

Chicago AMP

Alliance for Minority Participation

First Annual Chicago AMP Student Research Conference in

Science, Mathematics, Engineering,
and Technology

Chicago State University
April 13, 1996

Chicago State University, DePaul University, Illinois Institute of
Technology, Loyola University, Northwestern University,
and the University of Illinois

The Chicago AMP Program
gratefully acknowledges
the support of

The National Science Foundation

Dr. Luther S. Williams, Assistant Director
Education and Human Resources

Dr. Roosevelt Calbert, Deputy Division Director
Human Resource and Development

Dr. William McHenry, Program Officer
Alliances for Minority Participation

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Chicago AMP Governing Board

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President, Illinois Institute of Technology

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Chicago AMP Office

Project Director
Dr. Dolores E. Cross
President, Chicago State University

Chicago AMP Executive Director
Dr. Marian Wilson-Comer

Chicago AMP Office
Chicago State University
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Chicago, IL.60628
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Chicago AMP Program Coordinators

Chicago State University
Dr. Rachel Lindsey

DePaul University
Dr. Carolyn Narasimhan

Illinois Institute of Technology
Dr. Peter Johnson

Loyola University
Dr. David Slavsky

Northwestern University
Dr. William Brazelton

University of Illinois - Chicago
Dr. John Baldwin

Chicago AMP Student Leadership Council

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DePaul University
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Priscilla Villeda

Illinois Institute of Technology
Kim Terrell

Loyola University
Esteban Linares

Northwestern University
John Lindo
Elizabeth Felton

University of Illinois - Chicago
Angela Brandon

The Chicago AMP Program

The Chicago Alliance for Minority Participation (AMP) program, established in 1993 through a five year cooperative agreement is funded by the Nation Science Foundation (NSF). The Chicago AMP is one of twenty-five projects located in the United States and Puerto Rico, designed to quadruple the number of science, mathematics engineering and technology (SMET) baccalaureate and graduate degrees awarded to minorities by the year 2000.

Chicago AMP is a consortium of six Chicago Universities and research organizations participating in a collaborative effort to provide programs that improve the quality of science, mathematics, engineering and technology education for minority students. Each of these organizations has made a commitment of faculty, staff, research facilities and technical assistance to ensure successful opportunities for students participating in the AMP program.

Chicago AMP activities are comprehensive and multidisciplinary, focused specifically on SMET education. Great effort is expended to address transition points in student's undergraduate experience, specifically for students who are more likely, without intervention, to decide to withdraw from the SMET pipeline. Consequently, critical transition points along the SMET education pipeline: high school-to-college, 2-year to 4-year college, undergraduate study and graduate study-to-careers are addressed in various and innovative ways including: hands-on research, scholarship programs, science conferences, facilitated study group sessions, professional development, peer mentoring activities, summer bridge programs, tutoring programs, internships, and graduate activities.

PRESIDENT'S MESSAGE

Chicago State University is honored to host the First Annual Chicago AMP Student Research Conference. This is a wonderful opportunity for students from Alliance universities to come together to present their scientific achievements to an audience of faculty and peers.

The poster exhibits and papers presented today range in topics, including the biological, physical, and computer sciences. The high school and college students from Chicago, Illinois and Detroit, Michigan have in common the desire to understand natural phenomena by seeking knowledge through inquiry, investigation and analysis. The experience gained today provides an opportunity for personal and professional growth for all who participate.

On behalf of the entire Chicago State University community, I extend a warm welcome to the faculty and students of our sister Chicago Alliance institutions and the Detroit Metropolitan AMP. As you move around our campus today, you will notice that changes have taken place. Among the changes are a new residence hall, the student union building and additional science facilities. All of these changes serve to enhance the educational environment.

My best wishes for a successful and productive conference.

Dr. Dolores E. Cross
President and Principal Investigator, AMP
Chicago State University
April 13, 1996

MESSAGE FROM THE EXECUTIVE DIRECTOR

We have looked forward to this first annual AMP Student Research Conference with much anticipation. The members of the conference committee have worked long hours to prepare for this event. The success of this conference will be due in large part to their dedication.

We are pleased that conference participation in this first conference exceeded our expectation. We believe that this level of participation is due to the focus on student participants and to the conference objectives:

- To provide students with an opportunity to practice their research presentations before an audience of their peers, and to use the comments they receive to improve their presentations.
- To provide a forum for highlighting the research efforts of AMP students.
- To provide and strengthen collaborations in research among science and faculty throughout the metropolitan Chicago area.
- To provide opportunities for students to begin learning the value of networking research ideas and information as part of their research training.
- To foster and support students' desire to pursue careers in scientific research.
- To encourage students to pursue graduate study in science and to enable them to learn about graduate study opportunities at the AMP institutions.

On behalf of the Chicago AMP Coordinators and AMP Student Research Conference Committee, I hope that you enjoy the conference, that you make new friends, that you take the time to learn about new technological advances, and that you look forward to participating in the Second Annual AMP Student Research Conference in 1997.



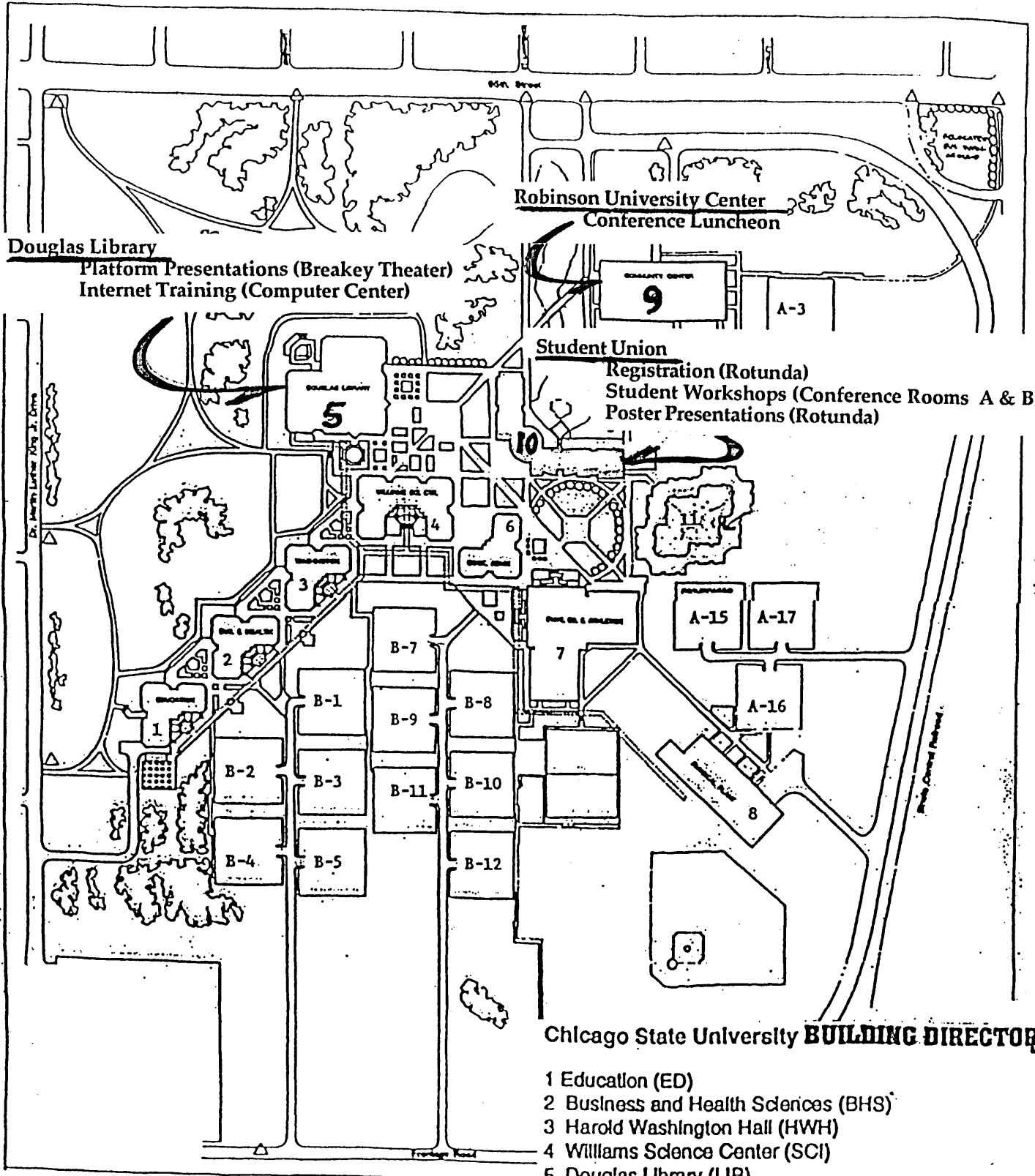
Dr. Marian Wilson-Comer
Executive Director, AMP
April 13, 1996

FIRST ANNUAL CHICAGO AMP
STUDENT RESEARCH CONFERENCE
 in Science, Mathematics, Engineering & Technology

CONFERENCE PLANNING COMMITTEE

First Name	Last Name	School
Justin	Akujieze	Chicago State University
John	Baldwin	University of Illinois - Chicago
Linda	Bell	Chicago State University
Angela	Brandon	University of Illinois - Chicago
William	Brazelton	Northwestern University
Cheryl	Caplan	Illinois Institute of Technology
Maria	Cisneros	DePaul University
Arlicia	Corley	Chicago State University
Jo'Beth	D'Agostino	Loyola University
Marla	Dwyer	Northwestern University
Fay	Edmond	Chicago State University
Elizabeth	Felton	Northwestern University
Lakeisha	Hampton	Chicago State University
Robert	Harris	Chicago State University
Caroll	Henry	Chicago State University
Beatriz	Jamaica	University of Illinois - Chicago
Peter	Johnson	Illinois Institute of Technology
Carolyn	Krulee	Northwestern University
John	Lindo	Northwestern University
Rachel	Lindsey	Chicago State University
Mike	Mimnaugh	Chicago State University
Carolyn	Narasimhan	DePaul University
David	Slavsky	Loyola University
Kevin	Smith	Chicago State University
Kim	Terrell	Illinois Institute of Technology
Priscilla	Villeda	DePaul University

CHICAGO STATE UNIVERSITY PARKING MAP
 REVISED 9/1/95



Chicago State University **BUILDING DIRECTORY**

- 1 Education (ED)
- 2 Business and Health Sciences (BHS)
- 3 Harold Washington Hall (HWH)
- 4 Williams Science Center (SCI)
- 5 Douglas Library (LIB)
- 6 Cook Administration (ADM)
- 7 Physical Education and Athletics (ATH)
- 8 Physical Plant (O&M)
- 9 Robinson University Center (RUC)
- 10. Student Union Center
- 11. Residence Hall
- 12. A&B Parking Lots

The Student Research Conference Planning Committee is happy to announce that the Conference Keynote Address will be given by

DR. SHIRLEY MALCOM

**Head, Directorate for Education and Human Resources
American Association for the Advancement of Science
and
Member, National Science Board**

Shirley Malcom is Head of the directorate for Education and Human Resources Programs of the American Association for the Advancement of Science (AAAS). The directorate includes AAAS programs in education, activities for underrepresented groups, and public understanding of science and technology. Dr. Malcom was head of the AAAS Office of Opportunities in Science from 1979 to 1989. Between 1977 and 1979, she served as program officer in the Science Education Directorate of the National Science Foundation (NSF). Prior to this, she held the rank of assistant professor of biology, University of North Carolina, Wilmington. Other work experience includes two years as high school science teacher.

Dr. Malcom received her doctorate in ecology from the Pennsylvania State University; master's degree in zoology from the University of California, Los Angeles; and bachelors degree with distinction in zoology from the University of Washington. In addition she holds six honorary degrees.

Dr. Malcom serves on several boards, including the American Museum of National History, Carnegie Corporation of New York, and the National Center on Education and the Economy. She is Vice Chair of the Executive Committee and member of the Governing Board of New Standards Project. In addition she has chaired a number of national committees addressing education reform and access to scientific and technical education, careers and literacy. In 1995 Dr. Malcom was elected a fellow of the American Academy of Arts and Sciences.

She was appointed by President Clinton and confirmed by the Senate as a member of the National Science Board and named to the President's Committee of Advisors on Science and Technology.

FIRST ANNUAL CHICAGO AMP
STUDENT RESEARCH CONFERENCE
in Science, Mathematics, Engineering & Technology

Sponsored by
The Chicago Alliance for Minority Participation
Saturday April 13, 1996

PROGRAM

**Conference Registration and
Poster Presentation Set-up**

8:00 a.m. Rotunda Foyer
 Student Union Building
 Chicago State University

CONFERENCE COMMENCEMENT

BREAKEY THEATER
DOUGLAS LIBRARY

9:00 a.m. *Welcome and Introduction:*

 Dr. Marian Wilson-Comer
 Executive Director, Chicago AMP

Greetings:

 Dr. Dolores Cross, President
 Chicago State University and
 Principal Investigator, Chicago AMP

 Dr. Hanley Abramson,
 AMP Project Director
 Metropolitan Detroit AMP

CONCURRENT SESSIONS

Session #1 9:20 a.m. to 10:40 a.m.

Student Platform Presentations

Breakey Theater, Douglas Library

Michael Mimnaugh, *Presiding*

Time	Paper #	Title/Authors
9:20 a.m.	#1 p 20	"IN-SITU SYNTHESIS OF SILVER SHEATED SUPERCONDUCTING $Tl_{1-x}Bi_xSr_{2-y}Ba_yCa_2Cu_3O_{9-\delta}$ (TI-1223) TAPE", <u>Tonya Stevens</u> , Nicole Scarbrough, Justin Akujieze, David Hinks and John Mitchell, Chicago State University and Argonne National Lab.
9:40 p.m.	#2 p 21	"A CYLIC VOLTAMMETRIC STUDY OF SEVERAL CARBYNE COMPLEXES", <u>Paul Jene</u> , Northwestern University.
10:00 a.m.	#3 p 22	"GROWTH OF CdTe ON SILICON BY MOLECULAR-BEAM EPITAXY", <u>Angela Brandon</u> , S. Sivananthan and T. Almeida, University of Illinois - Chicago.
10:20 a.m.	#4 p 23	"CHARACTERIZATION OF BACTERIOCIN PRODUCTION IN LEUCONSTOC", <u>Lakeshia Hampton</u> and Raj Sinha, Chicago State University.

Student Poster Presentations

Rotunda, Student Union Building

9:20 a.m. - 10:40 a.m.

Paper #	Title/Authors
#17. p 37	"GONADOTROPIN ANTIBODIES ASSOCIATED WITH INFERTILITY INVOLVING OVARIAN FAILURE AND HORMONE RESISTANCE", <u>Lynnette Galloway</u> M. DeGroot, S. Davies, B. Soltes, P. Tokimoto, E. Radwanska and J. Luborsky, Northwestern University and Rush Medical Center.
#18. p 38	"FETAL AND MATERNAL CONTRIBUTIONS TO SPONTANEOUS AND INDUCED CLEFT LIP IN A-STRAINS OF MICE", <u>Joanna Maza</u> , <u>Karmin Robinson</u> , Jennifer Derenne and Sidney Beck, DePaul University.
#19. p 39	"FIMBRIAL PROTEIN PRODUCTION FOR IMMUNOCYTOCHEMICAL STUDIES IN <i>USTILAGO HORDEI</i> ", <u>Tracy Smith</u> , Evelene Stewart-Clark and Carroll Henry, Chicago State University.
#20 p 40	"DETECTION OF A FUNGICIDE RESISTANT GENE BY R.A.P.D. AND PCR METHODS", <u>Leon Fischer</u> , Carroll Henry and Evelene Stewart-Clark, Chicago State University.
#21. p 41	"EFFECTIVENESS OF BACTERIAL CORRINOID EXTRACTS IN CCl_4 DECHLORINATION CATALYSIS", <u>Tina Beacham</u> and Susan Ford, Chicago State University.

- #22. "ELECTRON MICROSCOPY OF *HALOBACTERIUM HALOBIUM* AND CELL MEMBRANE REGIONS CONTAINING BACTERIORHODOPSIN", Rita Ware, Warren Sherman and Joyce Craig, Chicago State University.
- #23. "HETEROLOGOUS EXPRESSION OF CHROMATIUM VINOSUM CYTOCHROME C' IN E. COLI UNDER SEMI-ANAEROBIC CONDITIONS", Nina Hike and Richard Kassner, University of Illinois - Chicago.
- #24. "DEVELOPMENT OF A MALARIA TRANSMISSION-BLOCKING VACCINE: THE CONSTRUCTION OF PFS 230 EXPRESSION VECTORS", Cheryl Jogger, Loyola University.
- #25. "EFFECT OF ERYTHROMYCIN ON FORMATION OF PETITES DURING THE REPLICATIVE LIFESPAN OF YEAST", Jacqueline Rogers, Mark Holbrook and John Menninger, Chicago State University and the University of Iowa.
- #26. "COMPETITIVE E.L.I.S.A. FOR DETECTION OF ALLATOSTATIN-1 LIKE PEPTIDE AND ITS BIOLOGICAL ACTIVITY IN NEUROPEPTIDE OF ASCARIS", Kenya Wells, George Cain and D. Stay, Chicago State University and the University of Iowa.
- #27. "TOXICITY OF CARBAMATE COMPOUNDS TO EGGS OF THE PARASITIC NEMATODE ASCARIS SUUM, IN SEWAGE SLUDGE", Michael Reed and George Cain, Chicago State University and the University of Iowa.
- #28. "THE EFFECT OF BOILING TIME ON ASCORBIC ACID IN WATER", Eurdice Oware, Judith Ditekowsky, Mike Mimnaugh and Sharon McCarthy, Lincoln Park High School and Chicago State University.

Student Workshop #1

9:20 a.m. - 10:40 a.m.

Computer Center, 122 Douglas Library

How to Use the Internet to Access the World Wide Web

Note: attendance is limited. Students must sign up for session at the registration desk in the Rotunda of the Student Union Building

Facilitators

Dr. Sam Bowen, Adjunct Professor of Physics, Chicago State University and Division of Educational Programs, Argonne National Laboratory

Ms. Trena Hawkins, Computer Systems Specialist, Chicago State University

Cole Greaves, Computer Engineering Major, Illinois Institute of Technology

Description

This workshop will introduce beginning and moderate internet users to "surf'ing" the World Wide Web. Using NETSCAPE, participants will learn logging on procedures and travel to several educational and informative websites including our own Chicago AMP webpage!

BREAK 10:40 a.m.

Session #2 10:50 a.m. to 12:10 a.m.

Student Platform Presentations

Breakey Theater, Douglas Library
Marla Dwyer, Presiding

Time	Paper #	Title/Authors
10:50 a.m.	#5 p 24	"YEAST-PRODUCED MALARIA TRANSMISSION-BLOCKING VACCINE CANDIDATE", <u>Natasha Travis</u> , Loyola University.
11:10 a.m.	#6 p 25	"PC FLOPPY AND TERMINAL EMULATION FOR A ROBOT CONTROLLER", <u>Donald Cantrell</u> , Northwestern University.
11:30 a.m.	#7 p 26	"THE EFFECT OF CONJUGATED STYRYL KETONES ON THE YEAST-TO-MYCELIUM CONVERSION OF <i>CANDIDA ALBICANS</i> ", <u>Carri Duncan</u> , Elias Manavathu, Wayne State University.
11:50 a.m.	#8 p 27	"NETWORK AND DATA SECURITY AND PROTECTION - PAST AND PRESENT", <u>Felicia Anderson</u> , Luis Vidal and George Zazi, Chicago State University.

Student Workshop #2
10:50 a.m. - 12:10 p.m.

Computer Center, 122 Douglas Library

How to Use the Internet to Access the World Wide Web

(See description under Student Workshop #1)

Note: attendance is limited. Students must sign up for session at the registration desk in the Rotunda of the Student Union Building

Student Workshop #3
10:50 a.m. - 12:10 p.m.

Conference Rooms A and B
Student Union Building

**Accessing Undergraduate Research Opportunities
and the Role of Faculty Mentorship**

Moderator

Dr. Peter Johnson, Professor, Chemistry, Illinois Institute of Technology

Panelists

Dr. Linda Washington, Program Leader, Division of Education Programs,
Argonne National Laboratory

Ms. Valerie Goss, Graduating Senior, Chemistry, Chicago State University

Ms. Vernetta Lawson, Program Services Specialist, Chicago State University

Pierre LeBreton, Professor, Chemistry, University of Illinois - Chicago

Description

This workshop is designed to introduce the general process of seeking a summer research or internship opportunity. Strategies discussed will include searching for applications and submitting resumes, following up on leads, interviewing skills, utilizing Career Development Centers and advisors, and the advantages of starting early. Information and applications may be available on local and national research opportunities. We will also discuss the importance of a good faculty/student mentorship arrangement and developing expectations and goals for the research/internship opportunity.

LUNCHEON

DINING ROOM B
ROBINSON UNIVERSITY CENTER

12:20 p.m.

Welcome:

Dr. Rachel Lindsey, Dean
College of Arts and Sciences
and AMP Project Director,
Chicago State University

12:30 p.m.

Luncheon

1:00 p.m.

Introduction of Speaker:

Dr. Michael N. Mimnaugh, Chairman
Department of Chemistry and Physics
Chicago State University

Conference Keynote Address:

Dr. Shirley Malcom
Head, Directorate for Education and Human Resources
American Association for the Advancement of Science
Member, National Science Board

CONCURRENT SESSIONS

Session #3 1:40 p.m. to 3:00 p.m.

Student Platform Presentations

Breaky Theater, Douglas Library
David Slavsky, Presiding

Time	Paper #	Title/Authors
1:40 p.m.	#9 p 28	"MUTAGENESIS: THE INFLUENCES OF REVERSIBLE DNA BINDING ON THE REACTIVITIES OF PAH METABOLITES", <u>Valerie Goss</u> and Pierre LeBreton, Chicago State University and the University of Illinois - Chicago
2:00 p.m.	#10 p 29	"SYNTHESIS AND COPOLYMERIZATION OF PHENYL-SUBSTITUTED METHYL ALPHA-CYANOCINNAMATES WITH STYRENE", <u>Maria Cisneros</u> , DePaul University.
2:20 p.m.	#11 p 30	"CAN SPIRULINA MAXIMA ALGAE HELP TO SAVE OUR ENVIRONMENT?", <u>Karuna Warren</u> , Northwestern University.
2:40 p.m.	#12 p 31	"THE EFFECTS OF LESIONS OF BRAIN SEROTONIN AND NOREPINEPHRINE ON ANXIETY-LIKE BEHAVIOR", <u>Paul Aradayfio</u> , Goodness Ikeri and Randall Commissaris, Wayne State University.

Student Workshop #4 1:40 p.m. - 3:00 p.m.

Computer Center, 122 Douglas Library

How to Use the Internet to Access the World Wide Web

(See description under Student Workshop #1)

Note: attendance is limited. Students must sign up for session at the registration desk in the Rotunda of the Student Union Building

Student Workshop #5 1:40 p.m. - 3:00 p.m.

Conference Rooms A and B
Student Union Building

How to Apply for Graduate School

Moderator

Dr. Lynn Narasimhan, Assoc. Dean, College of Arts and Sciences
DePaul University

Panelists

Dr. Jorge Castillo, Dept. of Chemistry and Physics, Chicago State University

Ms. Yolanda Knight, Counselor, Office of Financial Aid, Medical School,
University of Illinois - Chicago

Ms. Penny Warren, Graduate School, Northwestern University

Dr. John Baldwin, Professor, Department of Mathematics,
University of Illinois - Chicago

Mr. Nate Whitmal, Graduate Student, Electrical Engineering,
Northwestern University

Description

This panel discussion is geared for upperclassmen who are thinking about applying to graduate school. Topics of discussion will include identifying the right professional school for you, graduate examinations, financial support and the application process.

BREAK 3:00 p.m.

Session #4 3:10 p.m. to 4:30 p.m.

Student Platform Presentations

Breakey Theater, Douglas Library
John Baldwin, *Presiding*

- | | | |
|-----------|-------------|--|
| 3:10 p.m. | #13
p 32 | "MEASUREMENTS OF ABSOLUTE SUBSTRATE UTILIZATION BY THE CITRIC ACID CYCLE IN ISOLATED PERFUSED RAT HEARTS", <u>Emily Anderson</u> , John Jones, Charles Storey and Craig Malloy, Northwestern University and the University of Texas. |
| 3:30 p.m. | #14
p 33 | "HIGH YIELD SYNTHESIS OF TRIBROMOCHLOROMETHANE", <u>Cecilia Hernandez</u> , Jeannette Strickland, Jorge Castillo and Sharon McCarthy, Chicago State University. |
| 3:50 p.m. | #15
p 34 | "THE UNIT FRACTION EQUATION", <u>Michael Hogan</u> Shylyn Lofton, Samara McCraney, Anthonino Rionda, Angela Smeekens and Premchand Anne, Wayne State University. |
| 4:10 p.m. | #16
p 35 | "CLONING GENES FROM MOUSE CHROMOSOME 17 USING <i>MUS SPRETUS</i> - SPECIFIC PROBES", <u>Avani Pandya</u> , Shreyash Pandya and Mark Erhart, Chicago State University. |

Student Poster Presentations

Rotunda, Student Union Building

3:10 p.m. - 4:30 p.m.

- | Paper # | Title/Authors |
|--------------|---|
| #29.
p 49 | "RAPID LOW TEMPERATURE SYNTHESIS OF CUPRATE SUPERCONDUCTORS VIA METAL HYDROXIDE PRECURSORS", <u>Nicole Scarbrough</u> , Justin Akujieze, D. Hinks ad J. Mitchell, Chicago State University and Argonne National Laboratory. |
| #30.
p 50 | "SUPERCONDUCTING PHASES IN $\text{Bi}_{2+x}\text{Sr}_2\text{Ca}_{1-x}\text{Cu}_2\text{O}_{8-\delta}$. (Bi-2212) SYSTEM", <u>Kaiton Bullock</u> , Clyde Smith and Justin Akujieze, Chicago State University. |

- #31. "DESIGN CONTROL PARAMETERS FOR VERTICAL CURVES",
p 51 Andrew Evans and Natacha Thomas, University of Illinois - Chicago.
- #32. "COMPETITION BETWEEN SUSPENDED AND ATTACHED BIOMASS
p 52 IN BIOLOGICAL REACTORS", Shaheerah Fateen and D. Parulekar,
Illinois Institute of Technology.
- #33. "CREATING INTERACTIVE TUTORIALS USING HYPERCARD",
p 53 Diego Carlton and D. Karagiannes, Illinois Institute of Technology.
- #34. "FEEDBACK CONTROL OF A CONING MOTION MODEL",
p 54 Alberto Quintana and D. Williams, Illinois Institute of Technology.
- #35. "THE DESIGN AND TESTING OF AN ELLIPTICAL NOSE CONE",
p 55 William Sewell and T. Corke, Illinois Institute of Technology.
- #38. "CARDINALITY OF SETS AND VARYING DEGREES OF INFINITY ",
p 56 Kendall Franklin and Victor Akatsa, Chicago State University.
- #39. "COMPUTATION AND RATIONALIZATION OF SECOND AND
p 57 THIRD ORDER NONLINEAR OPTICAL RESPONSES IN INORGANIC
MOLECULAR CHROMOPHORES", Tiffany Burgess, and David Kanis,
Chicago State University.
- #40. "COMPUTER ASSISTED ANALYSIS OF THE STRUCTURE ACTIVITY
p 58 RELATIONSHIPS OF POLYCYCLIC AROMATIC HYDROCARBONS
WITHIN DNA INTERCALATION SITES", Diana Adams, Sharon
McCarthy, Chicago State University.
- #40. "HALOGEN EXCHANGE IN A MIXTURE OF CARBON
p 59 TETRACHLORIDE AND CARBON TETRABROMIDE", Marisa Perkins,
Jorge Castillo and Lesley Williams, Chicago State University.
- #41. "A PRELIMINARY STUDY OF TRACE METALS ANALYSIS OF
p 60 COINS OF THE CHINESE EMPEROR CH' IEN LUNG", Jason Andrews
and Mark Benvenuto, University of Detroit Mercy and Wayne State
University
- #42. "SYNTHESIS OF A ZIRCONIUM COMPLEX MIXED LIGAND THAT
p 61 CAN BETTER WITHSTAND EROSION CAUSED BY ATOMIC
OXYGEN", Ezell Williams, J. A. Terschak and M. L. Illingsworth,
Chicago State University and Rochester Institute of Technology.
- #43. "NEW COPOLYMERS OF 2-PHENYL-1,1 DICYANOETHENE AND
p 62 VINYL FORMAMIDE", Emmanuel Adibu, DePaul University.
- #44. "THE EFFECT OF MOLECULAR ARCHITECTURE ON THE
p 63 THERMOTROPIC BEHAVIOR OF SIDE-CHAIN LIQUID
CRYSTALLINE POLYMERS AND ITS RELATION TO
POLYDISPERSITY", Charlotte Young, Zinea Wilson, Coleen Pugh and
Kevin Belfield, University of Detroit Mercy and the University of
Michigan.

Student Workshop #6
3:10 p.m. - 4:30 p.m.

Computer Center, 122 Douglas Library

How to Use the Internet to Access the World Wide Web

(See description under Student Workshop #1)

Note: attendance is limited. Students must sign up for session at the registration desk in the Rotunda of the Student Union Building

CONFERENCE CLOSING CEREMONY

BREAKEY THEATER
DOUGLAS LIBRARY

4:45 p.m..

Student Recognition:

Dr. Caroll Henry, Chairperson
Department of Biological Sciences
Chicago State University

Concluding Remarks

Dr. Marian Wilson-Comer
Executive Director, Chicago AMP

ABSTRACTS OF PAPERS

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STUDENT RESEARCH CONFERENCE
in Science, Mathematics, Engineering and Technology

April 13, 1996

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Chicago State University
Chicago, Illinois 60628

PLATFORM PRESENTATIONS

In-Situ Synthesis of Silver Sheated Superconducting $Tl_{1-x}Bi_xSr_{2-y}Ba_yCa_2Cu_3O_{9-\delta}$ (TI-1223) Tape.

**Tonya Stevens, Nicole Scarbrough and Dr J.K. Akujieze
Chicago State University, Department of Chemistry and Physics
And
Dr D.Hinks and Dr J. Mitchell
Argonne National Laboratory, Materials Science Division**

Abstract:

In-situ synthesis of silver sheated superconducting (TI-1223) tape was explored. Various synthesis routes were explored. If achieved, this work will address the lack of grain connectivity and the inherent "weak link" conditions that are prevalent in this compound. We shall present structural and electronic results in the studies so far carried out.

A CYCLIC VOLTAMMETRIC STUDY OF SEVERAL CARBYNE COMPLEXES

PAUL JENE
Northwestern University
Evanston, IL.

Carbyne complexes, characterized by a monovalent carbon attached to a transition metal center, have been prepared by several researchers. At the time of this work, these complexes were poorly characterized. The metal-carbon bond length was known to be very short, but questions about the formal oxidation state and bond order remained unanswered. This work describes the characterization of several carbyne complexes, primarily containing tungsten metal centers, as a function of ligand substitution, utilizing the technique of cyclic voltammetry. The two main components of this work involved development of an experimental procedure appropriate for the compounds and analysis of the voltammetric data. The technique of cyclic voltammetry was chosen because it can determine the electric potential needed to oxidize or reduce a given species. This work adds to the experimental picture of these compounds that is now more fully developed.

Growth of CdTe on silicon by molecular-beam epitaxy

Angela Brandon

Advisors: S. Sivananthan, T. Almeida

Microphysics Laboratory, Physics Department, University of Illinois at Chicago,
Chicago, Illinois

Abstract

CdTe/Si heteroepitaxy can provide an inexpensive, large area alternative substrate for subsequent growth of HgCdTe-based infrared detecting devices. CdTe's absorption coefficient makes it an excellent x-ray detecting material. In this study the effectiveness of the chemical cleaning process performed on the silicon substrate prior to the CdTe epitaxial growth is investigated. Reflection high-energy diffraction (RHEED) is used to determine the quality of the CdTe epilayers. The quality of the Si substrate surface greatly influences the quality of the subsequent epilayers. This study emphasizes the efficiency in the Si substrate chemical cleaning process, which includes removal of organic contaminants; etching to remove native oxides and produce a bare Si surface; re-oxidation and further cleaning. The chemically grown oxide layer is subsequently removed thermally in the ultra-high vacuum (UHV) chamber before growth. This proved to be an effective substrate preparation process which resulted in high-quality CdTe epilayers as determined by RHEED during epitaxial growth.

Characterization of Bacteriocin Production in *Leuconstoc*

Lakeshia Hampton and R.P. Sinha

Department of Biological Sciences
Chicago State University
Chicago, IL. 60628

ABSTRACT

A number of strains of *Leuconstoc* species from our culture collection were tested for the antagonistic effect against a number of lactic acid bacteria. One strain showed high activity against a strain of *Lactobacillus*. The *Leuconstoc* strain was then grown overnight (16-18h) in MRS broth at 30°C. Cells were harvested by centrifugation. The pH of the supernatant was adjusted to 2.0, 7.0 and 11.0 with HCl or NaOH and one left as is which showed pH 4.1. All four samples were filter sterilized and kept at 4°C. Then it was tested on the tester strain. All showed zone of inhibition indicating that inhibition of tester strain is independent of pH. Heat treatment (100°C for 30 min.) did not affect the activity of the filtrate. However alkaline filtrate (pH 11.0) when heated lost the activity. The activity was also completely destroyed by incubation of filtrate with pronase and toypsin suggesting that filtrate contains some protein or protein complex. Genetic studies are underway to locate its genetic determinants.

YEAST-PRODUCED MALARIA TRANSMISSION-BLOCKING
VACCINE CANDIDATE

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Malaria is caused by four different species of protozoan parasites of the genus *Plasmodium*. The most severe form of malaria is caused by the species *P. falciparum*. One of the proteins expressed on the surface of this species is Pfs230. This protein has been shown to be the target antigen for malaria transmission-blocking monoclonal antibodies. My objective is to construct an expression vector that could be used to produce Pfs230 in yeast, *S. cerevisiae*. Yeast-produced Pfs230 will then be tested as a transmission- blocking vaccine candidate. To do this, a region of the gene for Pfs230 was amplified using Polymerase Chain Reaction (PCR). Then the PCR product and yeast expression vector (YEp) were digested with enzymes to create compatible ends. The YEp and PCR products were then ligated together. Restriction enzyme analysis was used to confirm the correct insertion of the PRC product, then the expression vector was used to transform yeast by electroporation. The yeast colonies that contained vector were grown up and induced to express and secrete Pfs230 in the medium. The medium was harvested and the presence of Pfs230 will be characterized using immunologic techniques. The next stage of this project will be to test yeast-produced Pfs230 as a vaccine candidate.

PC FLOPPY AND TERMINAL EMULATION FOR A ROBOT CONTROLLER

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ABSTRACT

The research described in this document deals with the creation of a PC terminal and floppy emulation program for a robot controller. The goal of the project was to program a PC computer to imitate a robot controller's external floppy drive and its terminal.

The major motivation for the program is to replace an obsolete external floppy drive used to store and maintain files for a Unimation controller. The program is designed to continually check for characters or requests from the controller to the computer's floppy drive.

Assuming that a request is received, the program determines whether or not the request is for a file that is stored on its disk. If the file is stored on the disk, it is opened and the contents of the file are read to the controller. When there is no request from the controller to the floppy port of the PC computer, the program causes the PC computer, to emulate a dumb terminal. A dumb terminal is a device that has a keyboard and a monitor. Its main purpose in this application is to be a communication link between the robot controller and the robot user. The terminal tells the user any information that he or she might need to know about the current status of the robot or robotic processes. It also allows the user to type in commands to program the robot arm to execute certain actions.

THE EFFECT OF CONJUGATED STYRYL KETONES ON THE YEAST-TO-MYCELIUM CONVERSION OF *CANDIDA ALBICANS*

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Candida albicans is a dimorphic pathogenic yeast capable of producing alternate morphological forms (yeast or mycelium) in response to environmental changes. The dimorphism of *C. albicans* plays an important role in the pathophysiology of this organism. The intracellular level of glutathione, which helps to maintain the oxidation-reduction potential of the cell, is decreased significantly during the yeast-to-mycelium conversion implicating the possible involvement of thiols in the yeast-to-mycelium transition. To evaluate the possible participation of sulfhydryl group(s) containing component(s) in the yeast-to-mycelium transition of *C. albicans*, we first examined the effect of thiol-alkylators, and p-chloromercuriphenylsulfonate inhibited the yeast-to-mycelium conversion of *C. albicans*. These results suggest that a key thiol-blocker sensitive component(s) containing a critical sulfhydryl group(s) is involved in the yeast-to-mycelium transition of *C. albicans*.

NETWORK AND DATA SECURITY AND PROTECTION - PAST AND PRESENT

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Computer Networks have become an essential part of our everyday life. This is mainly due to the facts that, (1) Computer Networks by principle allow the sharing of resources and of information worldwide; and also (2) to the ease with which individuals with minimum expertise can get connected (through PCs) to a network and surf the internet.

Since computer systems control our communication systems, medical systems, banking, business, and military strategic operations, etc., whose sensitive data are shared among branches of the same organization through some form of network; then it is imperative that some network security measures must be taken to ensure that information arrives intact to its proper destination, and that information is used by the intended individual(s).

Network and Data Security imply the protection of assets and the limitation of their loss from mainly three basic threats: natural disasters, human errors and omissions, and intentional attacks such as fraud or sabotage. Security against intentional attacks are the most difficult to control. Several techniques that provide "security" from intentional attacks on networks and on the data transported through them have been developed and some are currently in operation. Protection measures can be as simple as placing the computer in a secure location and physically securing the nodes and links along the communication network, or as complex as utilizing sophisticated methods, such as encryption, access control, inference control, firewalls, etc., and in many cases combination of these techniques to increase the robustness of the security method.

Updating and standardizing applications for computer network and data security is an ongoing process. As new threats against network continue, new security techniques will be developed. Here, we present an overview of the present state of computer network and data security techniques, we discuss the effect past had in shaping the present, and what we might expect in the future.

MUTAGENESIS:
THE INFLUENCES OF REVERSIBLE DNA BINDING
ON THE REACTIVITIES OF PAH METABOLITES

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ABSTRACT

Polycyclic aromatic hydrocarbons (PAH)s are introduced into the environment daily. Exhaust fumes from automobiles, and the surface of barbecued foods are examples of where these carcinogenic hydrocarbons can be found. Our bodies metabolize the compounds and form reactive intermediates which then react with DNA, disturbing genetic coding patterns. It has been found that the carcinogenic activity of PAH metabolites depends on the formation of covalent adducts with DNA. These compounds also reversibly bind to DNA. By comparing pseudo-first-order rate constants for reactions with association constants for reversible binding, the relationship between DNA physical binding and reactivity has been studied.

To study the pseudo-first-order rate constants, epoxide containing metabolites of benzo[a]pyrene(BP) and benz[a]anthracene[BA] were examined. The epoxides, BP-4,5-oxide(BPO), and BA-5,6-oxide(BAO), have low fluorescent quantum yields. The overall pseudo-first-order rate constants for the epoxide containing metabolites were obtained by measuring the increase in fluorescence intensity which occurred over time as DNA adducts, or the hydrolysis and rearrangement products were formed in solutions. For BPO and BAO:

$$k = k_{Hy} + k_{DNA} + k_{Re}$$

where k is the overall pseudo-first-order rate constant, k_{Hy} is the rate constant for hydrolysis, k_{DNA} is the rate constant for DNA adduct formation, and k_{Re} is the rate constant for rearrangement. The overall pseudo-first-order rate constant has contributions from spontaneous reactions and from reactions which are catalyzed by the formation of reversibly bound DNA complexes. In the present investigation, k has been measured for BPO and BAO as a function of DNA concentration.

In reversible binding measurements the model compounds, trans-4,5-dihydroxy-4,5-dihydro-BP (BP45D) and cis-5,6-dihydroxy-5,6-dihydro-BA (BA56D) were used. The diols are highly fluorescent. The DNA association constants k_a , are given by the equation:

$$k_a = k_{sv} = [F-Q]/([F][Q])$$

where k_{sv} is the Stern-Volmer quenching constant; $[F-Q]$ is the concentration of the diol-DNA complexes, BP45D:DNA and BA56D:DNA; $[F]$ is the concentration of the free diols BP45D and BP56D; $[Q]$ is the concentration of DNA. The results confirm that for BPO and BAO the pseudo-first-order rate constant increases as the DNA concentration increases. It was also found that at low DNA concentrations, less than 0.05 mM in PO_4^- , the pseudo-first-order rate constant of BAO is larger than that of BPO. At higher DNA concentrations, greater than 0.1 mM in PO_4^- , the rate constant of BPO is greater than that of BAO, and the ordering of the pseudo-first-order rate constants in DNA is the same as the ordering of the association constants of the model compounds.

**SYNTHESIS AND COPOLYMERIZATION OF PHENYL-
SUBSTITUTED METHYL α -CYANOCINNAMATES WITH STYRENE**

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New trisubstituted ethylenes, phenyl-substituted methyl α -cyanocinnamates, were prepared as a part of an inquiry-based, organic laboratory course. The compounds were synthesized by the piperidine catalyzed Knoevenagel condensation of an appropriate substituted benzaldehyde and methyl cyanoacetate. The compounds were characterized by CHN elemental analysis, mp, IR, and NMR spectroscopy. Feasibility studies of the copolymerization of the trisubstituted ethylenes with styrene were conducted at the equimolar monomer ratio in the presence of a radical initiator, AIBN, in ethyl acetate solution at 70°C. The composition and structure of the copolymers was characterized by elemental analysis, IR, NMR, GPC, and thermal analysis. The molecular characterization data was correlated with the monomer structure, charge distribution, and reactivity in radical copolymerization as it relates to rates of propagation, chain transfer, and termination reactions.

CAN SPIRULINA MAXIMA ALGAE HELP TO SAVE OUR ENVIRONMENT?

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Spirulina Maxima is a blue-green microalgae that grows naturally on lakes across the world. It is also grown artificially in man made ponds in states such as California, Colorado, and Hawaii. One of the unique features of this algae is that it has the highest photosynthetic rate of any plant in the world. This means that it reproduces at an extremely fast rate, which has environmental relevance. Because of this, Spirulina can remove carbon dioxide and replenish the environment with oxygen at a rate that is surprising. This fact has placed Spirulina as one of the main solutions to the Greenhouse effect, which is characterized by excess CO₂. Another area in which this algae has been applied is in water decontamination and wastewater treatment. The algae cells are autotrophic, meaning they produce their own carbon, and take up other elements. Spirulina has the ability to absorb contaminants into its culture, thus improving the overall quality of a water source. The Spirulina can then be extracted from the water, bringing the contaminants such as lead, cadmium, and mercury with it. The algae also absorbs excess nutrients such as phosphorus, nitrogen, and carbon dioxide. This helps to prevent eutrophication, which is an excess of nutrients in the water which leads to an unbalanced lake. Experiments were set up with my supervising professor, Dr. Barbara-Ann Lewis, to test the effects of sewage effluent on growth of Spirulina Maxima. The wastewater was final treated effluent, and the algae was grown in this solution, and in complete nutrient solution, to compare the growth rates. One of the characteristics of the algae grown in effluent was that there was flocculation or clumping of the algae. From literary research and former data, it is estimated that the reason for this is a lack of nutrients in the sewage effluent. Research is continuing in this area to further study how Spirulina Maxima can affect water quality.

THE EFFECTS OF LESIONS OF BRAIN SEROTONIN AND NOREPINEPHRINE ON ANXIETY-LIKE BEHAVIOR.

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Abstract

The present studies examined the hypothesis that the brain neurotransmitters serotonin (5-hydroxytryptamine; 5HT) and norepinephrine (NE) are redundant systems in the modulation of anxiety-like behavior. Anxiety-like (conflict) behavior in female rats was investigated before and after treatment with vehicle, the 5HT neurotoxin 5,7-DHT, the NE neurotoxin 6-OHDA, or the combination of the two neurotoxins. When the absolute number of shocks accepted in conflict sessions was used as the measure of "anxiety", there was no apparent effect of any neurotoxin treatment on conflict behavior. Treatment with vehicle, 5,7-DHT or 6-OHDA alone resulted in a very modest reduction in water intake (unpunished responding). In contrast, subjects receiving the combination lesion treatment exhibited a dramatic reduction in water intake, perhaps the result of a generalized behavioral disruption produced by the combination lesion. To normalize for the differences in water intake across the various treatments, conflict (anxiety-like) behavior during the first week following lesion treatment also was evaluated in terms of a "suppression ratio" (i.e., shocks accepted/water consumed). This analysis again revealed that the vehicle and single lesion groups did not differ in their conflict behavior; in contrast, the subjects receiving the combination lesion exhibited a dramatic anticonflict effect (reduced "anxiety"). These findings with the suppression ratio measure are consistent with the hypothesis that 5HT and NE are redundant neurotransmitters in the modulation of anxiety-like conflict behavior. (Supported in part by GM08167).

MEASUREMENTS OF ABSOLUTE SUBSTRATE UTILIZATION BY THE CITRIC ACID CYCLE IN ISOLATED PERFUSED RAT HEARTS

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The citric acid cycle is the primary source of reducing equivalents in the heart, and the stoichiometric oxidation by O_2 drives ATP synthesis. One mole of acetyl-CoA generates four moles of reducing equivalents in a single turn of the citric acid cycle, consuming two moles of O_2 . With corrections for oxygen consumption from reducing equivalents produced outside the citric acid cycle, myocardial oxygen extraction is directly proportional to the absolute acetyl-CoA flux into the citric acid cycle. When several substrates supply acetyl-CoA, their fractional contribution to the acetyl-CoA pool has to be known to determine their individual utilization rates. We measured the difference in arterial and venous pO_2 to quantitate myocardial oxygen extraction and total acetyl-CoA flux into the cycle, and used ^{13}C isotopomer analysis to measure the fractional contributions of exogenous 1mM sodium [$3-^{13}C$]lactate, 0.25mM sodium [$1,2-^{13}C$]acetate, and endogenous sources to the acetyl-CoA pool. Myocardial oxygen extraction was 15.46 ± 1.56 μ moles/min/g dry wt. (\pm standard error, $n = 4$) and absolute fluxes of 3.07 ± 0.20 , 1.59 ± 0.08 , and 0.57 ± 0.19 μ moles/min/g dry wt. were obtained for lactate, acetate, and endogenous sources respectively.

HIGH YIELD SYNTHESIS OF TRIBROMOCHLOROMETHANE

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The improved synthesis of tribromochloromethane in yields averaging 92% was accomplished upon reexamination of the reaction of bromotrichloride and tribromofluoromethane. This reaction is used for the high yield preparation of non-fluorine containing halomethanes and consequently for the destruction of fluoromethane. The identification of tribromochloromethane was made possible by the use of elemental analysis, carbon-13 NMR, mass and IR spectra. In addition, theoretical studies have also been performed on related halogen containing compounds. Data on the current work will be presented.

This research is supported by HRD-9255150.

THE UNIT FRACTION EQUATION $\sum_{i=1}^k \frac{1}{n_i} + \prod_{i=1}^k \frac{1}{n_i} = 1$

by Premchand Anne, Michael Hogan, Shylynn Lofton, Samara McCraney, Anthonino Rionda,
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The Diophantine equation of the title has its roots in the fractional numeration system of dynastic Egypt, dating from the third millennium BC. The problem of writing 1 as the sum of unit fractions first appears explicitly in the famous Ahmose Papyrus (ca. 1500 BC, problems 23 and 24). In AD 1201 Fibonacci (Leonardo of Pisa) proved that every rational number P/Q can be written as such a sum, thus establishing the completeness of the Egyptian system. In the 1890's J. J. Sylvester of Johns Hopkins gave the first modern proof that our equation in fact has infinitely many solutions by examining the sequence 2, 3, 7, 43, 1807, ..., where each term is the product of all preceding terms, plus 1. Each truncation of this infinite sequence provides a solution to the equation under view. But despite a long and distinguished history, it was not until the age of computers that much progress was made regarding the distribution of solutions. Only in 1978 did Hungarian researchers Janek and Skula produce the complete list of solutions with $k \leq 6$ terms, while the complete list for $k=7$ (26 solutions) was published by Brenton and Hill in 1988, after preliminary results by Cao, Liu, and Zhang.

The study of this and related Egyptian fraction equations received a boost in the 1980's when a group of researchers at Wayne State University discovered applications of this topic to the structure theory of isolated singular points of four-dimensional topological spaces. Singularity theory, especially the study of degenerate points of analytic and algebraic surfaces over the field of complex numbers, provides models for such cosmological structures such as black holes, worm holes, and the big bang. These connections between number theory and four-dimensional geometry also led to the development of new themes in the theory of weighted graphs, which in turn led to new examples of perfect groups given by generators and relations associated with the solutions n_1, \dots, n_k of the equation under study.

The Wayne State University Student Research Program has been assisting on this project since 1993. Accomplishments by undergraduate students to date include

- * The discovery of a total of 105 solutions to the equation of the title for $k=8$, as well as many highly unusual solutions with 9 or more terms.

- * Verification for $k \leq 8$ of a conjecture of Ke and Sun that for each positive integer k there is at least one set of k primes p_1, \dots, p_k such that $\prod_{j \neq i} p_j + 1 \equiv 0 \pmod{p_i} \forall i$.

- * The discovery of several new "perfectly weighted graphs," with applications to continued fractions and to presentations of groups.

- * Improvement of the bound on the non-solvability of the Erdos-Moser equation $1^n + 2^n + \dots + (m-1)^n = m^n$: no solution exists for $m < 1.5 * 10^{9321153}$.

CLONING GENES FROM MOUSE CHROMOSOME 17
USING *MUS SPRETUS* - SPECIFIC PROBES

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Mouse Chromosome 17 (Chr 17) has been widely studied because it houses both the histocompatibility complex and the *t* complex, a region which influences meiotic transmission, embryonic development, male fertility, and mating behavior. The purpose of this study is to clone genes from a particular homologue of Chr 17 of a congenic mouse. The objective is to identify genes from a wild mouse, *Mus spretus* (*spe*) which might be similar to *t* complex genes found in *Mus domesticus* (*dom*). Creation of a congenic mouse (*dom* / *spe*) was achieved by backcrossing successive generations descended from a (*domesticus* x *spretus*) F1 hybrid to an inbred *M. domesticus* strain (SWR). A genomic library consisting of fragments of this congenic mouse genome was constructed using a lambda phage vector. The library was screened with a *M. spretus* - specific DNA probe [oMS496] which detects interspersed repetitive elements (LINES 1 or L1) in the mouse genome and rescreened with oMS416C, a DNA probe which is specific for *M. spretus* L1 elements. A total of 116 positive clones were obtained and are being purified. Positive clones are currently being characterized by restriction mapping to identify DNA segments that are polymorphic between the *M. domesticus* and *M. spretus* genomes. Polymorphic segments are being used to map the chromosome location of each parent clone. Most of the clones should map to the *t* complex region of Chr 17 because we have selected our genetic crosses for mice that have retained the *M. spretus* region of Chr 17. This project will help to characterize putative *t* complex loci using zoo blots and analysis of mRNA expression by Northern blotting with our clones versus RNA expressed in embryonic tissue and adult testes, two systems affected by the *t* complex.

POSTER PRESENTATIONS

GONADOTROPIN ANTIBODIES ASSOCIATED WITH INFERTILITY INVOLVING OVARIAN FAILURE AND HORMONE RESISTANCE

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Women with unexplained infertility and suboptimal estrogen secretion in response to gonadotropin-stimulated ovulation have gonadotropin antibodies while those with an adequate response do not [Obstet & Gyn, 75: 795, 1990]. The difference in response to gonadotropin stimulation may involve organ specific ovarian antibodies and ovarian auto immunity [J Clin Endo Metab, 70:69, 1990]. However, it is also possible that similar to some types of thyroiditis characterized by hormone autoantibodies, there may be a form of ovarian dysfunction associated with gonadotropin antibodies. The objectives of this study were to evaluate gonadotropin antibodies (anti-follicle stimulating hormone [FSH] and anti-luteinizing hormone [LH] in sera from infertility/ovarian failure patients and to assess gonadotropin antibody (GAB) specificity.

Sera from patients (n=60) with unexplained infertility, and with (n=46) or without (n=14) prior gonadotropin stimulation were obtained. In separate tests, antibodies were detected by enzyme immunoassay (ELISA) against gonadotropin (FSH, LH or alpha and beta subunits) or related and control antigens (TSH, prolactin, BSA) at physiological concentrations (10-100 mIU). Positive values ($p < .05$) were identified by comparison to control sera (n=12) from normally cycling women of similar age (14-50). The results include: (a) of 60 samples screened (gonadotropin treated or untreated), 40% were positive for GAB, (b) 3 (1 strong, 2 weak) of 14 sera from patients without prior gonadotropin treatment were positive for GAB, (c) of 18 positive samples selected for additional analysis, positive signals were associated with a mixture of reactions to alpha and beta subunits (27%) or alpha subunit (33%) or beta subunit of FSH or LH (22%) alone. In addition, (a) reaction with TSH was only found in sera positive for GAB, (b) some sera reacted with prolactin and/or BSA (10%). BSA reaction was reduced in 1 of 3 sera adsorbed with BSA-Agarose and 5 of 9 adsorbed with BSA bound to ELISA plates, suggesting the presence of BSA antibodies similar to reports to autoimmune diabetes. The signal remaining after BSA adsorption was due to GAB. BSA antibodies were not observed in this study in sera of patients with no prior hormone treatment. Sera evaluated against FSH or LH after adsorption (n=10) with gonadotropin bound to ELISA plates, confirmed that positive sera may contain a mixture of antibodies to FSH, LH and sometimes BSA in treated patients and that reactions may be due in part to common reaction sites on FSH and LH. Furthermore, since GAB were found in patients with no prior gonadotropin treatment, GAB may be a component of hormone resistance to gonadotropin.

Therefore, GAB are associated with infertility and ovarian failure or poor responses to gonadotropin stimulation. The GABs often recognize a combination of FSH, LH and their subunits, but some sera (<10% of positive samples) are specific for beta subunit of FSH or LH. Although GAB may arise from exposure to exogenous gonadotropin in patients with a predisposition to auto immunity, GAB are not solely a consequence of hormone treatment. Thus, similar to the well established existence of hormone antibodies in some forms of thyroiditis, some forms of ovarian dysfunction in humans may involve hormones as targets of autoantibodies.

Supported in part by a University Research Grant from RPSLMC.

FETAL AND MATERNAL CONTRIBUTIONS TO SPONTANEOUS AND INDUCED CLEFT LIP IN A-STRAINS OF MICE

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A/J (A), A/JWySn (W), reciprocal F1 outcrosses, and backcrosses (BC) to each strain were studied. In our lab, A shows a spontaneous cleft lip frequency of 4.2% and W has a frequency of 26.6%. Diphenylhydantoin, or Dilantin (DPH) is an anti-epileptic drug that has been shown to induce cleft lip in children when administered to pregnant women. In the present study, 75 mg/kg DPH is administered on day 10 of gestation to pregnant females. On day 18, the females are dissected and the fetuses are examined for cleft lip (unilateral and bilateral). Although the present study is not yet complete, a previous experiment with another cleft lip inducer, Retinoic Acid (RA) (Beck et al. 1996, *Teratology*, [in press]) showed that both maternal and fetal contributions to cleft lip formation are detectable and most likely there is a dominant gene that contributes to lower incidence of cleft lip in A/J strain. Based on this, we expect that the WxA will have a higher frequency due to maternal effect, than will AxW, even though the fetuses are genetically identical. We also expect that the F1 backcrossed to W will have a higher incidence of cleft lip as compared to the F1 backcrossed to A due to fetal effect.

**Fimbrial Protein Production for Immunocytochemical Studies in
*Ustilago hordei***

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ABSTRACT

Sporidia of *Ustilago hordei* produce surface fimbriae which are important in conjugation and pathogenicity. This work focuses on the large scale production and purification of fimbrial protein by mechanical and precipitational means for immunocytochemical studies. Wild type, I4A, sporidia were cultured in 12L YEG with rotary shaking at 21° C for 48 hours. The cell culture was harvested by centrifugation at 8,000 rpm for 20 minutes and sheared three times for 2 minutes at 2-minute intervals in a Waring mixer to remove fimbrial protein. This suspension was centrifuged at 8,000 rpm for 20 minutes and the supernatant was then ultracentrifuged at 105,000g for 4 hours. The most purified fimbrial protein was obtained by washing with citric acid (1M citric acid added to give a final concentration of 25mM); placing it through a Sepharose CL-4B column (fraction proteins between 60,000 and 20,000,000 MW) and washing in distilled water and 40% acetone. This fraction was then centrifuged at 13,000 rpm for 20 minutes and the protein pellet electrophoresed (SDS-PAGE) to isolate the 74,000 Da band. The gel was stained with 0.01% Coomassie Brilliant Blue and counterstained with silver to visualize the potential fimbrial subunit. The protein band was eluted from the gel, reduced to remove metallic silver and prepared for observation under the transmission electron microscope. After positive microscopic identification of the fimbrial protein, a total of 2.6g was used for immunizing test rabbits for subsequent antibody isolation and immunocytochemical analyses.

ABSTRACT

Detection of a fungicide resistant gene by R.A.P.D. and PCA methods.
Leon Fischer, Carroll E. Henry, and Evelene Steward-Clark.

The purpose of the experiment is to isolate and characterize a fungicide resistant gene or genes from *Ustilago hordei*, to better understand its genetic make up and molecular mechanisms. This study investigated the production of random polymorphic fragments from *Ustilago hordei* for use as markers. The DNA was extracted from wildtype UV mutants, and fungicide resistant mutants of 14A and E3a cells. The cells were lyophilized and DNA extracted by first adding isolation buffer (100mM Tris HCL-pH 7.4, 50mM EDTA- pH 8.0, and 500mM NaCl followed by 20% SDS, and 21ul of 2-mercaptoethanol. The mixture was incubated for 45 minutes at 65C and 5M potassium acetate was added to supernatant at -20 degrees for 10 minutes to remove proteins. The samples were centrifuged and decanted into clean eppendorfs. DNA was precipitated from the supernatant with isopropanol, washed with 70% ethanol, dried and dissolved in TE-1 ANase buffer. R.A.P.D. primer 0PG-17 detected polymorphism in the banding patterns of the samples using PCA techniques. The pattern was visualized when samples were electrophoresed on a 1.2% agarose gel. The results indicate a fungicide resistant gene may be present within the genome of *Ustilago hordei*. This technique will be useful in construction of genomic libraries for other hybridization studies.

EFFECTIVENESS OF BACTERIAL CORRINOID EXTRACTS IN CCL₄ DECHLORINATION CATALYSIS

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ABSTRACT

Chemicals such as some pesticides are not easily subjected to biodegradation due to their halogen content. A method to remove these halogens would produce products easier to biodegrade. Under anaerobic conditions, cobinamide, a biosynthetic precursor of vitamin B-12, is an effective catalyst in the dechlorination of Lindane (hexachlorocyclohexane). We are testing as catalysts several bacterial extracts from Vitamin B-12 producer organisms. These extracts contain a mixture of several corrinoids. The purpose of these tests is to determine which extracts are the most effective in reducing CCl₄ and other organohalides. The mixture used for these assays is: 0.5M aqueous Tris anaerobic buffer (pH 9.0), corrinoid extract (25 or 50 nmol), 0.1M DTT, and Dioxane (50% v/v). All reagents total 1.0ml and are crimp-sealed in a vial and incubated at room temp in the dark from ten to sixty minutes. The solutions are extracted with cold pentane and back extracted with 2% aqueous NaCl. The products are analyzed by gas chromatography. From 20% to 40% of the products have been identified as CHCl₃. Other possibilities not detected by our G.C. method are CH₂Cl₂ and CH₃Cl. Supported by NIH-GMS-08043.

**ELECTRON MICROSCOPY OF
HALOBACTERIUM HALOBIUM AND CELL
MEMBRANE REGIONS CONTAINING
BACTERIORHODOPSIN**

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Halobacteria are rod-shaped motile cells that exist in salt water marshes. We are interested in this organism because it produces a rhodopsin in its cell membrane which serves as a model for the "visual purple" of the animal eye. In *H. halobium*, the pigment functions by a photosynthetic mechanism that converts light into chemical energy, ATP. By using EM techniques the purple membrane lattice of bacteriorhodopsin (BR) can be characterized. Furthermore, we are using BR as a target for photochemotherapeutic agents. We anticipate that our EM pictures will give information about target damage.

H. halobium cells were cultured and electronmicrographs of the cells were obtained at three stages of cell maturity (i) the early part of the log growth phase; (ii) the middle stage of the log growth phase; (iii) the end of the log phase after anaerobic stimulation of the production of the purple membrane containing (BR). Progress is underway in mounting and visualizing the BR samples. (Supported by NIH grant GM 08043.)

**HETEROLOGOUS EXPRESSION OF CHROMATIUM VINOSUM
CYTOCHROME C' IN ECOLI UNDER
SEMIANAEROBIC CONDITIONS**

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ABSTRACT

Cytochrome c' are compounds believed to play a role in electron transport as do other cytochromes. The cytochromes c' are mono- and diheme proteins derived, from photosynthetic and denitrifying bacteria. They are autoxidizable and have a heme binding sequence pattern (-Cys- X-Y-Cys-His) similar to low-spin cytochrome c. The optical absorption spectra and CO- binding properties resemble the Of binding high spin hemoglobin and myoglobin.

The gene has been cloned in order to carry out site-directed mutagenesis. The gene has been expressed in Ecoli strain W3110 under semianaerobic conditions in order to prepare the recombinant cytochrome c' for further protein characterization for comparison to the native cytochrome c'. Multiple cultures of the clone were grown under semianaerobic condition in LB media containing ampicillin. A crude soluble cytochrome fraction was obtained by osmotic rupture of the outer membrane, soluble extracts contain 0.8mg of protein/L of media as determined by spectrophotometric analysis.

DEVELOPMENT OF A MALARIA TRANSMISSION-BLOCKING VACCINE:
THE CONSTRUCTION OF PFS230 EXPRESSION VECTORS

Jogger, Cheryl

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Loyola University
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Pfs230 is a large protein found on the surface of the parasite that causes malaria, *Plasmodium falciparum*. Previous work has identified Pfs230 as a possible malaria transmission-blocking vaccine candidate. This type of vaccine would prevent the malaria parasite from infecting the mosquito, which would in effect block the spread of malaria to humans. In order to develop an effective vaccine, it is necessary to identify the target region(s) of the Pfs230 protein that the transmission-blocking antibodies recognize. The gene for Pfs230 has been divided into six regions based on its theoretical structure. This study focuses on regions 3 and 4 of the gene, which are 2.4 and 2.3 kilobases in length respectively. The objective of this study is to generate DNA vectors encoding these specific regions of the Pfs230 protein. The regions were amplified from genomic DNA using the Polymerase Chain Reaction. Next the DNA of these specific regions of Pfs230 was digested with the restriction enzymes EcoRV and ApaI to form compatible ends with the vectors. The regions were then inserted into the vectors. Restriction enzyme analysis was used to confirm the presence of the 2.4 and 2.3 kilobase inserts in the vectors and DNA sequencing verified their correct alignments. Now the expression vectors containing the Pfs230 inserts will be used to express the protein on the surface of mammalian cells. The cells will then be screened for reactivity to the transmission-blocking antibodies using immunofluorescence. Regions that react with the antibodies will be further developed as malaria vaccine candidates.

EFFECT OF ERYTHROMYCIN ON FORMATION OF PETITES DURING THE REPLICATIVE LIFESPAN OF YEAST

Jacqueline Rogers

Supervisors: Mark Holbrook and John Menninger
Department of Biological Science
University of Iowa

The yeast *Saccharomyces cerevisiae* can undergo only a finite number of budding cycles before it stops, an event taken as the end of its replicative lifespan. "Petite" yeast cells have inactive mitochondrial function. I grew both mother and young cells, isolated at various times during the lifespan, as colonies on YPD plates (carbon source - glucose), conditions that favor the growth of both petites and non-petite cells. I then picked the colonies and streaked them onto fresh YPD plates, grew them at 30 C for 2 d, then replicated them using cheese cloth onto, first, a YPG plate (same composition as YPD except 2% non-respirable glycerol as the carbon source), and then a YPD plate. Petite cells grow very poorly on YPG plates. After 2 d at 30 C, I scored the plates for growth. The fraction of streaks that grew on YPG plates (YPG⁺) was taken as the fraction of non-petites.

Erythromycin is an antibiotic that binds to procaryotic and mitochondrial ribosomes. It is known to stimulate preferentially the dissociation from procaryotic ribosomes of erroneous peptidyl-tRNA with the result that completed proteins have fewer errors (Menninger, Coleman & Tsai, 1994). We are investigating the effect of erythromycin on the replicative lifespan of yeast. Preliminary results on a diploid yeast strain (K65-3D) indicated that erythromycin elicited a significantly extended lifespan (Holbrook & Menninger, 1994). Moreover, the fraction of non-petite cells was higher in yeast treated with erythromycin. The observed higher fraction of non-petites suggested that erythromycin did not degrade mitochondrial function in these cells.

I have extended these studies to a haploid yeast strain (X2180-1A). As cells proceeded through the replicative lifespan there was an increase in the number of non-petite (YPG⁺) cell an effect that was slightly more noticable in cells treated with erythromycin (Figure). Treatment with erthromycin seemed to have no effect on the aging cells (mothers) that was different from that on young cells derived from the mothers during the immediately preceding budding cycles. These results are consistent with findings on the diploid yeast strain K65-3D, namely that erythromycin's antibiotic effect on mitochondrial protein synthesis did not tend to convert cells to petites with defective mitochondrial function.

COMPETITIVE E.L.I.S.A. FOR DETECTION OF ALLATOSTATIN-1 LIKE
PEPTIDE AND ITS BIOLOGICAL ACTIVITY IN NEUROPEPTIDE
OF ASCARIS

Kenya Wells, Dr. Cain, Dr. Stay
University of Iowa
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Allatostatin 1 is a juvenile hormone that was detected in cockroaches. In the cockroaches, Allatostatin 1 is associated with the hormone synthesis that controls molting in insects. Recently, this hormone has been detected in other invertebrates that do not molt (a species of snail and the common earthworm). The hormone has been partially purified from each species and has been shown to have activity in a cockroach bioassay system.

A study of this hormone in the parasitic nematode, Ascaris suum, a member of a phylum in which molting is a necessary requirement for growth. Allatostatin 1 has already been demonstrated in A.suum by immunolocalization, but it is questionable as to whether or not there is biological activity. So to find out, my mentors and I did what is called a competitive E.L.I.S.A. (Enzyme Linked Immuno Sorbent Assay). Prior to this, the samples must be prepared by separation on Sep-Pak is for the proteins in the worm's extract to bind to the column and then be eluted with solvents. Authentic Al-1 added to a well plate to sit in the fridge overnight.

The next day, the primary and secondary antibodies are added along with Ascaris samples, respectively into the wells. The reason for adding antibodies with the sample of worm extract is to bind any peptide that are similar to Al-1. If the primary (mouse anti Al-1) antibody binds to A.suum peptide (similar to Al-1), then it will not bind to authentic Al-1 on the plate. The secondary antibody (goat anti mouse), linked to an enzyme then binds to whatever primary antibody is stuck on the plate. All soluble materials are then washed out of the plate and the substrate for the secondary antibody's enzyme is added. If color does develop, the primary antibody has bound to the Al-1 on the plate. If color does not develop, the primary antibody has bound to something else and been washed away.

The results of my experiments have proven to be inconclusive so far. In the first experiment, color development was absent in all wells, suggesting either that very large amounts of Al-1 like substance was present or that non-specific binding of the antibody to proteins in the A.suum extracts. The experiment was repeated with dissected nerve cords.

As far as biological activity is concerned, if able to determine the Allatostatin 1 sequence in the neuropeptide, then there should be some correlation in functions in two distinct insects. In order to confirm the thesis, a bioassay will be done. Due to time limit, I will not take part in finding out the function of the Ascaris worm which is determined by the bioassay results.

TOXICITY OF CARBAMATE COMPOUNDS TO
EGGS OF THE PARASITIC NEMATODE
ASCARIS SUUM, IN SEWAGE SLUDGE

Michael Reed and George D. Cain

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Department of Biological Sciences, University of Iowa

The eggs of *Ascaris suum*, a parasitic nematode of pigs, can be transmitted to humans intreated sewage, and if the eggs are fully embryonated, infecton can occur. We attempted to determine the time required for K⁺ " Rid-A-Vec," a proprietary biocidal compound, to exert a toxic effect on *A. suum* eggs recovered from the uteri of worms collected at the slaughterhouse. The results indicated the the compound, in concentrations of 40ml/10ml of a sewage/ egg mixture, effectively stopped normal egg development at treatment times of 60 min or longer. Shorter treatment times were apparently unable to completely block development, because eggs treated for 30 min contained normal -appearing embryos. It remains to be determined, however, whether these embryos are infective. We hope that this experiment can be helpful in improving the treatment of sewage and help to make if safer for use as fertilizer on crops intended for human consumption.

THE EFFECT OF BOILING TIME ON L-ASCORBIC ACID IN WATER.

Eurdice Oware,

Michael Mimnaugh and Sharon Lee McCarthy

Department of Chemistry and Physics

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Ascorbic acid is essential to humans and useful in many products. Today, studies on L-ascorbic acid are in process. It is important to find factors that affect the concentration of this vitamin and evaluate the methods that one may use to calculate this concentration. Previous experiments explored how baking temperature affected vitamin C in red peppers. This years work has looked at the effect of time on boiling pure L-ascorbic acid in water.

Rapid Low Temperature Synthesis of Cuprate Superconductors Via Metal Hydroxide Precursors.

**Nicole Scarbrough, Dr J.K. Akujieze
Chicago State University, Department of Chemistry and Physics
And
Dr D.Hinks and Dr J. Mitchell
Argonne National Laboratory, Materials Science Division**

Abstract:

Conventional ceramic techniques for synthesizing single phase cuprate superconductors typically involve multiple high-temperature (>800 C) firings with intermediate mixing and grinding, yielding particle sizes of several microns to tens of microns. Such large particle sizes are known to be disadvantageous in grain connectivity problems, particularly in wire fabrication. Low temperature synthesis (>600 C) synthesis from highly reactive metal hydroxide precursors may solve this problem. Here, we describe synthetic methods for forming high quality powders of $Tl_2Ba_2CuO_6$ (Tl-2201), $Tl_2Ba_2CaCu_2O_8$ (Tl-2212), $Bi_2Sr_2CaCu_2O_8$ (Bi2212), $YBa_2Cu_3O_{7-\delta}$ (Y-123) at low temperatures and/or short reaction times (<10 hrs). We discuss the effect of composition, temperature, and time on the synthesis.

Superconducting Phases in $\text{Bi}_{2+x}\text{Sr}_2\text{Ca}_{1-x}\text{Cu}_2\text{O}_{8-\delta}$ (Bi-2212) System.

Kaiton Bullock, Clyde Smith and Dr J.K. Akujieze
Department of Chemistry and Physics
Chicago State University, Chicago IL.

We present results showing that single phase superconducting material exists for the series studied. It is inferred from the structural studies that stability of the superconducting phase persists till $x=0.4$, when the inherent modulation of the structure is subsequently removed. We discuss with a standard pattern as a guide, the comparison of the experimentally derived x-ray pattern with indexes of characteristic peaks.

DESIGN CONTROL PARAMETERS FOR VERTICAL CURVES

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ABSTRACT

“A Policy on Geometric Design of Highways and Streets,” by the American Association of State Highway and Transportation Officials (AASHTO), exhibits severe disparities between the recommended procedures for the computations of stopping sight distance on grades, and the design controls for vertical curves. The stopping sight distances advocated in the computation of design controls for vertical curves are fully consistent with those for flat terrain. A vehicle traveling downgrade on a crest vertical curve of type II, or a sag vertical curve of type IV, experiences at no time a horizontal grade. It is imperative that the stopping sight distances afforded to vehicles on types II and IV vertical curves are consistent with those on grades. The purpose of this study is to pinpoint the deficiencies of the AASHTO procedures for the computation of design control parameters on vertical curves, and propose new methodologies for their computation. To this end, section 1 presents a review of the literature on design control parameters for vertical curves. A methodology is outlined in section 2. A comparison of the AASHTO and presently recommended procedures for the computation of design control parameters on vertical curves is undertaken in section 3. Section 4 drafts the conclusions, and a reference is listed in section 5.

Shaheerah Fateen

Dr. Parulekar

Department of Chemical Engineering

“Competition Between Suspended & Attached Biomass in Biological Reactors”

Conventional design procedure for biological reactors assumes that the degradation of pollutant is either by suspended or attached biomass. Attached biomass includes biomass that collects and forms a thin layer of biofilm on the walls of a biological reactor, while suspended biomass is simply suspended within the liquid medium of the reactor. The degradation rate equation for the suspended biomass or the biofilm is then used to calculate the reactor size required to achieve a prescribed treatment efficiency. However, all real world reactors (biological) contain both suspended and attached biomasses that degrade simultaneously the pollutant. Yet, which form of biomass is responsible for the degradation of pollutant at a faster rate? The objective of this project is to find out the form of biomass that is most dominant in degrading pollutant at a higher rate. Mathematical models for both suspended and attached biomass was used to perform a sensitivity analysis to evaluate the dominant form of biomass

Diego Carlton

Dr. Karagiannes

Educational Technology Center/ Department of Biological, Chemical and Physical Sciences

“Creating Interactive Tutorials Using Hypercard”

While interactive tutorials have existed at the grammar and high school levels for some time now, there is still little material on the market at the college level, especially in the area of Physics and Engineering. The aim of this project is to develop interactive tutorials for students in college level courses through the use of Hypercard. Hypercard allows for the easy integration of multimedia into tutorials, which is often a necessity in getting the concepts in advanced material across to students. A base template will be developed so that instructors in any class can create custom tutorials to serve the needs of their students. These tutorials will allow students to view topics on many levels as well as to cross reference between topics. The hope is to develop a self-paced learning experience that will serve students at all academic levels.

Alberto Quintana

Dr. Williams

Department of Mechanical, Materials and Aerospace Engineering

"Feedback Control of a Coning Motion Model"

Aircraft flying at high angles of attack experience strong side forces, which may cause the pilot to lose control of the aircraft. Experiments in a wind tunnel with a stationary model have demonstrated the ability to control the side force with very low levels of suction. The same type of side force will cause an aircraft model in a wind tunnel to rotate on a sting, which is known as the coning-motion. The same suction techniques were employed to control the rotation of the coning motion model with a tangent o-give type nose cone. Suction was applied through two holes located at the tip of the nose cone. Several experiments were performed involving different control settings and different wind tunnel speeds to explore and analyze the feedback from the model. The rotating rate data was acquired with an optical encoder located at the end of the shaft. The encoder measures angular velocity and angular acceleration.

Two pressure transducers located at the nose cone provide the feedback signal to the control computer, which adjusts the suction in order to control the motion of the model.

William G. Sewell, Jr.

Dr. T. Corke

Department of Mechanical, Materials, and Aerospace Engineering

"The Design and Testing of an Elliptical Nose Cone"

This research endeavor intends to understand the unique air flow conditions which leads from transition to turbulence on elliptical nose cones. This air flow will be tested at hypersonic speeds between Mach 6 and Mach 9 and at a maximum temperature of 900 degrees Fahrenheit. Past research has attempted to understand this phenomenon. Those experiments used flat plates and circular cones which only account for two dimensional flow conditions. However, the air flow over an elliptical nose cone provides three dimensional measurements which are more realistic. In order to understand the transition to turbulence flows on elliptical nose cones at hypersonic speeds, a model of this nose cone will be tested in the NASA Langely Research Center. However, the model, the mount, and the measuring devices must be designed. This part of the project involves designing the "sting"--the part of the mount that hangs from the strut and holds the cone in position. When designing the "sting", the forces, stresses, and the temperature which affect the beam, behave differently under such high speeds. All these conditions are being considered for the design of the sting.

ABSTRACT

CARDINALITY OF SETS AND VARYING DEGREES OF INFINITY

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and

Dr. Victor Akatsa
Professor of Mathematics
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Many undergraduate calculus students in the sciences, engineering, and mathematics have a monolithic view of infinity. They tend to think of infinity as being some vague concept whose exploration would be an exercise of futility. Contrary to this notion, there exists varying degrees of infinity. In fact, there are uncountably many distinct types of infinity. To illustrate this point, one needs to first understand the definition of a set, cardinality of a set, countability of a set, and the power set of a set. A set is simply a well-defined collection of objects. The number of elements within an arbitrary set G is referred to as the cardinality of the set, denoted $\#G$. A set G is said to be countable if there exists a bijective function from the set of natural numbers (\mathbb{N}) to G . If no such bijective function exists, then G is said to be uncountable. Furthermore, the power set of an arbitrary set G consists of all subsets of G (including the empty set, denoted $\{\}$). For any given set G , the cardinality of its power set (denoted $\#^{\mathcal{P}}(G)$) is given by the expression : $\#^{\mathcal{P}}(G) = 2^{\#G}$. The set of all real numbers (denoted \mathbb{R}) is an infinitely uncountable set, while the set of integers (denoted \mathbb{Z}) is an infinitely countable set. While both sets are infinitely large, since \mathbb{Z} is countable (i.e., there exists a bijection from \mathbb{N} to \mathbb{Z}) and \mathbb{R} is uncountable (no such bijection exists), then $\#\mathbb{Z} < \#\mathbb{R}$. This implies that there are at least two distinct degrees of infinity. Taking successive power sets of \mathbb{Z} and \mathbb{R} leads to the conclusion that there are uncountably (or, infinitely) many degrees of infinity.

Computation and Rationalization of Second- and Third-Order Nonlinear Optical Responses in Inorganic Molecular Chromophores

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The search for molecules possessing large second-order and third-order optical nonlinearities is currently an intense area of research. We have computed hyperpolarizabilities (β and γ) for a variety of inorganic structures using the computationally efficient, chemically-oriented INDO electronic structure model (ZINDO-SOS). The ZINDO-derived second-order responses are found to be in excellent agreement with those measured in the laboratory for a wide range of chromophores. The third-order responses are somewhat less accurate in comparison with experiment. Since the magnitude of the NLO susceptibility is governed by a molecule's electronic structure, our studies have identified electronic features that are characteristic of molecules displaying optimal NLO properties. The utility of this method in chromophore design will be illustrated by examining the effect of including metal groups in the π -electron system. Finally, fundamental differences between classical π -organic chromophores and non-traditional transition-metal structures will be highlighted.

COMPUTER ASSISTED ANALYSIS OF THE STRUCTURE ACTIVITY
RELATIONSHIPS OF POLYCYCLIC AROMATIC HYDROCARBONS
WITHIN DNA INTERCALATION SITES.

Diana Adams, and Sharon Lee McCarthy
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Chicago State University
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Polycyclic aromatic hydrocarbons or PAH's have been known since the turn of the century as potential carcinogens. The activity of these compounds is not fully understood, and it is the aim of this research to provide a better understanding of the activity that occurs when a PAH enters an intercalation site in a DNA strand. This presentation will show the current work in our laboratory in attempting to relate the size of the compounds as well as their planarity to their ability to intercalate in the DNA strand. This research has involved using the CACHE worksystem and software to study several PAH molecules. The work has included finding the best structure through MOPAC analysis and then correlations of the shape and size of these molecules to their activities, it is continuing with the insertion of these PAH molecules into intercalation sites within the DNA. Data on the current model will be presented. This work is supported by NIH-GM08043.

HALOGEN EXCHANGE IN A MIXTURE OF CARBON TETRACHLORIDE AND CARBON TETRABROMIDE

Jorge Castillo, Lesley Williams and Marisa Perkins
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Chicago, Illinois

Evidence for halogen exchange in a mixture of carbon tetrachloride and carbon tetrabromide has been observed. The presence of tribromochloromethane and trichlorobromomethane were detected after lengthy heating. These detections are based on comparison of observed carbon-13 NMR chemical shifts with those reported in the literature and, in the case of the tribromochloromethane, with the chemical shift of pure tribromochloromethane (dissolved in carbon tetrachloride) synthesized in our laboratory. The presence of dibromodichloromethane is beginning to appear, as judged from chemical shift comparison of the last carbon-13 NMR signal observed.

**A PRELIMINARY STUDY OF TRACE METALS ANALYSIS
OF COINS OF THE CHINESE EMPEROR CH' IEN LUNG**

Jason Andrews and Mark A. Benvenuto*

University of Detroit Mercy

Chemistry Department, 4001 W. McNichols Rd., Detroit, MI 48221.

A series of brass coins from 18th century China have been examined by inductively coupled plasma (ICP) to determine amounts of trace metals and relative amounts of their major components. Preliminary correlations have been made between trace metals percentages and physical data such as coins' density. Particular attention is paid to amounts of trace metals in relation to lead, because lead is known to have been utilized unofficially to adulterate brass purities.

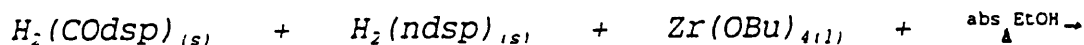
Synthesis of a Zirconium Complex Mixed Ligand that Can Better Withstand Erosion Caused by Atomic Oxygen

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of Technology, Rochester, NY 14623

This NASA originated research project focuses on synthesizing a Zirconium complex to add to a polymer, so that it can be used for insulation in satellites, which may endure the erosion caused by atomic oxygen better. The Zirconium oxide which forms protects the polymer beneath the oxide layer. However, a good ligand is needed to hold the Zirconium and the polymer together. To contribute to the overall goal, a new Zirconium complex was synthesized using two different Schiff base ligand. The new compound is $Zr(COdsp)(ndsp)$, derived from the reaction:



This reaction in equimolar amounts produces $Zr(COdsp)_2$, $4HOBu$, and $Zr(ndsp)_2$, as well as the new compound. However, these complexes can be easily separated by column chromatography. By TLC, FT-IR, proton NMR and elemental analysis evidence, the structure for the desired mixed ligand complex isolation can be proven. At this time, the $Zr(COdsp)(ndsp)$ is believed to be isolated and pure, but we are still in the process of obtaining the evidence to prove that we have the desired compound.

EMMANUEL ADIBU
NEW COPOLLMERS OF 2-PHENYL-1,1 DICYANOETHENE AND
VINYL FOFMAMIDE.

THE MAIN ODJECTIVE OF THIS RESEARCH IS TO STUDY COPOLYMERIZATION VINYL FORMAMIDE WITH 2-PHENYL-1,1-DICYANOETHENE .VINYL FORMAMIDE IS A NEW READILY POLYMERIZED FUNCTIONAL MONOMER THAT IS A USEFUL BUILDING BLOCK FOR PREPERATION OF AMIDE AND AMINE CONTAINING LONG CHIAN POLYMER SYSTEMMS. IT IS ALSO KNOWN THAT THE VINYL FORMAMIDE MONOMER ENHANCES VARIOUS PROPERTIES INCLUDING POLARITY AND WATER SOLUBILITY. HYDROLYSIS OF POLYMERS PREPARED WITH THE VINYL FORMAMIDE MONOMER ALLOWS THE INTRODUCTION OF PRIMARY AMINE FUNCTIONALITY. COPOLYMERS THAT OF VINYL AMINES OBTAINED IN THIS WAY ARE NOVEL MATERIALS THAT LEND THEMMSSELVES READILY TO FURTHER MODIFICATION OR CROSS LINKING.THE NOVEL VINYL FORMAMIDE (VF) AND 2-PHENLY-1,1-DICYANOETHENE (PDE) COPOLYMERS WERE PREPARED BY RADICAL COPOLYMERIZATION WITH 2,2-AZOBISISOBUTYRONITRILE AS INITIATOR IN ETHYL ACETATE AT 70*C. THE POLYMER COMPOSITION AND STRUCTURE IS BEING STUDIED BY ELEMENTAL ANALYSIS , IR SPECTROSCOPY AND BY PROTON AND CARBON-13 NMR.

THE EFFECT OF MOLECULAR ARCHITECTURE ON THE THERMOTROPIC BEHAVIOR OF SIDE-CHAIN LIQUID CRYSTALLINE POLYMERS AND ITS RELATION TO POLYDISPERSITY. Zinea M. Wilson[†], Coleen Pugh[‡], Kevin D. Belfield[†], and Charlotte Young^{†,*} [†]Department of Chemistry, University of Detroit Mercy, P.O. Box 19900, Detroit, MI 48219, [‡]Department of Chemistry, University of Michigan, Ann Arbor, MI 48109.

The extremely broad phase transitions of side-chain liquid crystalline polymers (SCLCPs) have always been attributed to their polydispersity. However, since polydispersity created by mixing linear polymers has no effect on the thermotropic behavior of polynorbornenes, we must consider what are the various sources of polydispersity. Most SCLCPs have been prepared by free radical polymerizations in which much of their polydispersity is due to chain transfer to polymer at high monomer conversions. Therefore, we believe that much of the anomalous behavior of SCLCPs, including broad transitions, is due to the polydispersity caused by a mixture of molecular architectures. In order to determine the effect of molecular architecture on the thermotropic behavior of SCLCPs, we will present the synthesis and polymerization of 5-[4'-(4"-cyanophenyl)phenoxy]-n-pentyl acrylate by both classic radical and atom transfer radical polymerization.

FIRST ANNUAL CHICAGO AMP
STUDENT RESEARCH CONFERENCE
 in Science, Mathematics, Engineering & Technology

CONFERENCE REGISTRATION

<u>First Name</u>	<u>Last Name</u>	<u>School</u>	<u>Registrant</u>	<u>Presentation</u>
Shirley	Malcom	American Association for the Adv. of Science	guest	
Sam	Bowen	Argonne National Lab	guest	
Linda	Washington	Argonne National Lab	guest	
Diane	Adams	Chicago State University	student	poster
Victor	Akatsa	Chicago State University	faculty	
Justin	Akujieze	Chicago State University	faculty	
Nana	Ampofo	Chicago State University	student	
Felicia	Anderson	Chicago State University	student	podium
Sylvia	Antonio	Chicago State University	student	
Quintella	Barnes	Chicago State University	student	
Tina	Beacham	Chicago State University	student	poster
Linda	Bell	Chicago State University	faculty	
Maria	Bonner	Chicago State University	student	
Kaiton	Bullock	Chicago State University	student	poster
Tiffany	Burgess	Chicago State University	student	poster
Jorge	Castillo	Chicago State University	faculty	
Edward	Coleman	Chicago State University	student	
Arlicia	Corley	Chicago State University	faculty	
Fay	Edmond	Chicago State University	faculty	
Mark	Erhart	Chicago State University	faculty	
Leon	Fisher	Chicago State University	student	poster
Kendall	Franklin	Chicago State University	student	poster
Dorothea	Friend	Chicago State University	student	
La'trica	Gamble	Chicago State University	student	
Tenica	Gamble	Chicago State University	student	
Anthony	Garcy	Chicago State University	faculty	
Valerie	Goss	Chicago State University	student	podium
Joe	Greenwood	Chicago State University	student	
Chanell	Gregory	Chicago State University	student	
Lakeshia	Hampton	Chicago State University	student	podium
Tamercia	Harris	Chicago State University	student	
Robert	Harris	Chicago State University	faculty	
Traci	Henry	Chicago State University	student	
Caroll	Henry	Chicago State University	faculty	
Cecilia	Hernandez	Chicago State University	student	podium
M'rald	Joshua	Chicago State University	student	
Dave	Kanis	Chicago State University	faculty	
Yolanda	Knight	Chicago State University	guest	
Tor	Kwembe	Chicago State University	faculty	

Vernetta	Lawson	Chicago State University	guest	
Vernetta	Lawson	Chicago State University	guest	
Tarshica	Lewis	Chicago State University	student	
Rachel	Lindsey	Chicago State University	faculty	
Gerald	Lyles	Chicago State University	student	
Sharon	McCarthy	Chicago State University	faculty	
Erica	McJimpsey	Chicago State University	student	
Mike	Mimnaugh	Chicago State University	faculty	
Sahidi	Olabodi	Chicago State University	student	
Avani	Pandya	Chicago State University	student	podium
Shreyash	Pandya	Chicago State University	student	
Marisa	Perkins	Chicago State University	student	poster
Patrick	Powe	Chicago State University	student	
Michael	Reed	Chicago State University	student	poster
Jacqueline	Rogers	Chicago State University	student	poster
Nicole	Scarborough	Chicago State University	student	poster
Raj	Sinha	Chicago State University	faculty	
Tracy	Smith	Chicago State University	student	poster
Kevin	Smith	Chicago State University	faculty	
Tonya	Stevens	Chicago State University	student	podium
Leandra	Thomas	Chicago State University	student	
Elliott	Treadwell	Chicago State University	faculty	
Adrien	Turner	Chicago State University	student	
Rita	Ware	Chicago State University	student	poster
Kenya	Wells	Chicago State University	student	poster
Ezell	Williams	Chicago State University	student	poster
Lachanda	Williams	Chicago State University	student	
Marian	Wilson-Comer	Chicago State University	faculty	
Emmanuel	Adibu	DePaul University	student	poster
Tony	Behof	DePaul University	faculty	
Maria	Cisneros	DePaul University	student	podium
Irma	Garcia	DePaul University	student	
Lara	Gutierrez	DePaul University	student	
Lidia	Hernandez	DePaul University	student	
Joanna	Mazza	DePaul University	student	poster
Jim	Montgomery	DePaul University	faculty	
Karen	Moore	DePaul University	student	
Lynn	Narasimhan	DePaul University	faculty	
Jaime	Pina	DePaul University	student	
Karnin	Robinson	DePaul University	student	poster
Victoria	Simek	DePaul University	faculty	
Priscilla	Villeda	DePaul University	student	
Robert	Andrews	Harold Washington College	student	
Uchenna	Aningo	Harold Washington College	student	
Nancy	Douge	Harold Washington College	student	
Motunrayo	Faldyin	Harold Washington College	student	
Michael	Robinson	Harold Washington College	student	
Michael	Zemlan	Harold Washington College	student	
Diego	Carlton	Illinois Institute of Technology	student	poster
Shaherrah	Fateen	Illinois Institute of Technology	student	poster

Cole	Greaves	Illinois Institute of Technology	student	
Peter	Johnson	Illinois Institute of Technology	faculty	
Cheryl	Kaplan	Illinois Institute of Technology	faculty	
Alberto	Quintana	Illinois Institute of Technology	student	poster
Will	Sewell	Illinois Institute of Technology	student	poster
Paul	Smith	Illinois Institute of Technology	student	
Kimberly	Terrell	Illinois Institute of Technology	student	
Robyn	Chester	Kennedy-King College	student	
Margarite	Ector	Kennedy-King College	student	
Joe	Kyle	Kennedy-King College	faculty	
Parris	Simmons	Kennedy-King College	student	
Jushelle	Smiter	Kennedy-King College	student	
Latasha	Taylor	Kennedy-King College	student	
Euridice	Oware	Lincoln Park High School	student	poster
JoBeth	D'Agostino	Loyola University		
Cheryl	Jogger	Loyola University	student	poster
David	Slavsky	Loyola University	faculty	
Natasha	Travis	Loyola University	student	podium
Kim	Williamson	Loyola University	faculty	
Akintayo	Adewole	Northwestern University	student	
Emily	Anderson	Northwestern University	student	podium
Javier	Armendariz	Northwestern University	student	
William	Brazelton	Northwestern University	faculty	
Donald	Cantrell	Northwestern University	student	podium
Stephen	Carr	Northwestern University	faculty	
Regina	Charles	Northwestern University	student	
Cheong	Cheng	Northwestern University	student	
Barry	Dabreu	Northwestern University	student	
Karen	Dickens	Northwestern University	student	
Anthony	Duran	Northwestern University	student	
Marla	Dwyer	Northwestern University	faculty	
Elizabeth	Felton	Northwestern University	student	
Lynnette	Galloway	Northwestern University	student	poster
Lance	Hester	Northwestern University	student	
Joe	Holtgrieve	Northwestern University	faculty	
Andrew	Horn	Northwestern University	student	
Paul	Jene	Northwestern University	student	podium
Carolyn	Krulee	Northwestern University	faculty	
Gilbert	Krulee	Northwestern University	faculty	
John	Lindo	Northwestern University	student	
Nycletha	McCarley	Northwestern University	student	
Monique	McRipley	Northwestern University	student	
Domingo	Miranda	Northwestern University	student	
Barbara	Nichols	Northwestern University	student	
Erica	Perry	Northwestern University	student	
Vincent	Rawls	Northwestern University	student	
Timothy	Searles	Northwestern University	student	
Monica	Walker	Northwestern University	student	
Karuna	Warren	Northwestern University	student	podium

Penny Nate	Warren Whitmal	Northwestern University Northwestern University	guest student	
Gide Rashawn Marlon Donica Rida	Collinet Howse Jones Lyles Shahin	Olive-Harvey College Olive-Harvey College Olive-Harvey College Olive-Harvey College Olive-Harvey College	faculty student student student student	
Charlotte	Young	University of Detroit Mercy	student	poster
Jesus Victor John Angela Rodrigo German Anthony Andrew Emeka Sharon Henri Thomas Maria Denise Oscar Nina Beatriz Yolanda Pierre April Jessica Lucila Andrew Domingo Curtis Carlos Angela Mike Donald	Aldana Alvarez Baldwin Brandon Carraminana Cruz Duran Evans Eze Fetzer Gillet Glenn Gonzalez Hayman Hernandez Hike Jamaica Knight LeBreton Lewis Lugo Martinez Martinez Miranda Montgomery Olvera Ortiz Rankin Wink	University of Illinois - Chicago University of Illinois - Chicago	student student faculty student faculty student student student student faculty faculty faculty student faculty student student student faculty student guest student student student student student student student student student student student student student faculty	podium podium poster poster poster
Jaweal Keshar	Lewis Varde	University of Michigan - Dearborn University of Michigan - Dearborn	faculty faculty	
Hanley Jason Paul Omari Carrie Michael Shylynn Samara Dan	Abramson Andrews Ardayfio Cannon Duncan Hogan Lofton McCraney Walz	Wayne State University Wayne State University Wayne State University Wayne State University Wayne State University Wayne State University Wayne State University Wayne State University Wayne State University	guest student student student student student student student student faculty	poster podium podium podium

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