolescent Alcohol Research Center. Participants were recruited from both clinical and community sources. All participants completed a battery of self-report questionnaires including the "History of Sexual Behavior" and the "Friends and Family Questionnaire." Regression analyses were conducted to examine the relationship between maternal and paternal relationship quality and sexual risk characteristics. Among girls, paternal relationship quality was significantly ($p<.05$) related to the number of sexual partners and the frequency of sexual intercourse, accounting for 6% and 3% of the variance respectively. Specifically, girls who reported having a closer, more trusting relationship with their father became sexually active at a later age and engaged in less frequent sexual intercourse. Maternal relationship quality was not associated with girls' risky sexual behavior. For boys, there was no relationship between maternal or paternal relationship quality and risky sexual behavior. These results suggest that paternal relationship quality, but not maternal relationship quality, may play a role in the sexual risk taking of adolescent girls. A strong bond between fathers and daughters may serve to protect female adolescents from engaging in certain risky sexual behaviors. However, future longitudinal studies are needed in order to determine the causal direction of this relationship.

30. **Effect of Exogenous Heat Shock Proteins on the Crayfish Nervous System.**
Swetangi Bhaleeya, Department of Chemistry, Southwestern University

Heat shock proteins (HSPs) are a distinct class of proteins produced by the cell in response to various types of environmental stress, including heat. Studies have shown that HSPs are important in protecting cells during stress. For example, Karunanithi, et al., reported that preliminary heat shock (HS) protects synaptic transmission in Drosophila during a secondary HS (1999). Most studies, however, have used a prior HS treatment to elevate levels of HSPs in the cell. Exogenous application of HSPs to cells may be more beneficial as it would be less destructive to the cell and may have the potential for medical applications. The focus of this study, therefore, was to test if exogenous application of HSPs would inhibit the HS response in the ventral nerve cord (VNC) of the crayfish Procambrium clarkii. The VNCs were preincubated in solutions of enriched HSPs (25mL or 75mL) for 20–30 minutes prior to a one-hour HS. Expression of new HSPs was determined by radiolabeling (35S methionine)and SDS-polyacrylamide gel electrophoresis. Fluorography data showed that exogenous application of HSPs did not inhibit the HS response in the VNC. Furthermore, it was observed that exogenous application of HSPs without a one-hour HS also produced a HS response. Since the exogenous HSPs were in an enriched form rather than a purified form, a high concentration of extracellular proteins may have triggered a stress response. In conclusion, results from this study suggest that application of exogenous proteins generally induce a stress response, possibly due to interaction with membrane proteins. However, it is necessary to repeat this experiment with purified HSPs.

31. **Ideal Free Distribution in Goldfish: An Animal Behavior Laboratory.**
B. Lucas Stafford, Department of Animal Behavior, Southwestern University.

A laboratory experiment will be designed for the animal behavior course at Southwestern University. Its purpose will be to illustrate the fundamental principles of ideal free distribution in an optimal foraging theory model. The result will be an experiment with replicable results for students to perform in the laboratory portion of the animal behavior class.

32. **Religious Affiliation and its Effects Upon Opinions Concerning Sex Education in Public Schools.**
Joel Andress, Departments of Religion and Sociology, Southwestern University.

The emergence of the Human Immunodeficiency Virus in the United States has sparked a movement for greater sex education within the public school systems. Control of school curriculum in many states rests primarily in the hands of local school districts, however, and moral objections at the local level have been raised against the notion of teaching sex education to public school students. Because local control over curriculum remains strong, the opinions of the people regarding sex education have a powerful influence from school district to school district. This study offers the opportunity to

identify predictors as to whether individual communities will embrace sex education as a necessary part of school curricula, or object to the instruction of their students in subjects with which they disagree morally. Already, public safety and religious beliefs have clashed and they will continue to do so until the two are reconciled.

33. **Using Space VLBI to Examine Free-Free Absorption on Parsec Scales in the LINER Galaxy NGC 1052.**
Timothy J. Woodruff, Departments of Physics and Mathematics, Southwestern University.

Two groups of very luminous water maser emission have been detected toward the elliptical galaxy NGC 1052. An apparent gap in the continuum emission found near these water masers at a frequency of 22 GHz in a 1995 VLBI image (Claussen et al. 1998, ApJL, 500, 129) suggested the possibility of strong free-free absorption. Utilizing two epochs of VLBI data taken in conjunction with the VLBI Space Observatory Programme (VSOP) at 1.6 and 5 GHz in 1999, we confirm the presence of free-free absorption in a region near this gap. An analysis of the orientation of the galaxy with respect to the observer is also presented, along with calculations of the electron density of the obscuring medium. Earlier (1997) VLBA observations at 2.3 and 8.6 GHz of NGC 1052 taken under the USNO Radio Reference Frame program were also utilized to calculate jet component velocities and variability so that the 1995 22 GHz image could be better correlated with the 1999 VSOP observations. The VSOP project is led by the Japanese Institute of Space and Astronautical Science. This research has made use of the United States Naval Observatory Radio Reference Frame Image Database. The National Radio Astronomy Observatory is a facility of the National Science Foundation, operated under cooperative agreement by Associated Universities, Inc. This research was conducted in part while Woodruff was an REU (Research Experiences for Undergraduates) student at the National Radio Astronomy Observatory.

34. **Isolation and Characterization of a Gelatin Degrading Protease from Koi Carp Fish Larvae.**
Ryan Cooper, Department of Chemistry, Southwestern University.

Proteins from a pre-frozen batch of Koi Carp fish larvae were extracted from the larvae by homogenization, and a certain protein was chosen to be isolated and characterized in regards to substrate specificity and inhibition. The protein chosen to be studied was thought to have a role in tissue remodeling during the process of cell growth and proliferation. The protein that was characterized can be isolated in a fairly high degree of purity in a single DEAE-sephacel anion exchange step. Using a polyacrylamide-gelatin gel, the activity of the protein can be tested by observing a clearing in the gel where the protein has degraded the gelatin. Inhibition studies showed the isolated protein to be inhibited by PMSF and pefabloc, both serine protease inhibitors. Substrate affinity studies found the protein to cleave fluorogenic substrates containing an arginine residue that was preceded by a phenylalanine residue.

35. **Investigations into the Sex Ratio among Frigatebird Populations.**
Jenny Ausen, Departments of Biology and Modern Languages and Literatures, and Travis Witherspoon, Department of Chemistry, Southwestern University.

Both sexual dimorphism and biparental care are not uncommon in bird taxa, however they are rarely seen in the same species. Frigatebirds are the exception to this rule. There is a marked sexual dimorphism *and* both sexes share in almost all aspects in the care of the young. Male sexual ornaments in frigatebirds may have evolved in conjunction with a male-biased operational sex ratio. In frigatebird populations there are many more males seeking mates than there are females who are receptive, which allows for sexual selection. In our research we are trying to determine at which point in the development that the sex ratio becomes skewed. Since young of both genders are visually indistinguishable, we will be testing blood samples from one year-old chicks to determine their sex. Testing methods will include DNA extraction, PCR and gel electrophoresis.

36. **Binary Space Partitioning Tree and Constructive Solid Geometry Representations for Objects Bounded by Curved Surfaces.**
Angela C. Roles, Department of Computer Science and Mathematics, Southwestern University.

Binary Space Partitioning (BSP) tree and Constructive Solid Geometry (CSG) tree representations are both set-theoretic representations of solid objects used in solid modeling and computer graphics. A CSG tree represents an object in a binary tree, using set operations as internal nodes and regular sets as leaves. A BSP tree recursively partitions d-dimensional Euclidean space to represent an object. Originally, the partitioning was accomplished using linear surfaces, so that the representation was restricted to objects bounded by these surfaces. Recently, an extension of the traditional BSP tree definition has been presented, in which surfaces used in the binary partitioning may include curved surfaces in addition to the traditional planar surfaces. We examine the relationship between this extended definition of BSP trees and halfspace CSG trees, including conversion between the two representations, in light of this new BSP tree definition for solid objects bounded by curved surfaces. Additionally, we investigate the size and time complexity of conversion from extended BSP trees to CSG trees.

37. **Use of Affinity Chromatography to Determine Similarity of Insulin-like Growth Factors in Humans and Koi Carp.**
Stacy Silvers, Department of Chemistry, Southwestern University.

Insulin-like growth factor (IGF) is a very well conserved protein throughout the animal kingdom. IGF has been shown to have many roles, including cell proliferation and differentiation during development. This ubiquitous protein is partially regulated by several insulin-like growth factor binding proteins (IGFBP) that bind to the IGF itself. The purpose of this study was to determine if IGFBPs are present in early developmental stages of a bony fish, specifically Koi carp larvae, which would bind to human IGF. We

used affinity chromatography with immobilized human IGF to select proteins from homogenates of fish larvae. Human IGF was bound to agarose activated with succinimidylsuberate. Soluble proteins in extracts of carp larvae were allowed to bind to the IGF immobilized on the agarose. After thorough washing to remove any proteins associated with the agarose or IGF by nonspecific interactions, free human IGF was used to remove the proteins that had specifically bound to the human IGF on the beads. The proteins that were eluted with the free human IGF were separated by discontinuous polyacrylamide gel electrophoresis. The proteins we identified that specifically bound to the human IGF were of too high a molecular weight to be similar to human IGFBP. Although this study did not find similar IGFBP, reports in literature indicate that zebra fish contain IGFBPs similar to those present in humans.

38. **GIS Analysis of Oak Wilt: Gathering New Information about Oak Wilt and Formulating a Containment Plan for the Disease.**
William M. McCaw, Department of Biology, Southwestern University, and Damon E. Waitt, Executive Director of Educational Programs, Lady Bird Johnson Wildflower Center.

Oak wilt is a disease caused by the fungus Ceratosystis fagacearum that infects and kills red oaks (Quercus shumardii) and live oaks (Quercus fusiformis). GIS (Geographical Information Systems) was used to evaluate the spread of oak wilt in Austin, TX. Maps of oak wilt spread created using ArcView software were used to formulate a containment plan for the disease. Information such as tree species, DBH (diameter at breast height), % crown loss, and disease symptoms were also recorded. Symptoms were positively correlated with presence of the causal fungus. The spread of the disease will be closely monitored over the next five to 10 years; this will allow for creation of a predictive rate of spread model tailored to the thin central Texas soils.

39. **Analysis of the Water Core of Several Reverse Micelle Systems using a pH Sensitive Dye.**
John Molloy, Department of Chemistry, Southwestern University.

Reverse Micelles are traditionally formed in nonpolar liquid solvents but it has recently been shown that they can be formed in supercritical CO_2 ($scCO_2$) using a perfluoropolyether (PFPE) surfactant. This project focuses on comparing the water core of reverse micelles formed in liquids and $scCO_2$. Neutral Red is a pH indicating dye that has previously been used to quantify the water core within liquid reverse micelle systems. The acid and base forms of Neutral Red have distinct absorbances, making it possible to quantify the forms of Neutral Red. Initially, the Neutral Red absorbance was determined in neat buffer solutions over a wide pH range. The absorbance of the dye was then determined in 1,4 bis(2-ethylhexyl) sulfosuccinate(AOT or Aerosol OT) in n-heptane as a model liquid reverse micelle system. Finally, the absorbance of the dye was determined in PFPE reverse micelles in $scCO_2$ as a function of CO_2 pressure and micelle water loading(R; R=[water]/[surfactant]).

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