

**ILLINOIS MATHEMATICS AND SCIENCE ACADEMY**  
**"A Pioneering Educational Community"**

**FIFTH ANNUAL IMSA PRESENTATION DAY**

**APRIL 28, 1993**

*Attached abstracts are listed in alphabetical order by last name of first author*

**Lecture Hall**

Session 1	8:30 - 8:50	R. R. DONNELLY AND SONS COMPANY: AN AMERICAN SUCCESS STORY Steve Crutchfield, Matt Groch, Richard T. Lee, George Su
	8:55 - 9:15	STUDIES ON A CORPORATION'S SOFTWARE CODING PRACTICES Scott C. Danielson, Kurt M. Gimbel, Soochon Radee
	9:20 - 9:40	GENETICS AND VIDEO PRODUCTION: THE BLENDING OF SCIENCE AND ART Kevin Fletcher, Kathy Vajda, Brain Thornburg
Session 2	9:45 - 10:05	THE WORLD OF INTERNET Matthew J. Wicks, Frank Rinaldo, Mike Kim, Darshan Mehta
	10:10- 10:30	MICROLANGUAGE CONVERSION IN CAD: PORTING MACROS FROM CADVANCE 4.0 TO CADVANCE 5.0 Eric F. Stuckey, Michael Ososky, Paul Ososky
	10:35 - 10:55	CLARIFYING EVOLUTIONARY RELATIONSHIPS BETWEEN AND WITHIN TWO MAJOR GROUPS OF BASIDIOMYCETOUS FUNGI (MUSHROOMS AND FALSE-TRUFFLES) BY MEANS OF rDNA SEQUENCING Elizabeth M. Pine, Gregory M. Mueller
 <b>A113</b>		
Session 1	8:30 - 8:50	THE OTHER SIDE OF CHICAGO CRIME: AN HISTORICAL ANALYSIS OF SIX KILLERS' IMPACT ON PERCEPTIONS OF CHICAGO CRIME Matt Kimmel
	8:55 - 9:15	APPARENT GRAFT TOLERANCE ENHANCEMENT SHOWN BY THE DRUG EDCI Donald Elmore, Ateet Shah, Roger Melvold
	9:20 - 9:40 .	
Session 2	9:45 - 10:05	MICROMORPHOLOGICAL STUDIES ON <i>Nolina</i> Michelle Kozlik, Danielle McTee, William Hess
	10:10- 10:30	THE ROLE OF INTERFERON IN THE PHENOTYPIC CONSEQUENCES OF TRISOMY 21 (DOWN SYNDROME) Jennifer Ellis, L.E. Maroun
	10:35 - 10:55	SIMULATED BIOLOGICAL INTELLIGENCE AND SEWAGE HYDRAULICS IN EGG-SHAPED DIGESTERS Don Ruehrwein, Alok Khuntia, Dorothy Gray



## A117

### Session 1

8:30 - 8:50

A REPRODUCIBILITY STUDY OF THE USE OF VOLUME-WEIGHTED NUCLEAR VOLUMES FROM POINT SAMPLED LINE INTERCEPTS IN CEREBRAL ASTROCYTIC NEOPLASMS

Marc G. Reyes, Saroja Illangovan,  
Charles W. Saletta, Jr.

8:55 - 9:15

THE EFFECT OF MATERNAL DIABETES ON FETAL GROWTH AND PLACENTAL BLOOD FLOW IN LABORATORY RATS

Samir Bangalore, Frederick L. Lueder,  
Shrikar A. Bangalore

9:20 - 9:40

INTRACELLULAR ADSORPTION OF HERPES SIMPLEX VIRUS TYPE 1

Rachel J. Burrell, Betsy Herold

### Session 2

9:45 - 10:05

STREAMLINING THE PLANT BREEDING PROCESS

Cathy Medich, Cheryl Guss, Kevin Chu

10:10- 10:30

A SEARCH FOR ANTIMALARIALS IN PLANTS USED IN FOLK MEDICINE IN THAILAND

Robert Chapman, Leah Berman

10:35 - 10:55

THE EFFECT OF CHLORATE ON THE ACTIVITY OF NITRATE REDUCTASE

Amy Concannon, John Smarrelli, Barbara Haas

## A149

### Session 1

8:30 - 8:50

GAS CHROMATOGRAPHY STUDIES ON GASOLINE

Tiffany Chiu, Charles E. Cannon

8:55 - 9:15

INVESTIGATION OF A POSSIBLE EFFECT OF HYPERTENSION ON THE SIZE OF GANGLION CELLS IN THE HEARTS OF LABORATORY RATS

Manu Gujrati, Robert D. Wurster

9:20 - 9:40

HOW SCALLOPS SWIM

Monica Jain, Mia Markey, Michael LaBarbera,  
John Thompson

### Session 2

9:45 - 10:05

USING SPECTROGRAMS TO ANALYZE THE BIOACOUSTICS OF ROCKHOPPER PENGUINS (*Eudyptes chrysocome*)

Katy Kobyluk, Amanda Mark, John Thompson,  
James R. Robinett

10:10- 10:30

AMELIORATING EFFECTS OF RHODOTORULIC ACID ON HEAVY-METAL TOXICITY IN THE SMUT FUNGUS *Ustilago violacea*

Sonia Lal, Manfred Ruddat

10:35 - 10:55

CELL ADHESION MOLECULES AS AN EARLY WARNING SIGN FOR CARDIAC TRANSPLANT REJECTION

Apinya Lertratanakul, Tanya Reddick,  
Linda Piccinini, Cathy Ciesielski



## Auditorium

Session 1	8:30 - 8:50	SEXISM IN ROCK-AND-ROLL Joe Prieto, Jeremy Gottlieb
	8:55 - 9:15	BO-WEAVIL BLUES: THE TRANSFORMATION OF THE BLUES AND ITS MIGRATION FROM THE DEEP SOUTH TO CHICAGO Roberta J. Anderson, Amanda C. Kracen, Heath M. McKee, Soniya Shrivastev, Kristen M. Ufferman
	9:20 - 9:40	HAMLET AND OPHELIA: SCENES OF MADNESS Michael Kimmitt, Rachel Kopay, Ellen Tarr
Session 2	9:45 - 10:05	DEATH OF THE OEDIPUS COMPLEX Jocelyn Logan, Gregory Oleksy, Daryl Shorter
	10:10 - 10:30	OPHELIA'S DESCENT INTO MADNESS Beezer Moolji, Stephanie Liang, John T. Dussman
	10:35 - 10:55	HAMLET AND GERTRUDE COP AND HOOKER Rita L. Kingsbury, Amanda C. Kracen, Deborah A. Linksvayer

## Academic Pit

Session 1	8:30 - 8:50	FISHNETS, IMPROV, AND YOU Liv Gjestvang, Paul Sopocy, Jenny Deller, Abby Scott, Danny Barstad, Norman Lee
	8:55 - 9:15	
	9:20 - 9:40	REACH FOR THE STARS: LEO BURNETT COMPANY, INC. Norman Lee
Session 2	9:45 - 10:05	THE EVOLUTION OF FEMALE IMAGES IN AMERICAN COMIC STRIPS Angela Chen, Ann Chen, Nora Chen, Jo Ann Sison
	10:10 - 10:30	THE BIRTH AND SUBSEQUENT DEVELOPMENT OF AMERICAN IMPROVISATIONAL THEATER IN CHICAGO Jenny Deller, Abby Scott, Rachel Kopay, Maggie Lilly
	10:35 - 10:55	A REINTERPRETATION OF FEMINISM/IMSA - AND ELSEWHERE Jenna Dran, Sasha Emmons, Claudia Flores, Janet Hodur, Genevieve Lakier, Andrea Swenson, Melissa Weintraub

## Horwitz Board Room

Session 1	8:30 - 8:50	PEOPLE, PUBLIC POLICY, AND PAUL Ann Chen, Sandra J. Park
	8:55 - 9:15	AN OVERVIEW OF LESSONS LEARNED FROM THE AIR CAMPAIGN OF THE PERSIAN GULF WAR Jim Cunningham
	9:20 - 9:40	GENDER BIAS FELT BY SENIORS AT THE ILLINOIS MATHEMATICS AND SCIENCE ACADEMY Sonia Lal



Session 2	9:45 - 10:05	EVOLUTION AND DEVOLUTION OF MINOAN POTTERY IN RELATION TO INHERENT SOCIETAL FLUX
		S. Michael McCormick, Jacob I. Weber
	10:10- 10:30	ASPECTS OF THEATER IN TOM JONES
		Cheri Read Long
<b>D101</b>		
Session 1	8:30 - 8:50	RESULTS OF KAROTYPIC STUDIES ON SPIDER MONKEYS ( <i>Ateles</i> spp.) IN ZOOS
		Anastasia C. Linas, Jean Dubach
	8:55 - 9:15	WHAT IS THE RELATIONSHIP BETWEEN CALCIUM AND SENILE PLAQUES DURING THE ONSET OF ALZHEIMER'S DISEASE?
		Harith Rajagopalan, Mark Reyes
	9:20 - 9:40	THE DEFENSES OF <i>Silene alba</i> AGAINST THE PARASITIC SMUT FUNGUS <i>Ustilago violacea</i>
		Rebecca A. Reichert, Manfred Ruddat
Session 2	9:45 - 10:05	5% MINOXIDIL STUDY
		Virginia C. Fiedler, Irene Wu
	10:10- 10:30	FURTHER RESULTS OF STUDIES ON SIDEROPHORE-MEDIATED IRON UPTAKE IN THE HETEROBASIDIOMYCETE, <i>Ustilago violacea</i>
		James A. Young, Manfred Ruddat
	10:35 - 10:55	RELATIVE NET SIGNAL RESPONSES FOR RCL SENSORS
		Frank Zaromb, Ali Husain, William, J. Buttner, William R. Penrose, Joseph R. Stetter
<b>D110</b>		
Session 1	8:30 - 8:50	INVESTIGATIONS ON THE BEHAVIOR OF LIGHT-EMITTING DIODES IN SMOKE DETECTORS
		Otmar Princevac, Elise Sivilay, George Schoenfelder
	8:55 - 9:15	QUANTITATIVE AND QUALITATIVE ANALYSIS OF INCLUSIONS IN METEORITES
		Alan Hsu, Steve Simon, Lawrence Grossman, Sigekazu Yoneda
	9:20 - 9:40	SYSTEMIC STATISTIAL ANALYSIS OF DATA FROM LANDFILL MONITORING WELLS
		Shane McCormick, Doug Dorgan
Session 2	9:45 - 10:05	STUDENT SKILLS COMPARED WITH CORPORATE NEEDS
		Paul Strasma, Chris Burke
	10:10- 10:30	ON A POSSIBLE RING SYSTEM FOR PLUTO
		Matthew E. Pritchard, Edward J. Moyer
	10:35 - 10:55	FINDING THE LOST ROAD OF GARFIELD FARM
		April Martin, Jerry Johnson, Eric Pierson

*The 5th Annual Presentation Day is funded in part by a grant from IMCERA Group Inc.*



## **BO-WEAVIL BLUES: THE TRANSFORMATION OF THE BLUES AND ITS MIGRATION FROM THE DEEP SOUTH TO CHICAGO**

**Roberta J. Anderson, 1502 B-13, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6226 (phone)**  
**Amanda C. Kracen, 1502 B-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6225 (phone)**  
**Heather M. McKee, 1507 A-20, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6743 (phone)**  
**Soniya Shrivastev, 1507 A-12, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6717 (phone)**  
**Kristen M. Ufferman, 1502 B-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6225 (phone)**

We present a video in which we outline the history of the Chicago blues—from its roots in the Deep South to the smoky clubs of Chicago today. Our work is based in part on talks we had with blues artists in order to get personal viewpoints. We explain the significance of blues in people's day-to-day lives from the time of the signing of the Emancipation Proclamation to today.

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## **THE EFFECT OF MATERNAL DIABETES ON FETAL GROWTH AND PLACENTAL BLOOD FLOW IN LABORATORY RATS**

**Samir Bangalore, 1503 A-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6306 (phone)**  
**Frederick L. Lueder, Department of Pediatrics, Evanston Hospital, 2650 Ridge Avenue, Evanston, Illinois 60201, U.S.A. 708/570-2033 (phone)**  
**Shrikar A. Bangalore, Department of Pediatrics, Evanston Hospital, 2650 Ridge Avenue, Evanston, Illinois 60201, U.S.A. 708/570-2369 (phone)**

Diabetes during pregnancy is often associated with abnormal fetal growth. Although mild diabetes produces excessive fetal growth, severe diabetes may reduce fetal growth. The reasons for this are not understood but severe diabetes may decrease placental blood flow. To test this hypothesis, we induced varying degrees of diabetes in pregnant laboratory rats through injections of streptozotocin at the time of conception. A control group was injected with a buffer solution. The diabetic rats were grouped according to their plasma glucose concentrations and the results of glucose tolerance tests. They were then assigned to four groups: severe diabetes, diabetes of intermediate severity, mild diabetes, the control group. At the end of gestation, placental blood flow was measured using radiolabelled microspheres and the fetuses were weighed. We found that severe diabetes and diabetes of intermediate severity were associated with significant reductions in placental blood flow and fetal weight. A significant correlation between placental blood flow and fetal weight was also observed.

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## **INTRACELLULAR ADSORPTION OF HERPES SIMPLEX VIRUS TYPE 1**

**Rachel J. Burrell, 1504 D-13, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6411 (phone)**

**Betsy Herold, Department of Pediatric Viral Immunology, Wyler's Children's Hospital, 5841 South Maryland Avenue, Chicago, Illinois 60637 312/702-1000 (phone)**

Heparan sulfate moieties of cell surface proteoglycans serve as receptors for herpes simplex virus adsorption. The purpose of our experiment was to test the ability of soluble heparin to inhibit the infection of monkey kidney cells (vero cells) with HSV-1. The vero cells were infected with one ml of the virus (at concentrations of  $10^{-5}$ ,  $10^{-6}$ , or  $10^{-7}$ ) in addition to dilution strains of the same concentrations with and without heparin in the plaque dishes in duplicate. After HSV-1 penetrated the cells, they were incubated two days in media, then finally fixed and stained for plaque counts. The results of these plaque counts support our hypothesis of soluble heparin inhibiting the infection of HSV-1 into vero cells. Our ongoing research of neomycin has yielded data to suggest the inhibition of the binding of virions to heparan sulfate moieties of cell surface proteoglycans: virions that mediate adsorption of HSV-1 into vero cells.

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## **A SEARCH FOR ANTIMALARIALS IN PLANTS USED IN FOLK MEDICINE IN THAILAND**

**Robert Chapman, Department of Pharmacy, Chicago College of Pharmacy, 555 31st Street, Downers Grove, Illinois 60516, U.S.A. 708/971-6417 (phone)**

**Leah Berman, 1504 A-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6419 (phone)**

We are studying compounds found in certain plants in order to ascertain if they may have antimalarial properties. The six species of plants studied are used in the folk medicine of Thailand to treat malaria. Thus far, we have studied in detail only two of the six plants, *Cyperus rotundus* and *Cassia tora*. The plants were percolated to obtain extracts which were then analyzed by means of liquid column chromatography. The fractions which resulted from these analyses were compared using thin-layer chromatography, and the resulting samples were bioassayed at the University of Illinois-Chicago. Further study is necessary to determine if these plants have any antimalarial properties.

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## **THE EVOLUTION OF FEMALE IMAGES IN AMERICAN COMIC STRIPS**

**Angela Chen, 1502 D-10, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6214 (phone)**

**Ann Chen, 1502 A-23, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6246 (phone)**

**Nora Chen, 1502 A-22, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6245 (phone)**

**Jo Ann Sison, 1502 A-22, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6245 (phone)**

Since their origin in the 1890s, comic strips have reflected the attitudes of society toward women. We examined female images, particularly in comic strips of the Chicago Tribune/New York Daily News Syndicate, from the early 1900s to the present in order to ascertain the relationships between these images and the societal values of the times. By interviewing persons in the comic strip business and by paying special attention to the strips "Brenda Starr" and "Winnie Winkle: The Breadwinner", it was found that female images have not closely mirrored the changes in women's roles. Instead, the majority of comic strips, including contemporary ones, tend to stick to traditional views and have "fallen behind the times." We present a video presentation showcasing various notable comics from the early 1900s to the present and illustrating our findings.

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## **PEOPLE, PUBLIC POLICY, AND PAUL**

**Ann Chen, 1502 A-23, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6246 (phone)**

**Sandra J. Park, 1502 D-11, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6213 (phone)**

The ways in which a given politician deals with the concerns of his or her constituents is fundamental to an understanding of that politician. We have made a study of Senator Paul Simon's functioning in this regard by working as volunteers in his Chicago office—an office which deals specifically with the constituency aspect of politics. Most of the work of Senator Simon's aides deals with helping constituents in matters involving immigration, taxes, and education. As volunteers in his office, we chose to ourselves deal with specific cases involving particular constituents, in addition to experiencing the overall operation of the office. We found that a politician such as Senator Simon will attempt to listen to constituents and can be successful in helping them. Specific cases involving constituents and courses of action taken concerning these cases will be discussed.

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## **GAS CHROMATOGRAPHY STUDIES ON GASOLINE**

**Tiffany Chiu, 1502 A-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6220 (phone)**

**Charles E. Cannon, Science and Mathematics Department, Columbia College, 600 South Michigan Avenue, Chicago, Illinois 60605-1996, U.S.A. 312/663-1600-ext. 396 (phone)**

**We utilized gas chromatography to study the composition of gasoline used in internal combustion engines. Gas chromatography allows one to measure the relative amounts by volume of each compound present in a mixture. A given compound can usually be identified by its retention time at a given temperature, its flow rate, and its chromatography column. The compounds we found will be discussed. This investigation was conducted in order to draw conclusions concerning the nature of various air pollutants produced by burning gasoline in internal combustion engines.**

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## **THE EFFECT OF CHLORATE ON THE ACTIVITY OF NITRATE REDUCTASE**

**Amy Concannon, 1507 D-16, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6708 (phone)**

**John Smarrelli, Biology Department, Loyola University, Chicago, Illinois 60611, U.S.A. 312/274-3000 (phone)**

**Barbara Haas, Biology Department, Loyola University, Chicago, Illinois 60611, U.S.A. 312/761-9406 (phone)**

**Each of three groups of wild type soybean plants was treated with solutions containing simple nutrients along with either chlorate, nitrate, or chlorate plus nitrate. A fourth group of plants, serving as a control, was treated with a solution containing only simple nutrients. Lowry protein tests and enzyme assays were then performed on supernatants of homogenized leaf tissue from each group in order to monitor the effect of chlorate on the activity of nitrate reductase. This enzyme is the first catalyst in the Nitrate Assimilation Pathway, the biochemical pathway by which plants make proteins. The activity of nitrate reductase determines the amount of protein manufactured by a plant, and regulation of nitrate reductase occurs at the genetic level. In soybeans, the enzyme is present in three isoforms, two of which are constitutive and one of which is induced by nitrate. Differing properties (the electron donor utilized and optimum pH) of each enzyme permit the measurement of the activity of each individual isoform. Preliminary results strongly suggest that chlorate decreases the activity of all three isomers.**

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## **R. R. DONNELLY AND SONS COMPANY: AN AMERICAN SUCCESS STORY**

**Steve Crutchfield, 1501 A-23, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6139 (phone)**

**Matt Groch, 1501 B-11, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6122 (phone)**

**Richard T. Lee, 1506 D-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6610 (phone)**

**George Su, 1503 C-25, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6350 (phone)**

The Chicago-based R. R. Donnelley and Sons Company is the world's largest printing company. It prints everything from the Encyclopaedia Britannica to TV Guide. It has over a hundred plants worldwide and employs over 31,000 people. We have discerned various aspects of the company that have helped it grow from its humble beginning in the late 1800s. Informational resources utilized included newspaper articles and archives at R. R. Donnelley's Calumet Plant in Chicago. By means of Supercard, we have put together a computer presentation which includes text, graphs, pictures, and sound.

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## **AN OVERVIEW OF LESSONS LEARNED FROM THE AIR CAMPAIGN OF THE PERSIAN GULF WAR**

**Jim Cunningham, Information Resource Center, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6953 (phone)**

Popular accounts in the media portrayed the air campaign of the Persian Gulf War as a conflict which Coalition air forces won easily. The matter is more complex than early analysis indicated, and the actual outcome of the campaign has profound implications for the structure of future forces and formulation of doctrine and strategy. Lessons from the conflict need to be carefully studied and changes implemented in order to ensure success in future operations, and situation-specific factors need to be recognized as well.

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## **STUDIES ON A CORPORATION'S SOFTWARE CODING PRACTICES**

**Scott C. Danielson, Tools Group, Tellabs Inc., 4951 Indiana Avenue, Lisle, Illinois 60532, U.S.A. 708/969-2121 (phone)**

**Kurt M. Gimbel, 1505 C-13, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6505 (phone)**

**Soochon Radee, 1506 C-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6607 (phone)**

As a software project grows larger, more programmers will need to read and revise the same piece of code. Readability and portability of source code, two measures of its "quality," must meet certain standards in order for a group's work to be efficient and successful. The *Tellabs C Programming Standard* attempts to define cosmetic rules for the company's programmers. We implemented two tools that verified formatting rules involving comments and lexical operators. We ran the tools on code from a project and noted major trends in the violations of the rules. We will discuss these violations, this project's relevance to code quality, and the project in general.

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## **THE BIRTH AND SUBSEQUENT DEVELOPMENT OF AMERICAN IMPROVISATIONAL THEATER IN CHICAGO**

**Jenny Deller, 1507 A-24, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora,  
Illinois 60506-1000, U.S.A. 708/801-6747 (phone)**

**Abby Scott, 1507 A-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora,  
Illinois 60506-1000, U.S.A. 708/801-6720 (phone)**

**Rachel Kopay, 1504 B-24, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora,  
Illinois 60506-1000, U.S.A. 708/801-6451 (phone)**

**Maggie Lilly, 1504 C-20, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora,  
Illinois 60506-1000, U.S.A. 708/801-6430 (phone)**

**We will present a performance to show that improvisational theater can be more than or is more than a form of entertainment. Traditionally, it has been a form of communication concerning social and political issues as expressed through skits. Improvisational theater is a constantly changing art form as a result of its mirroring of a changing society. The boundaries set by a scripted play or comedy act cannot exist in the uncertain twists and turns of improvisation. Improvisation has the spontaneity and mortality of conversation and the public aspect of theater. It is historically important because its birth and continued development in Chicago have resulted in cultural influences which have quite noticeably infiltrated popular Western culture. Although Second City, Saturday Night Live, and other improvisation-based kinds of entertainment are appealing to all classes of people, improvisation has its roots in intellectual America, especially in the University of Chicago.**

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## **A REINTERPRETATION OF FEMINISM/IMSA-AND ELSEWHERE**

**Jenna Dran, 1507 D-24, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora,  
Illinois 60506-1000, U.S.A. 708/801-6738 (phone)**

**Sasha Emmons, 1507 D-16, Illinois Mathematics and Science Academy, 1500 West Sullivan Road,  
Aurora, Illinois 60506-1000, U.S.A. 708/801-6708 (phone)**

**Claudia Flores, 1504 B-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora,  
Illinois 60506-1000, U.S.A. 708/801-6424 (phone)**

**Janet Hodur, 1507 B-25, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora,  
Illinois 60506-1000, U.S.A. 708/801-6750 (phone)**

**Genevieve Lakier, 1507 D-23, Illinois Mathematics and Science Academy, 1500 West Sullivan Road,  
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**Andrea Swenson, Student Services, Illinois Mathematics and Science Academy, 1500 West Sullivan  
Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6715 (phone)**

**Melissa Weintraub, 1504 B-16, Illinois Mathematics and Science Academy, 1500 West Sullivan Road,  
Aurora, Illinois 60506-1000, U.S.A. 708/801-6423 (phone)**

**What is feminism and what part does it play in the lives of the students and faculty at the Illinois Mathematics and Science Academy (IMSA) and in the rest of the world? What is the female voice and how does it, or how should it, affect society? We will read our personal responses to the idea of feminism and of being female at IMSA and in today's society. Also, we will present a dramatic reading of Adrienne Rich—a modern poet and feminist—in order to further explore the idea of a feminist consciousness and a feminist voice. A discussion on these matters will follow our presentation.**

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## **THE ROLE OF INTERFERON IN THE PHENOTYPIC CONSEQUENCES OF TRISOMY 21 (DOWN SYNDROME)\***

Jennifer Ellis, 1502 D-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6209 (phone)

L. E. Maroun, Department of Medical Microbiology/Immunology, Southern Illinois University School of Medicine, P.O. Box 19230, Springfield, Illinois 62794-9230, U.S.A. 217/785-2181 (phone), 217/524-3227 (FAX)

The role of interferon, a protein produced in response to a virus, in the aggravation of the phenotypic characteristics associated with Trisomy 21 (Down Syndrome) was studied using the mouse Trisomy 16 model. Individuals with Human Trisomy 21 are known to be extra sensitive to interferon due to genes on Human Chromosome 21 coding for the receptors to interferon. It is possible that this extra sensitivity to interferon may induce the phenotypic characteristics associated with Trisomy 21. To study this possibility, pregnant mice were given IP injections of anti-interferon antibodies, lowering the level of interferon. The control group received IP injections of similar but non-specific IgG. On day 17 of pregnancy, a Caesarian section was performed. Preliminary data suggested that the phenotypic characteristics of Trisomy 16 (growth retardation, delayed eye closure, and neck edema present in the control embryos) were moderated in the embryos from anti-interferon treated mothers.

\* Sponsored by American Heart Association, Illinois Division

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## **APPARENT GRAFT TOLERANCE ENHANCEMENT SHOWN BY THE DRUG EDCI**

Donald Elmore, 1501 B-10, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6120 (phone)

Ateet Shah, 1506 D-22, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6640 (phone)

Roger Melvold, Microbiology/Immunology Department, Tarry Building 6-733, Northwestern University Medical School, 303 Superior Road, Chicago, Illinois 60611, U.S.A. 312/503-4105 (phone)

We studied the effects of 1 ethyl 3 [3' dimethyl animopropyl] carbodiimide (EDCI) on skin graft acceptance in mice of various strains (B6, B10, and BALB). Immune system cells were taken from the spleens of additional mice of the B6 strain—some recipients of grafts received no spleen cells, some received B6 spleen cells not incubated in EDCI, and some received B6 spleen cells which had been incubated in EDCI. Each mouse in each group then received three grafts from the three different strains described above, and the tolerance-enhancing effect of EDCI was evaluated by the length of the graft rejection periods. The data show that EDCI has some promise as a tolerance-enhancing drug. The results of similar studies done by others in our lab, possible future studies of the drug, and some of the implications of our work thus far will be discussed.

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## **5% MINOXIDIL STUDY**

**Virginia C. Fiedler, Department of Dermatology, Clinical Research Unit, University of Illinois-Chicago, Chicago, Illinois 60612, U.S.A. 312/413-7783 (phone)**

**Irene Wu, 1507 A-26, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6749 (phone)**

**In this 32-week study, we investigated the histological responses of 61 individuals with androgenetic alopecia treated with 5% topical minoxidil. We sought to ascertain the specific parameters that would predict patient response to treatment with minoxidil. Clinical data and scalp biopsy data were correlated and analyzed statistically in order to isolate minoxidil's effects on hair follicles. In order to more accurately assess patient response, we used computer-aided quantification of scalp hair. Our discussion will include the effects of minoxidil on hair follicles as well as the effects of placebo solutions on inducing hair growth.**

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## **GENETICS AND VIDEO PRODUCTION: THE BLENDING OF SCIENCE AND ART**

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**Kathy Vajda, 1507 B-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6725 (phone)**

**Brian Thornburg, Toyota Video Production Laboratory, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6978 (phone)**

**We spent five months familiarizing ourselves with various procedures at Cargill Hybrid Seed Company in Aurora, Illinois. We then used the information and knowledge we had acquired to produce a promotional/educational video for Cargill. Among other things we have learned about producing promotional videos in the importance of allowing sufficient time for editing. This matter and others will be dealt with in our presentation.**

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## **FISHNETS, IMPROV, AND YOU**

**Liv Gjestvang, 1504 B-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6424 (phone)**  
**Paul Sopocy, 1506 B-22, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6653 (phone)**  
**Jenny Deller, 1507 A-24, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6747 (phone)**  
**Abby Scott, 1507 A-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6720 (phone)**  
**Danny Barstad, 1504 C-26, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6436 (phone)**  
**Norman Lee, 1506 A-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6620 (phone)**

Our group is comprised of six people who have formed compatible and trusting stage relationships. We knew that this would be valuable in experimenting with something as new and as difficult as improvisational theater. In the course of our rehearsals, we found this to be true. Performers must realize the importance of "conductivity" between the players in an improv group. If just one person comes to practice with a low energy or concentration level, it affects the whole group's performance. Improvisational performances are rarely individual. It is through the mutual support and unique communication in the group of players that produces successful improvisations. To illustrate our presentation, we present various improvisational techniques. Audience participation and interaction are incorporated in the routine.

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## **INVESTIGATION OF A POSSIBLE EFFECT OF HYPERTENSION ON THE SIZE OF GANGLION CELLS IN THE HEARTS OF LABORATORY RATS**

**Manu Gujrati, 1503 A-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6307 (phone)**  
**Robert D. Wurster, Department of Physiology, Loyola University Medical Center, 2160 South First Avenue, Maywood, Illinois 60153, U.S.A. 708/216-3340 (phone)**

Hypertension often leads to hypertrophy of the heart. We hypothesized that, concomitant with hypertrophy of the muscle, there would be enlargement of nerve ganglion cells in the heart. We studied the cardiac ganglion cells of a group of normotensive (Wistar-Kyoto or WKY strain) rats and a group of Spontaneously Hypertensive Rats (SHR) in order to determine if the latter group would display larger nerve cells than those of the other group. Tissues were histologically prepared, examined under the microscope, and cells were measured. Analysis of data from six individuals showed that the mean size of cells from hypertensive animals was less than that of the normotensive animals. This result was the opposite of what our hypothesis would predict. Physiological background and methods will be discussed, as well as potential sources of error. In addition, we will discuss other areas which may need to be studied in the future.

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## QUANTITATIVE AND QUALITATIVE ANALYSIS OF INCLUSIONS IN METEORITES

Alan Hsu, 1505 A-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6506 (phone)

Steve Simon, Department of Geophysical Sciences, The University of Chicago, 5734 South Ellis Avenue, Chicago, Illinois 60637, U.S.A. 312/702-8131 (phone)

Lawrence Grossman, Department of Geophysical Sciences, The University of Chicago, 5734 South Ellis Avenue, Chicago, Illinois 60637, U.S.A. 312/702-8131 (phone)

Shigekazu Yoneda, Department of Geophysical Sciences, The University of Chicago, 5734 South Ellis Avenue, Chicago, Illinois 60637, U.S.A. 312/702-8131 (phone)

Based on the present chemical composition of the sun, we know the composition of the gas cloud from which the planets and the sun formed. Various predictions have been made as to what minerals would condense, and in what order, upon cooling of such a cloud. We studied two meteorites that contain inclusions of some of the first minerals expected to form from a gas of solar composition. These fragile inclusions were carefully separated from and recovered from the materials making up the remainder of a meteorite by means of a "freeze-thaw" technique which gently disaggregated the sample, by means of heavy liquid separation, and by hand-picking under a microscope. The inclusions were then mounted on slides and examined with a scanning electron microscope. Because minerals with higher average atomic weights are more efficient in bouncing back electrons from the electron beam produced by the microscope, they appear paler on the screen than those of less weight—making it possible to examine the inclusions at high magnification. Studies of these inclusions are taking us one step further in understanding the origins of the solar system.

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## HOW SCALLOPS SWIM

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Mia Markey, 1504 A-13, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6418 (phone)

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John Thompson, Integrated Science Team, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6050 (phone)

We are investigating the biomechanics of movement in scallops. Scallops swim by "clapping" their shells. In order to ascertain the clap frequency for different species, we are filming various scallops as they swim. We are now generating data by analyzing and digitizing the film. In finding clap frequency, we follow, frame by frame, specific points on the hinge, on the right valve tip, and on the left valve tip. Then, by digitizing these points and determining a point at which a clap is in progress, claps per second is found. The number of trials that we film and the usefulness of each film determine the number of data points that we may accumulate. Our next step will be to measure swimming speed and initial angle from these films. All these data will be cross-indexed with the weight of the animal, length of the shell, umbonal angle, and the species, in order to see how these variables affect the biomechanics.

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## **THE OTHER SIDE OF CHICAGO CRIME: AN HISTORICAL ANALYSIS OF SIX KILLERS' IMPACT ON PERCEPTIONS OF CHICAGO CRIME**

**Matt Kimmel, 1501 C-13, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6116 (phone)**

I performed psychological analyses and comparisons of six killers and then examined the perceptions of the public in regard to these six. The killers were Herbert Webster Mudgett, Richard Leopold, Nathan Loeb, William Heirens, Richard Speck, and John Wayne Gacy. Their crimes were examined separately and then compared in an effort to discern similarities between the criminals themselves. The results of these comparisons were then studied in the light of the hypothesis that these individuals are not recognized as a part of the Chicago crime scene as the Mafia generally is. Possible reasons for this will be discussed, as well as its implications.

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## **HAMLET AND OPHELIA: SCENES OF MADNESS**

**Michael Kimmitt, 1501 C-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6115 (phone)**

**Rachel Kopay, 1504 B-24, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6451 (phone)**

**Ellen Tarr, 1507 A-11, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6716 (phone)**

By means of performing several pieces of the play, we show the changing relationship between Hamlet and Ophelia. Our performance relies as much on what is not actually depicted in the play as on what is. That is, we act out "scenes" which figure in the original play merely as described "offstage" events. The first "scene" (described by Ophelia in Act II, scene one) takes place in Ophelia's room. We chose to act out this scene instead of merely reading Ophelia's description of it because we wished to emphasize the physical interaction between the characters. The scene is accompanied by Depeche Mode's *Pimph* so as to add to the tension. The next two scenes (Act III, scenes one and two) show how Hamlet's behavior confuses Ophelia and how this leads to her insanity. The next scene (Act IV, scene five) shows the effects of Hamlet's behavior as manifested in Ophelia's madness, and the final graveyard scene (Act V, scene one) shows Hamlet's reaction to Ophelia's fate.

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## **HAMLET AND GERTRUDE COP AND HOOKER**

**Rita L. Kingsbury, 1502 B-13, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6226 (phone)**

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**Deborah A. Linksvayer, 1502 C-24, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6234 (phone)**

In our interpretation of portions of Shakespeare's *Hamlet*, we are attempting to show the relationship between Gertrude and Hamlet in contemporary urban terms. Our performance depicts the change in Hamlet's feelings for his mother. We see these feelings change from acceptance to disregard to disgust. We chose to portray Gertrude as a hooker in order to symbolize her loose and pernicious lifestyle. As in the play, she dies as a result of defective morality—only this time of a modern-day poison. We chose to treat Hamlet as a police officer because throughout the play Hamlet acted as both accuser and judge of Gertrude. His many attempts to warn her fall on deaf ears and because she does not listen, she dies.

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**USING SPECTROGRAMS TO ANALYZE THE BIOACOUSTICS OF ROCKHOPPER PENGUINS**  
(*Eudyptes chrysocome*)

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James R. Robinett, Marine Mammal Department, John G. Shedd Aquarium, 1200 South Lake Shore Drive, Chicago, Illinois 60605, U.S.A. 312-939-2426 (phone)

We are attempting to determine if there are definite recognizable patterns in Rockhopper Penguin vocalization. By patterns, we mean *syllables*, *phrases*, and *sequences*, as the terms are used and understood by students of animal vocalizations. We are also attempting to determine whether individual birds can be recognized by their vocalizations. To this end, we have been working with captive Rockhoppers, observing and recording them at Shedd Aquarium. In particular, we have been studying graphic representation of call frequency, amplitude, intensity, and duration by means of *Canary*, the *Cornell Bioacoustics Work Station* software. Also by means of *Canary*, we will analyze the recordings and compare them to pre-recorded tapes (Rockhopper Penguins, Library of Natural Sounds, Cornell Laboratory of Ornithology) for call characteristics.

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**MICROMORPHOLOGICAL STUDIES ON *Nolina***

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William Hess, Morton Arboretum, Route 53, Lisle, Illinois 60532, U.S.A. 708/719-2425 (phone)

As a part of the Flora North America Project, selected species of *Nolina* ("beargrasses") found north of México were examined for micromorphological characteristics. Cross sections were made of dried *Nolina* plants and then these sections were mounted on studs and sputter-coated. The leaves were examined by SEM for such surface features as waxy cuticle, "trenches", and serrate margins. The leaves of the different species were found to be relatively uniform and to have a thick cuticular wax. In some species, there was evidence of epicuticular flaking. In *N. georgiana*, we discovered laminar crypts, a feature previously unknown in *Nolina*.

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## **GENDER BIAS FELT BY SENIORS AT THE ILLINOIS MATHEMATICS AND SCIENCE ACADEMY**

Sonia Lal, 1502 D-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6210 (phone)

I gave a survey on gender equity to members of the Class of '93 at the Illinois Mathematics and Science Academy (IMSA). Half of the questionnaires were returned with answers. The survey asked questions about personal experiences the students might have had with gender discrimination at IMSA. The questions covered discrimination on the part of teachers in classrooms and by peers and dealt with stereotypical gender roles, stereotypical views concerning ability in science and mathematics, and stereotypical views concerning general intelligence. The results show significant differences in the responses of male and female students and support the view that gender bias is present in IMSA's classrooms. Analysis of various questions from the survey, anecdotes concerning gender bias at IMSA, and possible reasons for and solutions to the problem will be discussed.

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## **AMELIORATING EFFECTS OF RHODOTORULIC ACID ON HEAVY-METAL TOXICITY IN THE SMUT FUNGUS *Ustilago violacea***

Sonia Lal, 1502 D-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6210 (phone)  
Manfred Ruddat, Department of Ecology and Evolution, University of Chicago, Chicago, Illinois 60637, U.S.A. 312/702-8796 (phone)

The fungus *Ustilago violacea*, the anther smut, is a plant pathogen which releases rhodotorulic acid (RA), an iron-specific molecule, in order to scavenge iron under low-iron conditions and bring it to the cell membrane. We are investigating the effect of RA on the toxicity of metals to *U. violacea*. Our work has shown that 2mM cupric chloride, 8mM zinc chloride, and 12mM chromium potassium sulfate are concentrations of heavy metals that reduce cell density of the anther smut fungus under experimental conditions. The cells show the effects of toxicity and recovery from toxicity depending on their stage of growth. We have also discovered that RA can significantly ameliorate the toxic effect of the heavy metals copper, zinc, and chromium on the fungus cells. This may be owing to the RA binding the metals and thus reducing the number of potentially toxic metal ions. Our results suggest that it may be possible to partially protect *U. violacea*'s host plant (*Silene alba*) from the toxic effects of heavy metals by introducing into its tissues mutant fungi that overproduce RA.

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## **REACH FOR THE STARS: LEO BURNETT COMPANY, INC.**

Norman Lee, 1506 A-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6620 (phone)

I perform a dramatic presentation depicting the advertising philosophy and influence of Leo Burnett, founder of Leo Burnett Company, Inc. This advertising agency, based in Chicago, helped form the Chicago school of advertising and the soft-sell approach. This once very small company revitalized and rejuvenated advertising during the 1950s and now grosses over \$2.1 billion in U.S. billings, turning out fresh and creative ads each year. Leo Burnett's somewhat "down-home" style, based on Midwestern values and without the flash and glitz of many New York agencies, is responsible for the company's success.

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## CELL ADHESION MOLECULES AS AN EARLY WARNING SIGN FOR CARDIAC TRANSPLANT REJECTION

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Linda Piccinini, Department of Medicine, Loyola University Medical Center, Maywood, Illinois 60153, U.S.A. 708/216-6414 (phone)

Cathy Ciesielski, Department of Medicine, Loyola University Medical Center, Maywood, Illinois 60153, U.S.A. 708/216-6414 (phone)

Cytokines are local regulatory factors that affect cell activity and may be good indicators of organ transplant rejection. Cytokines have been shown to regulate the production of cell adhesion molecules which control leukocyte migration during immune responses. We are currently investigating the levels of the cell adhesion molecules LFA-1 and ICAM-1 in Brown-Norway to Lewis rat allograft *vs.* Lewis to Lewis rat isograft transplants. Using immunohistochemical techniques, we are monitoring levels of these cell adhesion molecules during the first eight post-transplant days, at the end of which time allograft rejection is complete. We hope to be able to monitor transplant status by using these molecular markers as a means of detecting rejection as early as possible post-transplant.

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## RESULTS OF KAROTYPIC STUDIES ON SPIDER MONKEYS (*Ateles* spp.) IN ZOOS

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Jean Dubach, Department of Conservation Biology, Brookfield Zoo, 3300 Golf Road, Brookfield, Illinois 60513, U.S.A. 708/485-2912-ex. 512 (phone)

Correct identification of zoo animals is crucial to successful breeding programs and the maintenance of pure non-hybrid lines of various species and subspecies. In the past, identifications have been based on morphological characteristics and (frequently unreliable) information on the geographical provenance of originally wild-caught individuals. We are finding that karyotyping zoo animals can be quite useful in making correct taxonomic determinations. We used karyology to check the identifications that had previously been made of thirteen monkeys of the genus *Ateles* and housed at four zoos and at the Lube Foundation Primate Preserve. Kunkel, Heltne, and Borgaonkar's published work of 1980 was used as our authority for the expected karyotypes of taxa of *Ateles*. Karyotypes were determined based on blood samples drawn from the thirteen monkeys. Our findings supported the prior determinations of six individuals identified as *Ateles geoffroyi* ssp., two monkeys identified as *Ateles fusciceps robustus*, two as *Ateles belzebuth hybridus*, one as *Ateles paniscus chamek*. An individual previously identified as *Ateles belzebuth hybridus*, however, was identified by us as an *Ateles belzebuth belzebuth* and another which had been called an *Ateles geoffroyi* ssp. was determined by us to be a hybrid between *Ateles geoffroyi* ssp. and *Ateles fusciceps robustus*.

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## DEATH OF THE OEDIPUS COMPLEX

Jocelyn Logan, 1502 C-26, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6236 (phone)

Gregory Oleksy, 1501 D-24, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6133 (phone)

Daryl Shorter, 1501 A-15, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6107 (phone)

We present a performance of excerpts from *Hamlet* in order to focus on the somewhat abnormal mother-son relationship between Gertrude and Hamlet. One can think of our title as suggesting two deaths: (1) the actual death of the Oedipus complex itself that occurs when Hamlet dies, and (2) the death of Claudius, which is the death brought about by the Oedipus complex. The latter is the central point that we wish to make in our performance—that the Oedipus complex, not the testimony of the ghost, causes Hamlet to finally kill Claudius.

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## ASPECTS OF THEATER IN *TOM JONES*

Cheri Read Long, English Team, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6020 (phone)

Henry Fielding wrote *Tom Jones* shortly after his works had been banned, for political reasons, from the London theater. I therefore thought it worthwhile to explore similarities between this novel and his plays, to examine the entire work with an eye for dramatic influence, and to analyze its mud-slinging scene as if it were a short play. I concluded that the novel displays a wealth of influences from drama and, in this way, foreruns the subsequent English novel.

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## FINDING THE LOST ROAD OF GARFIELD FARM

April Martin, 1507 C-26, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6736 (phone)

Jerry Johnson, Garfield Historical Farms, 3N016 Garfield Road, LaFox, Illinois 60000, U.S.A. 708/584-8485 (phone)

Eric Pierson, 1501 B-24, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6146 (phone)

We have reconstructed the route of the Sycamore-Chicago road across the Garfield Farm site near St. Charles, Illinois. This road served as a main trade route for farmers taking their crops to market. This route made it possible for considerable income to come to the farm through innkeeping. Our studies began with studies of aerial photographs and of early surveyors' records. The next step was to convert all of the measurements into modern English units. After this, we transcribed the surveyors' notes onto a computer. Finally we drew the old route on modern maps of the farm. Plans now exist for markers to be installed along the old route and for possible archaeological exploration.

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## **SYSTEMIC STATISTICAL ANALYSIS OF DATA FROM LANDFILL MONITORING WELLS**

**Shane McCormick, 1503 B-25, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6347 (phone)**  
**Doug Dorgan, Eldredge Engineering Associates, Inc., 1601 Bond, Naperville, Illinois 60563, U.S.A. 708/369-2901 (phone)**

The State of Illinois is now requesting that supervising engineering firms provide a basic statistical scheme for analyzing landfill monitoring data on landfills for which they are responsible. We are developing a visual and descriptive scheme of this sort in the form of a large flowchart and associated guide for use by employees of such a firm. The statistical methods used (Aitchison's and Cohen's adjustments, probability plots, ANOVA, parametric and non-parametric prediction limits, etc.) will be discussed and an explanation given of basic landfill monitoring procedures.

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## **EVOLUTION AND DEVOLUTION OF MINOAN POTTERY IN RELATION TO INHERENT SOCIETAL FLUX**

**S. Michael McCormick, 1503 B-25, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6347 (phone)**  
**Jacob I. Weber, 1506 D-21, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6641 (phone)**

In order to illustrate the evolution and devolution of the Minoan civilization, we have studied and replicated various examples of its pottery. We examine and define changes in the societal structure through correlation between the state of the society at different times and the quality of its contemporaneous pottery. We intend to not only portray the history of this civilization, but to also elaborate an integrative process linking art with archeology and reconstructive history.

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## **STREAMLINING THE PLANT BREEDING PROCESS**

**Cathy Medich, Tissue Culture Department, Cargill Hybrid Seed, 2600 West Galena Boulevard, Aurora, Illinois 60506, U.S.A. 708/892-4331 (phone)**  
**Cheryl Guss, Tissue Culture Department, Cargill Hybrid Seed, 2600 West Galena Boulevard, Aurora, Illinois 60506, U.S.A. 708/892-4331 (phone)**  
**Kevin Chu, 1506 D-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6610 (phone)**

Using embryo rescue techniques, we prematurely removed embryos from several hundred corn seeds. These embryos were then placed on growing media containing various concentrations of several different herbicides. Using isozyme analysis, we then tested the surviving plants for genetic similarity to parental lines. Those showing such similarity were further tested using RAPDs techniques, and then selected plants were sent to breeders to be used in the development of new lines. The efficiency of using such a biotechnological procedure is superior to that of traditional methods of plant breeding and we will show how its various components streamline the developing of new plant lines.

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## OPHELIA'S DESCENT INTO MADNESS

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By means of a dramatic montage of scenes taken from the play, we will illustrate the disintegration of Ophelia in Shakespeare's Hamlet. We perceive stages in Ophelia's transition from sanity to the madness which ultimately leads to her death, and will attempt to make this perceptible to the audience. We will also illustrate several of the causes for Ophelia's madness, including Hamlet's rejection of her and the murder of her father.

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## CLARIFYING EVOLUTIONARY RELATIONSHIPS BETWEEN AND WITHIN TWO MAJOR GROUPS OF BASIDIOMYCETOUS FUNGI (MUSHROOMS AND FALSE-TRUFFLES) BY MEANS OF rDNA SEQUENCING

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Gregory M. Mueller, Department of Botany, Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, Illinois 60605-2496, U.S.A. 312/922-9410-ext. 319 (phone)

Sequence data from the ITS of the ribosomal DNA were used to assess evolutionary relationships between and within two groups of basidiomycetous fungi: mushroom and false-truffles. Vastly different classifications for these fungi have been proposed due to conflicting interpretations of the relative importance of various morphological characters. For example, *Hydnangium*, *Laccaria*, and *Podohydangium* share a unique overall basidiospore morphology and ultrastructure, but differ dramatically in gross morphology and in some other micromorphological features. Some authors classify *Hydnangium* and *Podohydangium* in the Tricholomataceae with *Laccaria*, while others classify them in the Gastromycetes with other false-truffles. DNA sequences were obtained from representatives of three mushroom genera (*Laccaria*, *Collybia*, and *Tricholoma*) and four genera of false-truffles (*Hydnangium*, *Podohydangium*, *Octavianina*, and *Sclerogaster*). Analyses of these data indicate that *Hydnangium* and *Podohydangium* are sister taxa to *Laccaria* and are not closely related to other false-truffles. These findings are consistent with the hypothesis that basidiospore morphology evolves more slowly than macromorphological characters do in Agaricales and Gastromycetes, and therefore may be a better indicator of evolutionary relationships within these groups.

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## **SEXISM IN ROCK-AND-ROLL**

**Joe Prieto, College Counseling/Career Development, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6501 (phone)**

**Jeremy Gottlieb, 1505 A-20, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6543 (phone)**

**Rock plays a large role in American popular culture and it sends out definite messages about and to our society. We examined lyrics; album covers; videos, movies, and other media in which rock is presented; and we searched for and found the roots of one of those messages—sexism.**

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## **INVESTIGATIONS ON THE BEHAVIOR OF LIGHT-EMITTING DIODES IN SMOKE DETECTORS**

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**George Schoenfelder, Research Department, Pittway Systems Technologies, West Chicago, Illinois 60185, U.S.A. 708/876-0100 (phone)**

**Photoelectric smoke detectors use a light-emitting diode (LED) as a light source. The LED shines infrared light into a small chamber in the smoke detector. If the light scatters due to smoke, the sensor in the chamber detects the change in the light intensity and triggers the alarm. We investigated the inconsistencies of LED light intensity in the smoke detector. Initially, the image of an LED light beam shone on a wall was recorded with a camcorder. Using a RS170 jack as an interface, the camcorder's information of the light beam was transferred into the computer. We then created a program which, used with other programs, transferred the image information into a graphing program in order to create a 3-D graph of light intensity with respect to position of the sensor on the beam. By analyzing the 3-D graphs created through image procession, we could set standards upon which to distinguish a good LED from a bad LED. This will help correlate LED to smoke detector sensitivity.**

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## ON A POSSIBLE RING SYSTEM FOR PLUTO

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Using sublimation and thermal escape of methane as a source mechanism, we determined the total mass of  $\text{CH}_4$  molecules that would orbit within the limits which we have defined for a ring around Pluto. We found that escape mechanisms from the orbit, such as photodissociation and radiation pressure drag, would not contribute significantly to the loss of molecules from such a ring. Consequently, collisions among the molecules with various orbital inclinations would reduce the inclination to zero in the lifetime of the molecules as limited by radiation pressure drag. This would produce an equatorial ring with a mass on the order of  $10^9$  kg and with an optical depth on the order of  $10^2$ . A plutonian ring with our calculated values should be *significant*, which we define as sufficiently dense to be observed spectroscopically. We have developed an as yet untried protocol for attempts to observe such a ring. Other areas that merit further investigation are: the effects on dampening time which would result from the more elastic molecular collisions as opposed to those which would take place between rocky particles, whether the temperature and pressure would allow the molecules to condense into methane ice particles, whether the effect of radiation pressure drag would be less in the case of molecules as opposed to rocky particles, and using interaction with solar radiation reflected from Pluto itself in attempts to ascertain the presence of a ring.

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## WHAT IS THE RELATIONSHIP BETWEEN CALCIUM AND SENILE PLAQUES DURING THE ONSET OF ALZHEIMER'S DISEASE?

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Senile plaques in the hippocampus are characteristic of the onset of Alzheimer's disease. There are two types of these plaques, diffuse plaques (which also commonly occur in elderly, non-Alzheimer's humans), and neuritic plaques, uncommon in elderly people without Alzheimer's but found in advanced stages of Alzheimer's. At Cook County Hospital in the past three years, there have been two cases noted of calcification occurring inside these neuritic plaques. This condition is one which has not been documented in any journal. One explanation for the condition would be that deficiencies in calcium-activated proteases cause this calcium build-up. Another possibility is that because calcium is known to rebuild synapses in the brain, Alzheimer's could somehow keep the calcium from performing this function but the calcium nonetheless accumulates. Additional study must take place before we can begin to choose between explanations.

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## **THE DEFENSES OF *Silene alba* AGAINST THE PARASITIC SMUT FUNGUS *Ustilago violacea***

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Infection of *Silene alba* by the smut fungus *Ustilago violacea* results in the production and release of pathogenesis-related proteins (PRPs) by the host plant. These PRPs,  $\beta$ -endoglucanase and chitinase, accumulate in the intercellular spaces and may be the agents of pathogen resistance in *S. alba*. Certain strains of *S. alba* show a partial resistance to *U. violacea*, while others are completely susceptible to the fungus. We seek to determine if elevation in the activity of  $\beta$ -endoglucanase and in chitinase is responsible for the resistance of the resistant strains. Our gel electrophoretic analyses show that the resistant strains contain a greater variety of isozymes of chitinase and  $\beta$ -endoglucanase than the smutted susceptible plants, and this is in accordance with our hypothesis.

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## **A REPRODUCIBILITY STUDY OF THE USE OF VOLUME-WEIGHTED NUCLEAR VOLUMES FROM POINT SAMPLED LINE INTERCEPTS IN CEREBRAL ASTROCYTIC NEOPLASMS**

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We studied three grades of cerebral neoplasms: astrocytoma, anaplastic astrocytoma, and glioblastoma multiforme. Sections of neoplasms were taken from biopsies and viewed under a microscope. We measured the nuclei of these neoplasms by using the unbiased technique of point sampled line intercepts. We then calculated the mean nuclear volume of each case studied. Preliminary research by Reyes and Illangovan had shown that there is a correlation between the calculated volume of the nuclei and the malignancy of the neoplasm. In the present experiment, we are setting out to determine the level of reproducibility of the previous experiment by having four researchers measure the same cases and comparing the results.

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## **SIMULATED BIOLOGICAL INTELLIGENCE AND SEWAGE HYDRAULICS IN EGG-SHAPED DIGESTERS**

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We are attempting to understand the general hydraulics of egg-shaped digesters. An egg-shaped digester is a sewage treatment device which mixes its contents (sewage) in order to facilitate disposal of the material. Concerning its hydraulics, one of us (Ruehrwein) has developed a complicated experimentally-derived equation which can be used in attempting to determine the head loss, but the results are inaccurate and computation is difficult. The only accurate way to ascertain head loss in an egg-shaped digester constructed to new specifications is to measure it in an actual experiment, but that takes time and money. There should be an equation to solve for all relevant variables, but no one has yet developed it. We are comparing results we have gotten through use of a neural network (computer software that simulates biological intelligence) with those we have gotten by using the experimentally-derived equation and the conclusions we have reached will be discussed.

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## **STUDENT SKILLS COMPARED WITH CORPORATE NEEDS**

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The current public school system produces graduates suited to an archaic business world. They require directions, work alone, and have a narrow view of their role. The modern corporation, as exemplified by Motorola Inc.'s Cellular Division, requires workers who are self-motivated, team-oriented, and who understand the "big picture". We will discuss these modern corporate needs along with current programs designed to promote them. We will also present suggestions to students who wish to acquire these traits.

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## **MICROLANGUAGE CONVERSION IN CAD: PORTING MACROS FROM CADVANCE 4.0 TO CADVANCE 5.0**

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**Michael Ososky, Applied Computer Technology, Inc., 69 South LaSalle Street, Aurora, Illinois 60505, U.S.A. 708/896-2281 (phone)**

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Computer assisted design (CAD) programs have become popular in the past few years. New programs use the same ideas as the old programs, but often these new programs can't use the sub-programs, called macros, that were built for the older programs. These macros do necessary operations that can't be done by the base program. We are engaged in porting, or changing the language, of some of these macros from Cadvance 4.0 to Cadvance 5.0. This is being accomplished by analyzing the old macros, which are in the Cadvance 4.0 macro language, and reconstructing them in Softbridge Basic, used by Cadvance 5.0. Further details concerning this process will be outlined in our presentation.

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## **THE WORLD OF INTERNET**

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Internet is now a resource that is growing at an astounding rate. One may now communicate with and relay information to places all around the world. However, in order to search through the network, it has become necessary to develop various software. We have sought to find and learn to use such programs that would facilitate our journey through the Internet. Programs we found include Archie and Gopher and we will discuss the function and the versatility of these programs.

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## **FURTHER RESULTS OF STUDIES ON SIDEROPHORE-MEDIATED IRON UPTAKE IN THE HETEROBASIDIOMYCETE, *Ustilago violacea***

**James A. Young II, 1501 A-14, Illinois Mathematics and Science Academy, 1500 West Sullivan Road, Aurora, Illinois 60506-1000, U.S.A. 708/801-6145 (phone)**

**Manfred Ruddat, Department of Ecology and Evolution, University of Chicago, Chicago, Illinois 60627, U.S.A. 312/702-8796 (phone)**

Siderophores are specialized molecules secreted by microorganisms in order to facilitate the uptake of iron in iron-poor environments. *Ustilago violacea* is a smut fungus that utilizes the siderophore rhodotorulic acid. We utilized two strains of *U. violacea*, the wild type, 1 C425+ , and a constitutive mutant, H3. Each of the two strains was cultured under two extreme conditions, low ambient iron levels and high ambient iron levels. Data derived from assays of iron-siderophore levels and using a spectrophotometer set to 480 nanometers indicate that when the ambient iron concentration is low, fungus cells which had been grown under conditions of low iron concentration use a complex passive/active transport system, perhaps owing to the overefficiency of the siderophores. The fungus cells that had been grown under conditions of high iron concentrations brought about wild fluctuations in ambient iron-siderophore levels that we have not been able to explain. These results do not agree with our prediction that there would be a gradual decrease in ambient iron concentration in the presence of cells that had been grown in iron-poor media, and no fluctuations in the case of those grown in the iron-rich media.

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### **RELATIVE NET SIGNAL RESPONSES FOR RCL SENSORS**

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**William J. Buttner, Transducer Research, Incorporated, 999 Chicago Avenue, Naperville, Illinois 60540, U.S.A. 708/357-0004 (phone)**

**William R. Penrose, Transducer Research, Incorporated, 999 Chicago Avenue, Naperville, Illinois 60540, U.S.A. 708/357-0004 (phone)**

**Joseph R. Stetter, Transducer Research, Incorporated, 999 Chicago Avenue, Naperville, Illinois 60540, U.S.A. 708/357-0004 (phone)**

We exposed four similarly manufactured "RCL" chemical sensors (developed by Transducer Research, Inc.) to various concentrations (0.5, 5, 10, 20 ppm) of chlorinated hydrocarbons in order to test the changing signal responses (amps) during the exposures over time. The sensor showing net signal changes with the least amount of response noise, combined with the greatest response strength, was selected to acquire data on relative responses with other chlorinated organic vapors. The graph which resulted showed that the higher numerically substituted chlorinated hydrocarbons showed higher net signals with respect to changes in R-Cl concentrations. The results of this experiment may help determine whether the sensor operates through a semi-conducting or an electrochemical mechanism. Possible applications of the RCL sensor will be discussed in conjunction with its background and environmental importance.

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**The Illinois Mathematics and Science Academy**  
**A Pioneering Educational Community**

**Office of Academic Programs**  
**Marcelline A. Barron, Director**

**TO: ALL RESIDENT COUNSELORS**  
**STUDENT SERVICES STAFF MEMBERS**

**SUBJECT: Presentation Day**

**DATE: April 26, 1993**

Attached you will find a memo addressed to all students about the Fifth Annual Presentation Day, which will be held on the morning of EX Day, Wednesday, April 28, 1993. A schedule has also been sent to all students so that they can make their choice from various presentations that will be given on that day. We would appreciate your help and support in making sure all students are, indeed, at this event. You are also invited to participate in the schedule presentations if you so choose.

Thank you for your help!