APRIL 10, 2003

CSI UNDERGRADUATE RESEARCH CONFERENCE
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COLLEGE OF STATEN ISLAND/CUNY

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Conference Schedule

12:15 - 1:15 Authors and mentors lunch
1:00 Opening remarks by President Springer
1:30 - 4:00 Poster presentations
2:00 - 3:00 Musical performances
3:00 - 3:45 Dramatic presentations

*Sponsored by the Office of the Provost with funding from the CSI Student Government Academic and Curricular Affairs Commission, and the CSI Foundation.
It is a pleasure that the College of Staten Island is holding the second annual Undergraduate Research Conference. The conference theme “Your Passport to Knowledge” underscores the importance this College places on pursuit of knowledge, academic excellence, and scholarly research. Each discipline pursues knowledge and conducts research using unique methods and approaches. In their laboratories, scientists conceive and conduct experiments; social scientists engage in fieldwork and analyses of problems; artists, through years of rigorous training, perform, compose, and expand the creative possibilities of human expression. Learning takes place both inside and outside of the classroom. The projects presented at this Conference clearly are testimony to the learning that our students have accomplished with their mentors, starting in their classes and continuing outside the classroom.

I take this opportunity to congratulate all student scholars and their faculty mentors for sharing their projects at this conference. I know how much effort has gone into the scholarship being presented at the conference. I commend students and faculty mentors for their hard work, dedication, and collaboration in completing these projects.

I am very encouraged by the diversity of academic disciplines represented at this year’s conference. More than sixty undergraduate students mentored by faculty members from twelve academic departments are presenting their work. The presentations in the conference include dramatic and musical performances, as well as poster presentations based on research work in the natural sciences, mathematics, social sciences and humanities. I am also pleased to note that the College was able to support many of our students’ research projects through Summer Undergraduate Research Awards sponsored by the CSI Foundation and through faculty grants.

A conference of this size requires a great deal of planning and many organizational hands. I want to express my sincere appreciation to faculty and students on the conference committee. I would also like to acknowledge the financial support for the conference provided by the CSI Student Government Academic & Curricular Affairs Commission and the CSI Foundation.

The College of Staten Island continues to grow and excel and this conference reflects just one facet of that growth. In its longstanding tradition of providing opportunities for intellectual growth and academic excellence to the students, the College remains committed to supporting faculty-mentored research and creative activities in all disciplines. In closing, let me once again congratulate and thank all student presenters and their faculty mentors and wish them success in their future projects.
Dramatic Presentations
Center for the Arts
Black Box Theater
3:00 - 3:45 p.m.

1. Keith Palumbo and Victoria Venezia
   Mentor: Maurya Wickstrom
   Department of Performing and Creative Arts
   The Trestle at Pope Lick Creek

2. Michelle Philipin and Duo Diggs
   Mentor: Maurya Wickstrom
   Department of Performing and Creative Arts
   The Trestle at Pope Lick Creek

Musical Performances
Center for the Arts
Recital Hall
2:00 - 3:00 p.m.

3. Performers: Jeffrey Cassorla, Ashley Corrao, Alfred DeRosa, Drew Dorans, William Gregg, Christopher Grupinski, Kyeong Kim, Ji-Wook Kim, Doris Neilsen, Dustin Primeau, John Tartaglia, Gregory Tumbarello
   Directed by Ed Brown
   Mentor: Sylvia Kahan
   Department of Performing and Creative Arts
   The CSI Guitar Ensemble

4. Hanako Hirose
   Mentor: Sylvia Kahan
   Department of Performing and Creative Arts
   Piano selections from “Suite Bergamasque” by Claude Debussy.

5. Dimitri Shevelev
   Mentor: Sylvia Kahan
   Department of Performing and Creative Arts
   A piano solo of “Una Surtiva Legrima” by Gaetano Donizetti.

   Trumpet: Reginald Denis
   Tenor Saxophone: Christopher Grupinski, Joseph Maniscalco, Gregory Tumbarello
   Guitar: Kate Farley
   Violin: Michael Case
   Bass: Michael Friedman, John McKoy
   Piano: Philip Oppenheim
   Drums: Brett Seymour
   Directed by Michael Morreale
   Mentor: Sylvia Kahan
   Department of Performing and Creative Arts
   The CSI Jazz Ensemble

Poster Presentations
1P-Atrium
1:30 - 4:00 p.m.

7. Antoinette Ajavon
   Mentor: Chwen-Yang Shew
   Department of Chemistry
   Monte Carlo Simulation for Confinement Induced Molecular Alignment

8. John Anastasio
   Mentor: Chwen-Yang Shew
   Department of Chemistry
   Combination of Molecular Modeling and Quantum Calculation to Explore the Role of Stabilizers in Nanoparticle Formation

9. Tariq Bandoo, Jitendra S. Rathore, and Pradyot Patnaik
   Mentor: Bhanu Chauhan
   Department of Chemistry
   Generation of Novel Porous Materials and their Applications in Environmental Redemption

10. Devin Bracco
    Mentor: Patricia Brooks and Julie Hanauer
    Department of Psychology
    Exploring Executive Components of Development in the Cross-modal Stroop Effect
11. Brighid Castacio  
Mentor: Deborah Popper  
Department of Political Science, Economics, and Philosophy  
Benefits of Squatter Settlements to Developing Economies

12. Chris Cornacchio, Joy Lim, and Nhan Truong  
Mentor: Nan Sussman  
Department of Psychology  
Cultural Transitions and Acculturation Styles: Effects on Body Satisfaction and Eating Disorders Among Immigrant Women in the United States

13. Lekovic Djordjije  
Mentor: David Gerstner  
Department of Media Culture  
Visual Aesthetics of Maori in New Zealand Cinema: Inscription, Prescription or Subscription

14. Jacqueline Englander and Racha Estephan  
Mentor: Fred Naider  
Department of Chemistry  
Biosynthesis of a Domain of a G Protein-Coupled Receptor

15. Adam Ferretti  
Mentor: William Wallace  
Department of Biology  
Recovery from Cd Exposure in Grass Shrimp: The Importance of Metal-Binding Proteins

16. Anna Fiorentino  
Mentor: Natacha Gueorguieva  
Department of Computer Science  
Supervised Learning Based on Multi-layer Feed-forward Potential Function Approach

17. Tara Gianoulis  
Mentor: Robert Corin  
Department of Biology  
Differentiation of RBL cells in vitro

18. Ellen Grasso  
Mentor: Katharine Goodland  
Department of English, Speech, and World Literature  
Female Grief and Emotions in the Middle Ages and the Renaissance/Early Modern Periods

19. Adelpha Hall  
Mentor: Chwen-Yang Shew  
Department of Chemistry  
Monte Carlo Simulation of Charged Particles on Cylindrical Surfaces

20. Adonia Hall  
Mentor: Chwen-Yang Shew  
Department of Chemistry  
Simulations of the Structure of Nanocrystals on the Surface of Cylindrical Templated Rods

21. Elie Jarrouge  
Mentor: Valerie Pierce  
Department of Biology  
Verifying the Suitability of Silver-urea Nanoparticles for Studying Urea uptake in Drosophila

22. Stephanie Kaminski, Loretta Leotta, Karen Lutz, and Nisha Philip  
Mentor: Eileen Gigliotti  
Department of Nursing  
Types and Sources of Social Support and Maternal-Student Role Stress

23. Kristin Kane  
Mentor: Gregory Cheplick  
Department of Biology  
Sibling Competition

24. Anatoliy Konovalov  
Mentor: Charles Kramer  
Department of Biology  
The Effect of Dibutylphthalate (DBP) on Rodlet Cells in Tissues of the Platyfish, Xiphophorus Maculatus Teleostei Poeciliidae)
25. Jitendra Rathore, Moni Chauhan* and Alexandra Krawicz  
Mentor: Bhanu Chauhan  
Department of Chemistry  
*Queensborough Community College,  
Palladium Nanoweb: First Example of Catalytically Active Recyclable Particles

26. Dileepa Kumarapperuma  
Mentor: Antonia Foldes  
Department of Mathematics  
The Ballot Theorem and Its Proof

27. Herve Nganguia  
Mentor: Andrew Poje  
Department of Mathematics  
A Generalized Look at Manifolds as Principal Organizers of Fluid Particles in Motion

28. Susan Pace  
Mentor: Jonathan Peters  
Department of Business  
Air Quality and Queuing Issues in Electronic Toll Collection

29. Mario Perez  
Mentor: William Wallace  
Department of Biology  
Differences in Prey Capture in Grass Shrimp, Palaemonetes Pugio, Collected Along an “Environmental Impact” Gradient

30. Umer Latif and Lana Rabinovich  
Mentor: Bhanu Chauhan  
Department of Chemistry  
Silicon Based Nanoreactors for Nanoparticle Generation

31. Haroon Raja  
Mentor: Andrzej Wieraszko  
Department of Biology  
The Influence of Melatonin on Glutamate Uptake

32. Kathleen Ratcliffe  
Mentor: Eric Ivison  
Department of History  
Pilgrim Flasks and Early Christian Pilgrimage

33. Rajesh Sardar, Pankaj Tewari and Prashant Sharma  
Mentor: Bhanu P.S. Chauhan  
Department of Chemistry  
Silver Nanoparticle Reservoirs in Non-aqueous Solvents

34. Rachna Sondhi  
Mentor: Probal Banerjee  
Department of Chemistry  
Developmental Role of the Serotonin 1A Receptor

35. Adriana Vela  
Mentor: Bhanu Chauhan  
Department of Chemistry  
Bio-patterning of Metal and Semiconductor Nanoparticle

36. Annie Wang  
Mentor: Natacha Gueorguieva  
Department of Computer Science  
New Approach to Design of Radial Basis Functions Neural Networks

37. Annie Wang and Mendee Baigalsaikhan  
Mentor: Natacha Gueorguieva  
Department of Computer Science  
Women in Computer Science at CUNY: Problems and Solutions

38. Kong Chi Wai  
Mentor: Natacha Gueorguieva  
Department of Computer Science  
Adaptive Denoising of Images by Extracting Independent Components

39. Helen Zhang  
Mentor: Natacha Gueorguieva  
Department of Computer Science  
Neural Network Learning and Classification: A Potential Functions Approach
#1. The Trestle at Pope Lick Creek
Keith Palumbo and Victoria Venezia
Mentor: Maurya Wickstrom
Department of Performing and Creative Arts

This presentation includes two scenes from Naomi Wallace’s play entitled, “The Trestle at Pope Lick Creek.” The play is about a tragic death in a small southern town during the depression. The two teenage protagonists are locked in an ambiguous sexual game of power and vulnerability.

#2. The Trestle at Pope Lick Creek
Michelle Philipin and Duo Diggs
Mentor: Maurya Wickstrom
Department of Performing and Creative Arts

A scene from Naomi Wallace's play entitled, “The Trestle at Pope Lick Creek” will be performed. The play is a poignant and moving story about two adolescents growing up during The Great Depression in Middle America towards the end of the 1930’s.

The Council on Undergraduate Research (CUR)

The Council on Undergraduate Research (CUR) is the only national organization whose mission is to support and promote high-quality undergraduate student-faculty collaborative research and scholarship. CUR achieves its vision through efforts of its membership (~3000 members representing over 850 institutions) as organized in a divisional structure viz. biology, chemistry, geosciences, mathematics and computer science, physics and astronomy, psychology, social sciences and an at-large division that serves administrators and other disciplines. (www.cur.org)
#3. The CSI Guitar Ensemble
Directed by Ed Brown
Mentor: Sylvia Kahan
Department of Performing and Creative Arts

From Baroque to Bluegrass

Performers: Jeffrey Cassorla, Ashley Corrao, Alfred DeRosa, Drew Dorans, William Gregg, Christopher Grupinski, Kyeong Kim, Ji-Wook Kim, Doris Neilsen, Dustin Primeau, John Tartaglia, Gregory Tumbarello

#4. Piano Selections
Hanako Hirose
Mentor: Sylvia Kahan
Department of Performing and Creative Arts

Piano selections from "Suite Bergamasque" by Claude Debussy will be performed. These include Prelude, Menuet, Clair de Lune, and Passepied.

#5. A Piano Solo
Dimitri Shevelev
Mentor: Sylvia Kahan
Department of Performing and Creative Arts

A piano solo of “Una Surtiva Legrima” by Gaetano Donizetti from the comedy Elixer of Love will be performed.

#6. THE CSI Jazz Ensemble
Directed by Michael Morreale
Mentor: Sylvia Kahan
Department of Performing and Creative Arts

This performance includes works by Duke Ellington, Kenny Dorham, Thelonious Monk, Reginald Denis, and William Bauer

Performers: Omar Daniel, Maggie Harden, Julie O’Brien, Eric Siegel
Trumpet: Reginald Denis
Tenor Saxophone: Christopher Grupinski, Joseph Maniscalco, Gregory Tumbarello
Guitar: Kate Farley
Violin: Michael Case
Bass: Michael Friedman, John McKoy
Piano: Philip Oppenheim
Drums: Brett Seymour
We have conducted Monte Carlo simulations to investigate the alignment of two rigid rods confined by a spherical harmonic potential to mimic rod-like chains trapped in a flexible cavity. We model rigid rods as shish-kebab chains with tangent hard spheres aligned in the same axis. Beads interact through hard-core repulsions, and are subjected to the harmonic potential. For fields of weak strength, the two rods can be far apart and are essentially uncorrelated. As field strength is increased, the distance between rods decreases. When their separation roughly becomes less than the chain length, the parallel alignment of two rods emerges more frequently. As the separation of two rods is decreased to near the length scale of bead diameter, strong intermolecular repulsions induce perpendicular alignment. Such a model will be useful to elucidate liquid crystal ordering in polymer/liquid crystal composites and molecular packing within tiny cellular nuclei.

**Poster #7**

Monte Carlo Simulation for Confinement Induced Molecular Alignment

Antoinette Ajavon

Mentor: Chwen-Yang Shew

Department of Chemistry

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**How to Get Started in Research**

This booklet provides useful information on beginning a research program and finding support for the program from both administrators and funding agencies.

Appendices give advice on writing grant proposals and hosting poster sessions. A list of funding sources for faculty at predominantly undergraduate institutions is included. This is a must-have booklet for new faculty as well as for established research programs who want to begin or expand their program with undergraduates.

A useful publication from the Council on Undergraduate Research; www.cur.org
A great deal of effort has been devoted to fabrication of nanoparticles, novel materials with enormous applications, such as molecular size devices. In the formation of metallic or metal containing nanoparticles, experimental evidence has shown that smaller nanocrystals will form first, prior to further aggregation to larger nanoparticles. Such a finding has been utilized to control the growth of nanoparticles. With careful design, stabilizers, such as acids or acidic surfactants, are added into a reaction system to disperse and stabilize nanocrystals. The desired nanoparticles of different sizes and geometries can be synthesized by removing stabilizers in a controlled way. Despite recent experimental progresses, our understanding regarding how stabilizers interact with nanocrystals is still in its infancy. In this presentation, we will present a novel computational method developed by our research group. This method is to combine quantum mechanics calculation and molecular modeling, which can manifest the interplay between nanocrystals and stabilizers. In the calculations, we first sketch the molecular structure of a nanocrystal and stabilizers. Molecular modeling is used to find the optimal geometries and positions of these molecules. In the second step, we update the charge of each atom by conducting quantum calculations. The updated charges are incorporated into molecular modeling. These two procedures are repeated until the energy and geometry converge. This self-consistent calculation greatly enhances the computational efficacy, and has been applied to rationalize the structure of magnetic iron-oxide nanoparticles stabilized by surfactants.

1 Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants
Due to their huge surface areas, nanosized metal particles possess unique chemical and physical properties that can be exploited in a wide variety of technological applications, including catalysis, nonlinear optics ultra-purification and microelectronics. It has been established that the properties of such nanoparticles depend sensitively on factors such as size, size distribution, shape and chemical environment. One of the design strategies that has shown tremendous potential as a viable route by which to produce metal nanoparticles with improved size control and colloidal stability is to employ polymeric matrixes as the form of growth media. Thus, nanoparticles can be grown to satisfy specific application requirements and enhance the polymer with new properties. Studies have demonstrated that if the polymer matrix is nanostructured, control over the nanoparticles’ development and stabilization can be further enhanced. Examples of nanostructured polymer matrixes include amphiphilic block copolymers either in the bulk or as micelles.

In this presentation we will disclose our preliminary results on the grafting of the porous polymer and its application as host agent for environmental redemption. Our strategy not only permits us for the quantitative generation of porous silicon materials but also allows a chemical control over the size of the pores under very mild reaction conditions. Preliminary results indicate that this material is stable under atmospheric conditions and the agglomeration of the nanostructured particles can be successfully prevented.

1 Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants
Recent work by Hanauer & Brooks (2002) has documented failures in selective attention. Using the cross-modal Stroop task they found that children and adults were impaired in their ability to name color patches when incongruent color words were presented simultaneously over headphones. The present study examines whether the cross-modal Stroop effect stems from semantic or executive processing. In the cross-modal Stroop task, auditory information (e.g., words over headphones) conflicts with visual information (e.g., a color patch). In the related picture-word interference paradigm, a picture to be named is presented with a distracter word superimposed. In both of these tasks, researchers have theorized that the main source of interference is semantic competition occurring during lexical access. An alternative account is that interference effects are due to the activation of a response set. We asked adults to name pictures while listening to distracter words, instructing them to ignore the words presented over headphones. RTs were measured as each picture was identified. We varied the semantic category of the distracters (i.e., their relatedness to the pictures), and their status as members of the response set (i.e., whether or not the distracters were names of target pictures). The magnitude of the interference effect did not differ as a function of the semantic distance of the distracters relative to target pictures, but depended on their status as members of the response set. This indicates that the locus of the cross-modal Stroop effect resides in executive rather than semantic processing.

\[\text{Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants}\]
My research was undertaken as the culmination of my majors in Spanish and Economics, and links both fields. I have focused on the economic benefits of squatter settlements in the developing world, particularly in Latin America. Most governments have sought to eradicate such communities, claiming that they are socially aberrant.

Empirical evidence demonstrates however, that immigrants dwelling in these communities are those who have been pushed out of surrounding regions for various reasons, and have settled within cities with hopes of improved futures. They are generally optimistic and industrious in working toward their objectives.

Because of the government’s preconceived ideas about the nature of these communities and the subsequent lack of aid to them, squatters must be wholly self reliant, in terms of job creation as well as the provision of housing and services. Squatters thus solve the basic economic problems of their society, and by doing so, create a level of productivity where there had been none while simultaneously alleviating the government of any added pressure that joblessness, homelessness and migration, would otherwise cause.

Squatter settlements, rather than a social and economic burden meriting obliteration, provide less developed countries with strong institutions that are self sufficient and improve greatly people’s ability to improve their own lives, and by extension the macro economy of that city and nation.

Further studies on this issue are necessary, especially as policies in at least one nation has moved towards favoring granting tenure to these communities, and can serve as a paradigm to others.
As body ideals are culturally constructed, how does immigration and acculturation style affect satisfaction with one’s body and risks for eating disorders? Participants were 237 immigrant women students from five regions representing body ideals which are normatively different from those in the United States. Assessments were made on self-esteem, body satisfaction, risk for eating disorders and acculturation style. Findings indicated that immigrant women with an integrated acculturation style had higher self-esteem and were more satisfied with their bodies than women with other acculturation styles. However, the integrated and assimilated groups were at highest risk for developing eating disorders. With respect to specific ethnic groups, Asian-Americans had the lowest self-esteem and were least satisfied with their bodies, but a regression analysis found that strong American identity and East European background predicted risks for eating disorders. Moreover, Caribbean women with an integrated acculturation style were at higher risk of developing eating disorders than Caribbean women with marginalized and separated acculturation styles. Thus, while strong American identification was associated with high self and body esteem, it was also associated with increased risk for eating disorders.

Summer Fellowships through the Deans’ Offices at CSI

The fellowships are intended to give motivated and talented students the opportunity to enhance their educational experience and become involved in the research activities of faculty mentors who devote substantial time and effort in scholarship during the summer months.
Attending to New Zealand Cinema one cannot but feel the presence of something different, not experienced before with Hollywood or other cinemas. I say feeling precisely because I fail to notice or point out anything tangible but only feel this and I still remain unable to explain what it is. Discussing a particular national cinema one falls in danger of associating the form with what is strictly contained within given boundaries (the cultural construct of that nation) and thus is prone to overlook the importance of the interaction between that nation and the rest of the world. What will be of much help to us lies within the very nature of New Zealand: the presence of Maori population.

The fact that Maori population has not been effaced and annihilated like many other indigenous populations across the globe and that they are still very much both politically and physically present in New Zealand offers us a unique opportunity to look into how the presence of indigenous culture has affected the cinematic form. The lack of a severe colonizing discourse, like that found in Africa and South America, provides for certain traces of indigenous Maori culture and language and thought to have inscribed itself into film without being much disturbed or tempered with.

While Third Cinema is marked with constant struggle against the colonizer/aggressor and so is every cinematic endeavor from the Third World, New Zealand offers us a somewhat isolated place where such discourse took place on another level.

If all the given premises are true, this short study will have a chance of tracing certain constructs within the New Zealand’s cinematic form all the way back to the indigenous Maori culture and language thus establishing valuable connections between the two that might further our understanding of the medium.

It is a ‘post-strucuralist’ approach which sees ideology as being inscribed in a specific discourse, and in a specific language, and that no medium is ever transparent, never a carrier of messages that exist outside of it: it is always a language that offers the possibility of constructing that world.

The question to investigate is whether Maori culture/language had any impact in constructing what we call New Zealand Cinema, and if so, what traces of this culture are found inscribed in a cinematic language. Our title inscription, prescription or subscription refers to three possible relations between Maori language and cinematic form. It is very appropriate to put forward this title, because the research will examine whether Maori people have inscribed themselves into cinematic medium, prescribed a new form or solution or subscribed to the existing discourse.
The α-factor pheromone receptor (Ste2p) that stimulates mating in the yeast Saccharomyces cerevisiae belongs to the large family of G protein-coupled receptors (GPCRs). Ste2p exhibits the typical GPCR pattern of hydrophobicity indicative of seven transmembrane segments. A plasmid expressing a fusion protein, consisting of a TrpΔLE leader sequence joined via a methionine residue to the 3rd extracellular loop, 7th transmembrane domain, and 40-residue tail (E3-M7-I4-40) fragment of the Ste2p receptor, was constructed. DNA encoding for the E3-M7-I4-40 segment was amplified via the polymerase chain reaction (PCR) and digested with BamH I and Hind III restriction enzymes. The DNA segment was then ligated to the TrpΔLE, found in the pSW02 plasmid, via the restriction sites using T4 DNA ligase. The construct is being confirmed using restriction enzyme analysis and DNA sequencing. Subsequently, it will be transformed into BL21(DE3)pLysS cells and expression of the TrpΔLE-E3-M7-I4-40 fusion protein will be induced with IPTG.

1 Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants

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**Undergraduate research**

Undergraduate research...provides opportunities for students to be creative and to pursue scholarly endeavors in more depth than is possible in the traditional classroom setting. The research environment ... allows students to push the boundaries of their intellect and to take risks on a terrain that is largely explored. Research ... serves as a primary vehicle to channel the intellectual inquiry of our student body in the performing arts, humanities, social sciences, and natural sciences. The faculty benefit immensely as the in-house research enriches classroom teaching and helps build careers that rest on a foundation of scholarly activities.

From Willamette University-Mentored Research in Liberal Arts by Scott Hawke and Tori Haring-Smith, CUR Quarterly, December 2002
Sublethal cadmium exposure was previously shown to affect feeding behavior in the grass shrimp, *Palaemonetes pugio*. We investigated recovery from cadmium (Cd) exposure in grass shrimp by comparing time-dependent changes in feeding behavior to changes in total metal body burdens as well as subcellular partitioning. Shrimp collected from Great Kills harbor in Staten Island, NY, were exposed for 14 days to a variety of Cd concentrations (0.0, 2.25, 5.0, and 10.0 mg/l; n=12 per treatment). Prey capture of control and exposed shrimp was then assessed. Shrimp were allowed to depurate the accumulated metal for a period of 8 days. Prey capture was the periodically assayed (t=4, t=8) (using live brine shrimp = ‘sea monkeys’). In a parallel radiotracer study ($^{109}$Cd) exposed shrimp were used to determine the accumulation and subcellular distribution of Cd. Results show that shrimp can recover from Cd exposure and that improvements in prey capture are related to a repartitioning of metals from metal-sensitive cellular constituents (i.e., enzymes) to more detoxified forms (i.e., metal-binding proteins).

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**Poster #15**

**Recovery from Cd Exposure in Grass Shrimp: The Importance of Metal-Binding Proteins**

**Adam Ferretti**

**Mentor:** William Wallace  
**Department of Biology**

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1. Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants

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**Make Research-Based Learning the Standard**

Undergraduate education in research universities requires renewed emphasis on a point strongly made by John Dewey almost a century ago: learning is based on discovery guided by mentoring rather than on the transmission of information. Inherent in inquiry-based learning is an element of reciprocity: faculty can learn from students as students are learning from faculty.

(The Boyer Report- Reinventing Undergraduate Education: A Blueprint for America’s Research Universities)
Our research focuses on the architectures and algorithms used by multilayer neural networks. The performance of a multilayer feed forward potential function neural network is based on the potential functions used to recognize patterns in the input domain. The feed forward network differs from Hamming and Hopfield Networks because it does not focus on a winning neuron approach. In its place it uses the linear boundaries of the input space and then instead of using fuzzy decision making as a simple multilayer, it uses nonlinear potential functions to extrapolate the teaching patterns. The network incurs multiple layers as well as two learning phases.

The potential function units presented in the multilayer feed forward network are Gaussian. The Gaussian function is a good potential function because of its ease and regulation of the number of parameters. The three layers, the input, hidden and output layers allow the network to correctly classify patterns by clustering and by function approximation.

The performance of the network in pattern recognition is accurate but can be improved upon. Some drawbacks to the network are maintained in its inability to correctly generate the appropriate number of potential function units. This results in redundancy of Gaussian units or minimal units. The number of potential function units is identical to the number of hidden layers generated. As with any multilayer network an algorithm that can determine the adequate number of hidden layers for performance will improve the networks ability. There seems to be a consensus that radial basis functions employed with multilayer feed forward neural networks are a better approach.
The rat basophilic leukemic cell (RBL) is a transformed cell that exhibits some phenotypes of the differentiated mast cell. The cells resemble the mucosal mast cell subpopulation in that they secrete granule contents in response to Fcε receptor activation but not in response to agents that act through G protein mechanisms e.g. compound 48/80. The ability to respond to both classes of secretion signals is characteristic of connective tissue type mast cells. RBL cells can be induced to express the connective tissue phenotype of compound 48/80 responsiveness by treatment of cells with the drug quercetin. We have examined some phenotypes of RBL cells treated with quercetin. In our laboratory we were able to induce compound 48/80 induced secretion with quercetin treatment. Secretion was assayed by quantitating the granule marker enzyme hexoseaminidase. We also found an increased specific activity for hexoseaminidase after quercetin treatment. To determine if the quercetin induced differentiation was related to the growth of cells we examined the growth of cells at several quercetin concentrations. For comparison, we also examined the effect of HMBA (an agent that is known to induce a terminal differentiation of many transformed cell types in vitro), upon the growth of RBL cells. We found a dose dependent decrease of cell number in response to both agents. Neither agent was toxic as judged by the ability of cells to remain attached and spread upon tissue culture plates. To determine if either agent affected the proliferative potential of RBL cells i.e. induced terminal differentiation, we examined the cloning efficiency of cells in the presence of either agent. RBL cells had a high cloning efficiency in growth medium. The ability of single cells to form colonies from single cells was lost when HMBA was included in the medium, as has been reported for other cell types i.e. terminal differentiation. Surprisingly, the presence of quercetin did not affect the cloning efficiency of RBL cells. We conclude that quercetin treatment caused expression of the connective tissue phenotype, which included accumulation of granule enzyme hexoseaminidase but not terminal differentiation.

\(^1\) Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants
For ten weeks, beginning the first week of June and continuing through the middle of August, 2002, I was on a mission to acquire as much information as possible on the research topic of female grief and emotions both in the Middle Ages and Renaissance/Early Modern periods. My goal was to provide Professor Katharine Goodland with as wide a range of information as possible regarding the topic, without bombarding her with too much extraneous or irrelevant material, in order to assist her with the writing of her book. I sometimes question how successful I actually was in weeding out unnecessary information, since by the end of the project, I had identified upwards of 100 scholarly works and articles on some aspect of female grief. Thankfully, Professor Goodland always seemed to be able to find at least a modicum of relevance in each and every work I presented her.

Our project took off right from the start. Initially, Professor Goodland suggested that I familiarize myself with two texts in particular, specifically, Webster’s *The White Devil* and Shakespeare’s *Titus Andronicus*, as both works involve interesting characterizations of women and intense emotion. In *Titus*, for example, Shakespeare portrays Tamora as the personification of revenge when she masterminds the rape and mutilation of Lavinia as payback for the death of her sons. Therefore, just within the character of Tamora, we see the embodiment of both grief and revenge.

1 Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants
We have conducted Monte Carlo simulations to investigate a generalized model consisting of charged particles adsorbed onto the surface of a cylinder, a limiting case of the cell model for DNA solution. In the cell model, the DNA polyion is considered to be an infinity long charged cylinder surrounded by counterions, with a linear charge density equal to that of a DNA polyion. The radius of the cylinder is chosen to mimic the molecular diameter of a DNA molecule. In this work, we investigate the limiting case of the cell model in which counterions are distributed on the surface of the cylinder. Monte Carlo simulation is carried out to examine the spatial distribution of charged particles on a cylindrical surface, and the charged particles interact through electrostatic repulsion, depicted by a reduced potential: $A/r$ where $r$ is the distance between two charged particles and $A$ the interaction strength which is inversely proportional to temperature. Our preliminary calculations show that the charged particles arrange in a random fashion for smaller $A$, but a strong spatial correlation between charged particles emerge as $A$ is increased. Meanwhile, for large enough $A$, we find the charged particles arrange in a highly order structure. For smaller charged cylinders, the heat capacity due to the charged particles displays a non-monotonic behavior, that is the heat capacity increases first and decreases after passing a maximum as the parameter $A$ is increased, indicating that a phase transition between disorder-order structure may occur in such a system.

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**How to Mentor Undergraduate Researchers**

Topics include: How to get started; Mentoring tips; Coaching and Training; Helping the students to develop presentation skills; Letters of recommendation for students and much more

*A useful publication from the Council on Undergraduate Research; www.cur.org*
Fabrication of nanoparticles has attracted a great deal of attention because of their enormous applications, such as reduction of the size of existing devices. Introducing templated polymers into nanoparticle syntheses has become a widely used method to regulate the size and geometry of a nanoparticle. Experimental evidence has shown that the tiny nanocrystals condense onto the surface of templated polymers. To better understand the distribution of nanocrystals on the surface of templated materials, we carry out Monte Carlo simulations to study a simple model in which small nanocrystals condense onto the surface of a cylinder, to mimic templated carbon nanotube. In the preliminary calculations, we consider a short-ranged repulsive potential between nanocrystals, $A/r^{12}$, where $A$ is the interaction strength, inversely proportional to temperature. Meanwhile, the excluded volume of nanocrystals (as hard spheres) is incorporated into the model. In the simulations, we calculate the spatial correlation of nanocrystals and the corresponding thermodynamics. For smaller $A$, we find that the smaller particles are randomly distributed on the cylindrical surface without specific correlation. When the interaction strength $A$ is increased, our results show that the heat capacity of the system undergoes a monotonic increase, for the range of our investigation. Surprisingly, the calculated heat capacities of different cylinder radii can be fitted with a simple exponential function, suggesting a universal behavior may be exacted from this type of system. Moreover, our results also show that at large enough $A$, the nanocrystals exhibit highly ordered on the surface of a cylinder.

**Facilitating Undergraduate Research**

Department chairs are best positioned to help create a departmental and institutional culture that values undergraduate research. This can be accomplished by setting an example as an active researcher, mentoring new faculty, supporting and encouraging established faculty, and most of all by encouraging students to participate in all aspects of the research process from the formulation of hypothesis to publication. A vigorous student research program is a valuable asset for recruitment, fund raising, and student outcomes. A lot of work, but rewarding for everyone involved.

*Kerry L. Chessman et al, CUR Quarterly, pp. 76-80 (Dec. 2001)*
We are studying urea tolerant *Drosophila melanogaster* populations that are known to have a slower rate of urea uptake than wild-type populations. This suggests that how urea crosses the body may be important. We propose ultimately to use silver-conjugated urea nanoparticles as tracers to visualize the crossing of urea into the body under electron microscopy. The purpose of this project is to verify the suitability of these nanoparticles by comparing their behavior *in vivo* with that of regular urea.

We have 4 specific objectives to investigate. First, the viability of the urea tolerant and wild-type flies will be assessed both in the presence of silver-urea and regular urea to detect any toxicity of silver nanoparticles. Second, we will measure the concentration of urea in the hemolymph of third instar larvae to see if silver-urea accumulates to the same levels during development as regular urea. Third, we will compare the rate of urea uptake in the presence of silver-urea nanoparticles and determine whether the nanoparticles interfere with the uptake process. Our final objective is to verify that the nanoparticles cross into the body; we will spot hemolymph of larvae fed nanoparticles onto EM grids and examine it using TEM. Then, we want to quantify the amount of silver-urea nanoparticles taken up by assaying hemolymph for silver content using a Perkin Elmer 3100 furnace atomic absorbance spectrophotometer.

Some preliminary data from only one pair of populations showed that there was no difference in viability percentages between urea tolerant flies reared on urea food versus silver-urea food. These results suggest that silver-urea might possess the same level of toxicity in both populations as regular urea.

Urea assay showed that both urea and silver-urea led to the same urea concentrations in the hemolymph. The wild-type larvae showed an average of 110 mM urea in their hemolymph on both urea and silver-urea food, while the tolerant larvae showed an average of only 85 mM on both urea and silver-urea food. As expected the tolerant population had a significant lower concentration of urea.
Purpose: An increasing number of women who are also mothers are returning to college to pursue a degree. These women may experience maternal-student role stress (MSRS) which is detrimental to their health including a weakened immune system, depression, heart disease, and a host of other illnesses. Because social support helps reduce MSRS, there is a need for interventions to increase these women’s social support. However, before an interventional program can be implemented it is necessary to find out if particular types and/or sources of support are beneficial. This study will investigate whether maternal-student role stress is decreased if particular people in their networks like them, agree with them, and would help them. Two groups of women will be studied separately because Gigliotti (1999; in press) found that women under and over 37 years had different sources of support.

Problem Statement: Does greater social support of a specific type and/or from a specific source decrease Maternal-Student Role Stress for married undergraduate (AAS Nursing Majors) women who are mothers in two age groups?

Theoretical Framework: The theoretical framework was derived from the Neuman systems model and social support theory. Being both a mother and a student is an environmental stressor that may lead to maternal-student role stress, disturbance of one’s dynamic equilibrium or usual health state. However, particular types of social support from particular people may buffer this stress response and thus reduce or prevent maternal-student role stress.

Research Questions:
1. Does high social support (affect, affirmation, and aid combined scores) from specific network members decrease MSRS for women in two age groups?
2. Does greater affection decrease MSRS for women in two age groups?
3. Does greater affection from specific network members decrease MSRS for women in two age groups?
4. Does greater affirmation (agreement) decrease MSRS for women in two age groups?
5. Does greater affirmation (agreement) from specific network members decrease MSRS for women in two age groups?
6. Does greater aid (help) decrease MSRS for women in two age groups?
7. Does greater aid (help) from specific network members decrease MSRS for women in two age groups?

Method: This study will be a secondary analysis of data (N = 132) collected from a previous study (Gigliotti, in press) investigating the relation between social support from one’s total support network and maternal student role stress for women in two age
groups (women 37 years and older \( n = 59 \); women < 37 years \( n = 73 \)). After human subjects approval is obtained, data will be recoded to reflect the amount of a particular type of support (affect, affirmation, and aid) given by each member in the total support network. Pearson product moment correlations will be used to analyze the relation between types and sources of social support and maternal student role stress. Study instruments were the Norbeck Social Support Questionnaire and the Perceived Multiple Role Stress Scale.

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**Inquiry Based Learning**

The basic idea of learning as inquiry is the same as the idea of research; even though advanced research occurs at advanced levels, undergraduates beginning in the freshman year can learn through research. In the sciences and social sciences, undergraduates can become junior members of the research teams that now engage professors and graduate students. In the humanities, undergraduates should have the opportunity to work in primary materials, perhaps linked to their professors’ research projects. As undergraduates advance through a program, their learning experiences should become closer and closer to the activity of the graduate student. By the senior year, the able undergraduate should be ready for research of the same character and approximately the same complexity as the first-year graduate student; the research university needs to make that zone of transition from senior to graduate student easy to enter and easy to cross. For those who do not enter graduate school, the abilities to identify, analyze, and resolve problems will prove invaluable in professional life and in citizenship.

(The Boyer Report-Reinventing Undergraduate Education: A Blueprint for America’s Research Universities)
The effects of natural selection on seed production, shoot mass and tiller length of the annual dune grass *Triplasis purpurea* were examined. The objective of this sibling competition is to determine if kin selection occurs. By comparing the performance of individuals competing with genetic relatives to that of individuals competing with unrelated plants, formulates the hypothesis that if kin selection occurred, the performance of individual competing with genetic relatives will be greater than that of individuals competing with unrelated plants. The species *Triplasis purpurea* has poor dispersal ability; the seeds, drop within a meter or so of the parent that produced them. When the seeds germinate, the seedlings will result as genetically related as siblings and often occur in groups in the field. Twenty *Triplasis purpurea* plants were randomly collected 20-50 m from shore. To ensure that the seed families were genetically distinct, each plant was separated from the previously collected by at least 15 meters to as much as 30 meters.

Post collections were then surfaced sterilized with a general purpose fungicide. To ensure germination, the seed families were placed into a 25 degree celcius/15 degree Celsius 12 m-light/12 m-dark incubator for approximately one month. Square plastic pots were filled with a 2:2:1 mixture of Midland beach sand: sterile commercial sand: topsoil. Ten- paired sets of families comprised of a control group, intrafamily and interfamily competing groups. The inter family and intra family treatments are comprised of a target plant with two competing neighbors approximately 2cm apart diagonally from the target plant. The plants matured in the greenhouse over the summer with scheduled tiller measurements, visual observations and collection of flowering seeds on the terminal of the plant. In the fall the plants were harvested and final tiller, shoot mass, and no of seeds were recorded. The data demonstrated genetically related siblings performed better when competing together.

1 Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants
An enigmatic cell, the rodlet cell, exists in tissues of both freshwater and saltwater teleosts. Although this cell was identified over a century ago, its origin and function still remain unresolved. One proposed function for the rodlet cell is that of defense whereby this cell forms part of the fish’s immune system. In fish exposed to environmental contaminants and or infectious agents, the rodlet cells increase in number as compared with unexposed individuals.

It was the purpose of this study to investigate the rodlet cell response in the platyfish, *Xiphophorus maculatus* exposed to the environmental contaminant di-n-butylphthalate (DBP) for up to eight days. Several tissues were examined including gills, gallbladder, liver, spleen, gonads, heart, kidneys, and intestine. The greatest effect was seen in the gill epithelium where on average of 488 cells were present by the end of 8 days exposure. The unexposed control had an average of ten cells after five days. Furthermore, the number of rodlet cells in the experimental fish increased with exposure time. At one day of exposure to DBP 113 cells were counted: at five days, 918 cells were observed.

These results lend support for the endogenous tenet of rodlet cell origin, Furthermore, our findings suggest that the rodlet cell is involved in an as yet unspecified immune response in platyfish, *X. macalatus* triggered by exposure to xenobiotic di-n-butylphthalate.

*Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants*
Interest in the synthesis and properties of colloidal metal particles and metal clusters has grown constantly because of their unique properties. For noble metal colloids, especially catalytic applications are considered, since a unique combination of reactivity, stability, and selectivity is expected. Interest in the synthesis and properties of colloidal metal particles and metal clusters has grown constantly because of their unique properties. For noble metal colloids, especially catalytic applications are considered, since a unique combination of reactivity, stability, and selectivity is expected.

Various noble metal colloids stabilized by surfactants and solvents have been used for hydrogenation, Heck and Suzuki coupling reactions. Even enantioselective hydrogenation reactions on noble metal colloids with chiral ligands have been performed. The controlled generation of Pd colloids is also promising for a number of other reactions, such as oxidative conversions and cyclizations. On the other hand, in the case of catalytic transformation involving silicon only platinum-catalyzed hydroisilylation reactions are known to undergo Si-C bond formation reaction via Pt-colloid formation.

In this communication, we present the first example of soluble polysiloxane network stabilized “Pd” colloids and unequivocal evidence of their participation in Pd(OAc)2-catalyzed Si-H to Si-OCOR bond transformations. We will also provide the conclusive evidences that the silicon polymers play the role of intermediate host stabilizing agents preventing generation of bulk palladium.


2 Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants
Suppose that two candidates compete at a presidential election, or two players are playing against each other a series of games. In either case, and in many similar situations of this nature besides knowing who is the winner it might be important to know whether the winner was always leading throughout the whole competition. “The Ballot theorem” tells us the exact probability of such a situation.

For example: Candidate A winning an election over candidate B may have occurred in either of the following ways.

(1.) A may have been a winner at any given time throughout the counting process

OR

(2.) There was at least one (but possible many more) instance when that the competitor, B was leading the ballot and A became a winner because he gained more total votes than B when the counting was completed.

The ballot theorem tells us that if we know the total number of votes for candidate A and the total number of votes for candidate B, then what is the probability that case (1) above occurred, that is to say in each and every instant of the election candidate A had more votes than candidate B.

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**A Mentor for Every Student**

Generations of experienced scholars have known and acted upon the knowledge that the intellectual development of their graduate students is most effectively guided in one-to-one relationships. Essentially the same techniques of tutorship have been practiced at the undergraduate level in areas like art and music, where individual performance is watched, corrected, assisted, and encouraged. In the process, an undergraduate student and instructor can develop a supportive relationship not unlike that found between doctoral candidate and advisor. This kind of mentoring needs to be emulated throughout universities.

(The Boyer Report- Reinventing Undergraduate Education: A Blueprint for Americaís Research Universities)
Studies have shown that, with great certainty, fluids don’t just organize randomly. Indeed numerical simulations based on actual data demonstrate that, in such complex systems as oceans, the motion of fluid particles is heavily dependent on the existence of hyperbolic, or saddle, points from which ‘lines of conduct,’ better known as manifolds, emerge. These manifolds, which are either stable or unstable, have complicated profiles, and therefore they can, and indeed they will, generate intersections. These intersections, it has been shown, lead to the formation of lobes that dictate how fluid particles are transported in the Lagrangian dynamic of the system.

The present project proposes to generalize this aspect of fluid motion in complex systems to more common occurrences. Achieving this goal implies the comparison of the quantification and mixing process of a simple system (cream in a cup of coffee), and a more complex one (occurrences in oceanography).

**Internships**

Internships can offer an invaluable adjunct to research-based learning by allowing the student concrete contexts in which to apply research principles. Whether a student has an internship in a physics lab, a news room, a hospital, or a business office, the experience can provide learning that cannot be replicated in the classroom. For undergraduates in the arts and sciences as well as in professional schools, these experiences provide useful, often interdisciplinary, learning and real-life problem solving. When students need to work to support their education, internships can make that economic requirement a valuable part of university experience.

(The Boyer Report- Reinventing Undergraduate Education: A Blueprint for America’s Research Universities)
Automobiles and other mobile sources are one of many sources of ozone formation in the Eastern United States. Ozone is not emitted directly into the atmosphere but is formed from chemical reactions involving hydrocarbons, oxides of nitrogen, and sunlight. The process rate depends upon both temperature and sunlight. New Jersey is listed as an extreme and severe non-attainment area for air quality by the U.S. Environmental Protection Agency and is in frequent violation of the health-based national air quality standards for ozone. Laboratory tests have concluded that a motor vehicle’s high acceleration and deceleration rates can cause as much pollution as an entire trip. New Jersey’s air quality is severely impacted by the collection of tolls on its bridges, tunnels and roadways.

This study was designed to explore the impact of implementing electronic toll collection, also known as E-ZPass, on both the North and South Raritan Toll Plazas of the Garden State Parkway. These plazas have twenty available toll facilities and an approximate annual throughput rate of 81,000,000 vehicles or 13.6 percent of the roadway’s total traffic.

Several studies have shown the benefits of electronic toll collection but does it maximize utilization of the transportation resources available? This study focused on the impact of the hourly processing rates and the distribution of the twenty toll lanes available either to cash, token, or E-Z Pass and there effect on queuing. The actual weekly throughput, obtained from the New Jersey Highway Authority, for each direction of this roadway was applied to the three following theoretical models:

1. Maximum Possible Throughput. Assumes all twenty toll lanes are accepting E-Z Pass.
2. Current Mix of Usage. Represents the average hourly number of vehicles that should be able to be processed.

These models were used to study the capability of this roadway and the effect user participation has at different peak periods of traffic, e.g. week-day rush-hour and weekend pleasure travel. Our results show that a small decline in E-Z Pass participation can have a dramatic effect on queuing and in turn the environment. This is demonstrated by both theoretical models and by quantitative analysis.
The waterways and associated salt-water marshes along the western border of Staten Island, New York, the Arthur Kill, have long been under environmental duress. Grass shrimp, *Palaemonetes pugio*, inhabiting the Arthur Kill are therefore potentially at risk of exposure to metal as well as organic pollutants. Successful prey capture (of live brine shrimp, *Artemia salina*) was used to compare the relative ‘health’ of shrimp collected from three sites along an environmental impact gradient. Study sites included a relatively unimpacted harbor (Great Kills Harbor - GK) and two creeks adjoining the Arthur Kill [Nassau Creek (NC) and Richmond Creek (RC)]. Shrimp originating from GK exhibited a rate of prey capture (6.3 prey hr⁻¹) that was ~2x greater (p<0.05) than that of shrimp originating from a creek behind a series of landfills (RC - 3.2 prey hr⁻¹); rate of prey capture for shrimp collected from a creek impacted by historic smelting activities (NC) was intermediate (5.4 prey hr⁻¹).

Laboratory studies with shrimp from a pristine site (Tuckerton, NJ) exposed to RC conditions (i.e., sediment and water) for 8 wk indicate that reduced prey capture can be induced in ‘healthy’ shrimp. Finally, video analysis suggests that reduced prey capture in RC shrimp may not be the result of less effort, but rather the composite of 1) 80% fewer (p<0.05) prey being captured with a ‘Lunge’ type of attack and 2) a greater reliance (p<0.05) on a less efficient ‘Grab’ type of foraging behavior (64% success rate for RC vs 87% success rate for GK; p=0.058). These results indicate that sublethal toxicity in environmentally impacted populations can occur and that prey capture may be used to assay the relative ‘health’ of field specimens.

¹ Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants
Generation of the nanosized metallic and semiconductor particles is of considerable interest due to their optical and catalytic property profiles. We are interested in devising general synthetic routes to monodisperse nanoparticles via a nanoreactor approach. Our synthetic strategy is based on the recent results of the our laboratory, in which we have demonstrated a very efficient route to alcohol substituted siloxane based macromolecules.

In this study, we have utilized the above-described synthetic strategy to accomplish the oxidation of cyclic tetrasiloxanes with polyethylene glycol, using Rhodium as a catalyst. Our goal is to create a micellar network under normal laboratory conditions in multiple yields. By applying the polyol process, these micellar networks were used to reduce metal salts in organics solvents. The role of micellar networks in production of nanosized metallic particles (as the reduction of metal salts takes place) was also studied. Particle size and morphology studies were carried out by Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). The detailed characterization of the products and reduction of metallic salts to metal colloids was conducted by utilizing IR, UV-visible spectroscopy, 1H-, 13C-, and 29Si –NMR techniques.

Glutamate is a major neurotransmitter in the hippocampus. Following its release from the nerve endings it activates glutamergic receptors and is taken up by Na+-dependent, neuronal uptake mechanisms. Due to their action the extracellular concentration of glutamate in the brain is normally maintained at a low level (1-3 µM). The balance between release and uptake of glutamate is essential for proper function of glutamergic synapses and any deviation from that balance can cause enhanced or reduced synaptic activity. Since melatonin is able to interfere with the glutamate uptake in retina, it is reasonable to assume that similar situation occurs in the hippocampus. The aim of this project is to evaluate the influence of melatonin on glutamate uptake using synaptosomes as an experimental model. Synaptosomes obtained from isolated hippocampi were loaded with radioactive D-Aspartate, which is a marker of glutamergic system. 300 µl of synaptosomal suspension was diluted with 1 ml of Ringer’s containing 20 nM 3H-D-Aspartate. Following 2 min incubation the synaptosomes will be separated from free 3H-D-Asparate by filtration and radioactivity remaining on the filters was counted in the scintillation counter. This experimental paradigm was repeated with synaptosomes incubated with melatonin. The difference in D-(3H) Asp uptake between melatonin-exposed and unexposed synaptosomes was an indicator of the influence of melatonin on the intensity of D-(3H) Asp uptake. It has been found that 20 µM, 200 µM and 1 mM melatonin facilitates glutamate uptake by 17, 25 and 35%, respectively. These results were included in the report presented at 33rd ASN Meeting.

1 Sponsored by the CSI Foundation, the Office of the Academic Deans and/or faculty grants
The subject of my project is “Pilgrim Flasks and Early Christian Pilgrimage,” from Byzantine Egypt. My research focused on three St. Menas flasks in varying degrees of preservation which date to the 6th-7th century CE. These artifacts are part of the SIIAS@CSI Archaeology Study Collection at the CSI Library, on loan from the Staten Island Institute of Arts and Sciences.

The flasks are terracotta pottery, roughly round and flat, and were constructed by joining two sides, imprinted with an image using a mold. A cylindrical neck and two handles were added, and then the piece was fired. They fall within the normal size range for St. Menas flasks, about 3 inches by 2+ inches, and less than an inch thick. On the best preserved, the image is St. Menas depicted in Roman military attire—a tunic, a chlamys (cloak), and boots. His head is nimbed (or haloed), and is flanked by Greek inscriptions, “St. Menas.” He stands between two kneeling camels in the orant position—arms outstretched and hands upraised in supplication.

These are pilgrimage souvenirs from the shrine at Abu Mena, southwest of Alexandria, but what was their function and significance in pilgrimage? Who participated in pilgrimage in the Byzantine Empire? Who was St. Menas and what was his significance in Early Christian religious experience?

Pilgrimage marks a period of development of Christianity when the theology of incarnation became a theology of holy contagion—holiness by physical contact with a holy person or a relic. This presentation will demonstrate that flasks were a means of obtaining a blessing from the holy place that could be used later and at a distance for protection and healing, as well as personal piety.

In support of my thesis, my presentation will refer to the saint, his legends, and the development of his shrine at Abu Mena where the flasks became popular and important. I will also explain the pilgrim phenomenon that attracted people from every part of society and gave them a common experience based on varied, yet similar motivations, by contrasting pilgrimage and tourism. I will also compare earlier relics with secondary relics (the souvenirs that developed) and how the new form would still provide the pilgrim with tangible evidence of blessing and continue the contact with the saint, and, by extension, the holiness of God.
Nanometer-sized particles of metals and semiconductors have been investigated intensively in recent years because of their size-dependent properties and the possibility of arranging them in micro assemblies (and nano assemblies). In this presentation, we will present a versatile new synthetic approach to generate polyorganosiloxane encapsulated nanosilver sols by polyhydrosiloxanes induced reduction of silver salts (Scheme).

Our method enables routine formation of dispersions of silver particles in organic solvents avoiding particle aggregation during the nucleation and growth process. The kinetics of reduction reactions was compared in presence reducing agents as well as using several other catalysts. Using PMHS as reducing agents, acetonitrile was found to be better among other polar solvents viz. methanol, N,N-dimethylformamide (DMF), tetrahydrofuran and acetonitrile and toluene was suitable among different non-polar solvents.

[Scheme]

AgOAc + Me₃SiO(OSiMe₃)₂H Me₃Si
Toluene, RT
Catalyst
Surfactant

(X = Bi or trivalent donor atom)
In the central nervous system, the serotonin 1A receptor (5HT1A-R) plays an important role in neuronal communication that regulates many behavioral traits, such as anxiety and depression. The blueprints of many of these traits are made in the brain during embryonic and neonatal development. Studies have shown that when the 5HT1A-R is absent during embryonic development, the mice become anxious. However, when this receptor is present during the developmental stage and then removed at a later stage, the young adult mice are not affected. This provides evidence that most behavioral traits are characterized during the embryonic stage. This leads us to question the role of the 5HT1A-R. Our previous studies in the hippocampal neuron-derived cell line (HN2-5) have shown that in undifferentiated cells, agonist activation causes increased cell division. Also, agonist activation of differentiated cells shows the neuroprotection of the receptor against signals that trigger apoptosis. Interestingly, the same biochemical pathway via mitogen-activated protein kinase (MAPK) is responsible for the increase of cell division and neuroprotection. Based on these observations, we have hypothesized that the 5HT1A-R supports brain development by increasing proliferation of early, pre-neuronal cells. In addition, this receptor then helps in the formation of neuronal connections by protecting post-mitotic neurons when they are establishing their synapses. Using normal mice, we will use immunohistochemistry to ask if the 5HT1A-R agonist 8-OH-DPAT causes activation of the MAP isozymes ERK1/2 in embryonic mouse brain. In double antibody-labeled brain slices, we will test if the agonist-stimulated 5HT1A-R causes increased cell division in BrdU-injected mice. Here, we will treat mice with both carrier as well as 8-OH-DPAT in the absence and presence of an antagonist (WAY-100635) to verify if agonist stimulation of this receptor indeed causes increased cell proliferation. The specific role of the 5HT1A-R in this signaling pathway will be verified by performing similar experiments using 5HT1A-R knockout (-/-) mice that act as a negative control.

Templates of biological origins are known to affect the structure of the minerals formed therein. There are only a few examples in which templates of biological origin have been exploited for the preparation of nanostructured materials. To the best of our knowledge, no one has reported the effects of particle deposition and structure of nanoparticle formation in biological templates. In this research we seek to provide much needed fundamental information on nanoparticle formation and self-assembly in naturally occurring biological templates and in their polymer replicas. There are important practical ramifications of the proposed work. The semiconductor nanoparticles formed in biological templates and in their polymeric replicas may have unique electrical and photonic properties, which could be exploited for device and sensor construction.

In this presentation we will disclose our preliminary results on the structure of sea urchins and their conjugation with nanoparticles of different size and morphology (see picture). We are also studying the grafting of such porous cells for environmental redemption. Our strategy not only permits us for the quantitative generation of porous silicon materials but also allows a chemical control over the size of the pores under very mild reaction conditions. Preliminary results indicate that this material is stable under atmospheric conditions and the agglomeration of the nanostructured particles can be successfully prevented.

* Scholarship provided by the Alliance for Minority Participation (AMP) program.
Supervised learning techniques are extensively used in object recognition based on neural networks. For instance, this theory has been used for the observation of the pattern on a radar screen in the radar detection system. In the research of medical diagnosis, it has been used for the study of disease by observing the pattern of the clinical data. This theory has also been widely applied to the supervised learning for hand written Chinese, Arabic, and other character recognition to acquire recognition rules. This paper develops the theory and applications for different neural network architectures rooted in potential functions and their implementation in solving classification problems. Algorithms are proposed for teaching automata to recognize classes of input functions derived from the construction of the potential functions.

Several classification functions are considered —- multilayer perceptron and radial basis functions are involved. However, both the multilayer perceptron and radial basis functions have limitations in their applications. Because multilayer perceptron is a highly nonlinear optimization process, the training of it can be reasonably complicated. Also, it is difficult to find good parameters for the basis function centers and their variances for the radial basis functions, while the number of centers is small. It is a problem to discover an appropriate network size and fitting parameters.

On the other hand, the training of the radial basis functions is much less computationally intensive than the multilayer perceptron. Also, the networks of the radial basis functions have the best approximation ability. Therefore, the goal of this project is to develop supervised learning algorithms for feed forward and radial basis functions neural networks and a novel method for data clustering. In our research, the classification is derived from a set of potential fields synthesized over the domain on input space by several potential function units.

In order of neural networks to learn to recognize different classes of objects, many algorithms have been developed. In this research, we concentrate on the supervised learning algorithm, which uses potential functions. We try to generate the learning algorithm, which mainly contains the initializations phase, the learning phase, and the dynamic learning phase, with structural changes by using the potential functions between cluster centers and samples as the learning criterion. One of the great advantages the potential function has is that it facilitates matching of non-overlapping sets. The potential method results in higher order decision boundaries while the other method, for example, the Euclidean distance method, generates piecewise linear boundaries between classes. Therefore, we use potential function method to approach the determination of decision
functions, which generate the partition boundaries in the pattern space to separate patterns of one class from another. The analytical design of automatic pattern classification systems consists primarily in the determination of the decision functions. Our research shows that the potential functions method has more uniform similarity distribution between samples in the same class, and has smoother and more natural decision boundaries between classes. It is our expectations that applying this algorithm will give rise to a precise classification when performing object recognition.

Specific recommendations to implement the Internship model include:

1. Beginning in the freshman year, students should be able to engage in research in as many courses as possible.
2. Beginning with the freshman year, students must learn how to convey the results of their work effectively both orally and in writing.
3. Undergraduates must explore diverse fields to complement and contrast with their major fields; the freshman and sophomore years need to open intellectual avenues that will stimulate original thought and independent effort, and reveal the relationships among sciences, social sciences, and humanities.
4. Inquiry-based courses should allow for joint projects and collaborative efforts.
5. Professional schools need to provide the same inquiry-based opportunities, particularly in the early years.
6. Provision of carefully constructed internships can turn inquiry-based learning into practical experience; internship opportunities need to be widely available.

(The Boyer Report- Reinventing Undergraduate Education: A Blueprint for Americaís Research Universities)
Our research concentrates on different aspects of the CUNY Computer Science environment that involve the professional development and gender issues of female graduate students, professors and research staff. As we all know, computer science is a challenging, competitive, and difficult subject for both men and women. However, women have made fundamental and unique contributions to computer science from the early history of computers and up to the present. The last twenty years have played marginal role for women in computer science and technology. Women are making progress and gaining equal treatment from society. However, there still exist a major number of differences between men and women in the field of computer science and technology.

A key objective of our research is to identify courses of action and areas where academia can provide significant progress towards the goal of bringing and retaining more women to the computer science field. We tried to discover the problems of women facing in CS and find the solutions that enable them to grow both professionally and personally.

Our studies in the summer of year 2002 prove that there is a definite lack of women in the computer science field. The survey of CUNY female professors that we conducted clearly shows that not even 30% of teachers in the field of computer science are women. These figures are alarming and unfortunately, this problem is generally consistent with that of other scientific and engineering fields. Increasing the number of female faculty members is one of the solutions that will result in female students being encouraged more. Female students will feel more comfortable in the academic environment and will gain more self-esteem.

Many women in CS encounter particular problems that limit their academic, professional, and personal growth nowadays. What are the problems? How did they solve the problems? What is the definition of a success as a female? Why is there a gender gap in computer science? From our survey, it shows that there are two primary and consistent challenges that women face in pursuing their PhD degrees:

➢ Pressures encountered.

➢ Difficulties in balancing career and family responsibilities.

Even thought computer science is a very competitive and challenging subject. However, our survey shows that not only PhD Students but also female professors still found their life excitement and adventure in their chosen field.
ICA (Independent Component Analysis), ISA (Independent Subspace Analysis) and TICA (Topographic Independent Component Analysis) are computational and statistical techniques which attempt to find hidden factors that underlie sets of random variables, measurements, or signals when the known classic methods fail completely. Applications of these algorithms can be found in many different areas. However, the purpose of this software package is focus on the image processing. It will read any formats of image files and use ICA, ISA or TICA as the principal model for natural images. Finally, we will see that these algorithms do provide some models that are very similar to the most sophisticated low-level image representation used in image denoising.

The ICA neural network model is based on FastICA and includes the phases of whitening, separation and estimation of basis vectors for different layers. FastICA is a parallel, distributed, computationally simple network, which requires little memory space. During the whitening, the image is linearly transformed so that the resulting vector has decorrelated components, which are then normalized to unity. The FastICA algorithm was applied using the hyperbolic tangent nonlinearity. Our experimental input data are patches from colored natural images.

The implementation of this approach requires selecting suitable parametrizations and estimation of parameters. Testing all possible combination of parameters would require a huge amount of experiments. In order to restrict their number we test the influence of one or two parameters at a time. We also propose a graphical user interface (GUI), which greatly reduces the amount of the test time.
Artificial neural network (ANN) is an information-processing paradigm inspired by the way the densely interconnected, parallel structure of the mammalian brain processes information. Neural networks have been extensively used in the area of pattern classification due to their parallel computation and learning capabilities. Algorithms are proposed for trainable pattern classifiers to recognize different classes of objects based on the construction of the potential functions. The performance of a given algorithm is not only dependent on the type of data being analyzed, but is also strongly influenced by the chosen measure of pattern similarity and the method used for identifying clusters in the data.

Suppose that we want to distinguish between two pattern classes, and . Sample patterns of both classes are represented by vectors or points in the n-dimensional pattern space. If these sample pattern points are likened to some kind of energy source, the potential at any of these points attains a peak value and then decreases rapidly at any point away from the sample equipotential contours, which are described by a potential function. There are two types potential functions: Type 1 — Orthonormal functions over the region of definition of the patterns by using Hermite polynomial functions and Type 2 — a symmetrical function of two variables by using exponential form. By using potential function of Type 1, the general form of the selected decision function was quadratic. By using Type 2, the form of the decision function depends on the number of corrections made on the cumulative potential.

Selection of appropriate potential functions plays the role of the pattern classification. For the purpose of this research, we present the foundation of decision functions and their application to pattern classification. The quality of the decision functions is dependent on the complexity of the approximation chosen for these decision functions. Pattern classification consists primarily of the determination of the decision functions, which generate the partition boundaries in the pattern space to separate patterns of one class from another. When the patterns are well distributed, the algorithm yields all optimal solutions. If the classes are separable, there exists of course a unique solution. Our approach is to determine the decision functions and partition boundaries by use of the potential function.
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For comments and questions contact:

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