NE Regional
Undergraduate and Graduate Student
Sigma Xi
Poster Conference

Cornell University, Ithaca, NY
April 29th, 2006
Welcome to the NE Sigma Xi student poster conference

Saturday, April 29th, 2006, Cornell University, Ithaca, NY

Schedule:

- 9:30 to 10:30 AM - arrival, set up, and breakfast snacks
  Corson-Mudd Hall, the atrium on the first floor

- 10:30 AM to 12 PM - poster session, judging, and networking
  Corson-Mudd Hall, the atrium on the first floor

- 12 to 1 PM - "The Power of Comparative Genomics" by Andrew Clark, Professor of Population Genetics, Cornell University
  Corson-Mudd Hall, Morrison Room

- 1 to 2:15 PM - lunch, networking, and poster awards
  Corson-Mudd Hall, the atrium on the first floor

- 2:15 PM - end of session, feel free to remove your poster

- 2:30 PM - Cornell University tour, two groups
  leaving from Corson-Mudd Hall, the atrium on the first floor

Registration:
There is no registration fee and no cost for breakfast or lunch but all attendees must register;
please sign in at the registration desk and prepare yourself a name tag.

Awards:
Recommendations for your abstract and poster were published at the national Sigma Xi conference web site, and the judges will select winning posters based on these criteria.

Places of Interest:
The Lab of Ornithology, the Johnson Art Museum, and the Museum of the Earth at Cornell,
downtown Ithaca, and the nearby waterfalls

Organizers:
Please send you comments and suggestions for next year to Kestas Bendinskas (SUNY-Oswego;
bendinsk@oswego.edu) and James Mandel (Cornell University; jtm39@cornell.edu)

Acknowledgements:
We thank Sigma Xi Chapter 001 at Cornell University for hosting and sponsoring this event and
Chapter 642 at SUNY-Oswego for the preparation of all printed materials.
ROLE OF VISION IN MATING BEHAVIOR OF MALE NASONIA VITRIPENNIS

Jin J. Yun, Candace W. Collmer, A. Thomas Vawter, Christina Wahl, Wells College, Aurora, New York 13026

Like many insects, the parasitoid wasp Nasonia vitripennis displays stereotypic courtship behaviors characteristic of the species. These behaviors occur within minutes after the first exposure of males to females. The latent period before the male mounts the female and begins head nods that lead to female receptivity can be particularly important for male N. vitripennis because they are brachypterous and cannot follow a female that flies away. Courtship begins when a male pursues the female for a short distance and then mounts the female’s head. This is followed by cyclical repetitions of characteristic combinations of head nods, mouthpart extrusions and antennal sweeps that usually elicit female receptivity, followed by copulation. This research explores the effect of vision on courtship behavior in male N. vitripennis. The hypothesis was that N. vitripennis males lacking vision would be handicapped in the beginning of the courtship. Males were visually impaired by placing a small drop of diluted acrylic paint over their eyes. The results indicate that the time elapsed for visually-impaired males to begin courtship (N=39, mean=3.80 minutes) were significantly longer than that for control males (N=30, mean=2.60 minutes). This suggests that vision contributes to eliciting male courtship in this species.

Variation in gene expression in caterpillars of the tobacco hornworm (Manduca sexta).

Samantha Palmer¹, Marta L. del Campo² and Marina Caillaud¹, ¹Department of Biology, Ithaca College, Ithaca, NY 14850 USA, ²Department of Biological Sciences, Binghamton University, State University of New York, Binghamton, NY 13902-6000 USA

Food preferences of larvae of the moth Manduca sexta vary depending on the diet experienced after hatching. If neonate larvae feed on solanaceous foliage (potato for instance), they subsequently accept only solanaceous foliage. In contrast, if fed on non-solanaceous foliage or artificial diets, these larvae remain able to accept a variety of plants as food. Previous research shows that this modification in feeding preference involves the formation of a recognition template to the chemical indioside D, a steroidal glycoside so far only found in Solanaceae. Previous research also shows that this behavioral change involves chemosensory tuning to indioside D in 50% of the taste receptor cells located on the mouthparts of the larvae. We hypothesize that these changes in taste receptor responses may be due in part to changes in gene expression in these cells. To test this hypothesis, and to identify genes that are differentially expressed, caterpillars were reared until the 5th larval instar on either potato foliage or wheat germ artificial diet. Two types of tissues were collected from these caterpillars: maxilla containing taste receptors as well as the maxillary palp, and the dorsal abdominal horn containing neural tissue but no taste receptors (control tissue). Total RNA was extracted from each tissue type, in each type of caterpillar, and turned into cDNA. The profile of cDNAs generated in each tissue and type of caterpillar was compared by differential display. Differentially expressed cDNAs were extracted from polyacrylamide gels, reamplified by PCR, and then sequenced.

Role of multiple disulfide bonds in the structure stabilization of lysyl oxidase

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Lysyl oxidase (LOX; protein-6-oxidase; EC 1.4.3.13) is the key enzyme in elastin and collagen maturation. It initiates the formation of the cross-links that provide the required strength and flexibility of these important structural proteins. This 32 kDa, highly conserved protein is difficult to isolate in large quantities and has poor solubility precluding its three-dimensional structure determination. Biochemical studies of this enzyme showed its requirement for copper (II), which explains some of the pathologies where the inhibition of LOX is directly or indirectly involved. To clarify the mechanism underlying the inhibitory effect on LOX, molecular dynamics simulations of native and mutant enzyme were performed to elucidate the functional role of some of the conserved residues in the catalytic mechanism. The structural elements that are responsible for the accessibility of the active site are identified and potential inhibitory effects will be discussed. The network-skeleton of the disulfide bond arrangement is the major contributing factor to the tertiary structure of LOX.

It was reported earlier that the enzyme has 10 conserved cysteines organized into five disulfide bonds. Though the disulfide bond formation is one of the most important factors influencing the three-dimensional fold of proteins, nothing is known about the disulfide bond patterns in this enzyme. The location of disulfide bridges can strongly reduce the search in the conformational space and help illuminate the three dimensional structure of lysyl oxidase. A variety of recursive neural networks and evolutionary information prediction methods followed by energy minimization techniques (Macromodel, Schrödinger Inc.) were used to determine the disulfide bond arrangement in this enzyme. Here the identification of the disulfide bridges of lysyl oxidase and its tertiary structure are proposed for the first time.

Cross-cultural differences in the predictors of depression: The U.S. and India

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This cross-cultural study examines the role of perceived stress, social support (family and friends), and locus of control on depression. 322 college students in the U.S. and India completed the Perceived Stress Scale, the Multidimensional Scale of Perceived Social Support, Rotter's Locus of Control Scale, and the Center for Epidemiological Studies - Depression Scale. Results indicated that while the mean levels of social support, locus of control, and perceived stress were not significantly different between the two countries, their respective roles as predictors of depression were significantly different. Correlational and regression analyses, and tests for significance between correlations using Fisher's r to z transformation revealed that perceived stress was a significantly better predictor of depression for Americans than for Indians, while social support of family was a significantly better predictor of depression for Indians than for Americans. The present study is essential for understanding the dynamics contributing to depression in different cultures. Other findings and implications are further explained.

North Atlantic right whale presence and the abundance of copepods in the Gulf of Maine

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Each winter and spring a portion of the North Atlantic right whale (Eubalaena glacialis) population enters the Cape Cod Bay (CCB) critical habitat to feed and to nurse their young. Later in the spring, aggregations of right whales are found feeding and socializing in the Great South Channel (GSC) critical habitat (east of Cape Cod), a region that is transected along its nearshore boundary by the Boston shipping lanes. There have been several documented
right whale-vessel collisions in the past two decades in the vicinity of the shipping lanes, likely a result of the overlap between the right whale spring distribution and the vessel routes. Right whale movements within and between the CCB and GSC habitats are thought to be driven by their need to feed on ultra-dense patches of copepods. Unfortunately, it is difficult to sample with the frequency and resolution needed to identify these patches. Using aerial sighting data of right whales and measurements of copepod abundance from vessel-based oceanographic sampling, we test the hypothesis that regional-scale average copepod abundance is an indicator of right whale presence in the CCB and GSC critical habitats. Our analysis shows a strong time-averaged correlation between the copepod *Calanus finmarchicus* and right whale abundance in the Great South Channel. The relationship between copepods and right whales in Cape Cod Bay is less clear, suggesting that resource acquisition is not the only reason right whales visit this habitat. Understanding the relationship between region-wide average concentrations of copepods and presence of right whales could provide managers with a useful proxy to right whale abundance, which may in turn support management strategies to balance right whale conservation with the fishing and shipping demands in the region.

#6
Principal Component Analysis of LMC RR Lyraes
Greg Feiden and Shashi Kanbur, Department of Physics, SUNY Oswego, Oswego, NY 13126

We present a Principal Component Analysis (PCA) of 4000 RR Lyrae stars in a nearby galaxy, the Large Magellanic Cloud (LMC). The PCA method allows a much more efficient description of the non-linear structure of the light curves of these variable stars than existing Fourier methods. We also show that this sample of stars exhibit Period-Color properties that can be explained by a simple application of the Stefan Boltzmann law and a consideration of the relative location of the photosphere and the hydrogen ionization front. We briefly discuss the possible applications of these results.

#7
Metallicity effects in Cepheid infra-red light curves
Dylan Wallace and Shashi Kanbur, Department of Physics, SUNY Oswego, Oswego, NY 13126

A critical component in evaluating cosmological models is the extra-galactic distance scale and crucial to a firm foundation for the extra-galactic distance scale is the metallicity dependence of the Cepheid Period-Luminosity relation. As a prelude to studying the metallicity dependence of the infra-red Cepheid Period-Luminosity relation, we present a study of the non-linear structure of Cepheid light curves in the Large Magellanic Cloud. We use both Fourier analysis and Principal Component Analysis to study this structure and show that Principal Component Analysis is a much more efficient way of studying light curve structure than Fourier analysis.

#8
Non-Enzymatic Glycosylation of Bovine Albumin and Gamma Globulin
Dr. Albert Notation, Jeffrey Smith, Quinnipiac University, 2508 Whitney Avenue Apt. Q, Hamden, CT 06518

Published reports describe Advanced Glycosylated End Products (AGEs) that form when albumin reacts non-enzymatically with glucose at physiological pH. A study using polylsine demonstrated that the γ-amino group on lysine incorporated in a polypeptide leads to the formation of the compound, 2-(2-furoyl)-4(5)-2(furanyl)-1H-imidazole (FFI). This study sought to determine to what degree the protein, gamma globulin, would undergo similar physiochemical changes when placed in the presence of D-glucose for long periods of time. Samples were studied for UV-visible absorbance, fluorescence, and electrophoretic migration. Based on the results, glycosylated gamma globulins exhibited increased absorbance compared to glycosylated albumin based on UV-
visible spectroscopy. Research using electrophoresis showed that the level of
glycosylation was much more distinguished in the gamma globulins as compared to
the bovine albumin samples.
RETRONASAL AND ORTHONASAL ADAPTATION: SIMILAR OVER 60 SECONDS

Orthonasal adaption for odorants is well studied but not retronasal adaptation. Retronasal and orthonasal judged intensity were tracked by 22 non-smoking unscreened subjects (14 females, median age = 21). Five vapor-phase odorants (anise, coffee, orange, peppermint, and strawberry) were first matched for intensity orthonasal-only and retronasal-only in a non-tracking task to a common standard, then tracked over 60 seconds 5 times each in random order. Results show that times to initial, maximum, and final intensity did not differ significantly between orthonasal and retronasal smelling, and mean final intensities were less than initial intensities. However, one intensity change did differ between orthonasal and retronasal smelling. Mean orthonasal intensity increased 10% between initial and maximum, with final intensity 19% below initial. In contrast, mean maximum retro intensity was not significantly different from initial intensity, but final retro intensity was 17% less than initial. Another difference was that mean absolute retro intensity was 20-22% less than ortho. These results suggest that retronasal and orthonasal smelling have similar decreases in judged intensity over 60 seconds, although orthonasal but not retronasal intensity increases before decreasing.

Stabilization of mutant forms of Cox2p by deletion of YME1 and overexpression of PETIII
Martin Tomov and Vicki Cameron, Ithaca College, Biology Department, 164 Center for Natural Sciences

Cytochrome c oxidase (CcO) is the terminal member of the electron transport chain and is required for cellular respiration. To better understand this enzyme complex, we have isolated a collection of respiration deficient yeast strains which carry missense mutations in subunit II of the CcO complex. Many of these strains have very low steady state levels of the mutant Cox2 protein (Cox2p). Work by others has shown that unassembled wild type Cox2p is degraded by the chaperone YME1 and that the unassembled wild type protein can be stabilized by deletion of YME1. Additionally, levels of wild type Cox2p can be increased by over-expression of the PET111 gene. We wish to determine if the steady state levels of the mutant Cox2 proteins can be increased by deletion of YME1, over expression of PET111, or both simultaneously. We are engineering our cox2 mutant strains to accomplish these alterations in expression of YME1 and PET111. Data will be presented confirming the alterations, the effect of the alterations on steady state levels of Cox2p and on the ability of the strains to carry out cellular respiration.

Impact of Digital Divide Remediation on Income and Public Assistance Use
Maria Paino, Frank Ridzi, Le Moyne College, 1419 Salt Springs Rd; Syracuse, NY 13214

This research is a program evaluation which examines the Syracuse Housing Authority's (SHA) "Neighborhood Networks" (NN) Program. This program has allowed residents within the SHA residences to gain access to computers, technology, and information, at the site of their housing development. We examine whether or not having this access has improved economic self-sufficiency among the residents by measuring both their income levels and public assistance levels at Time 1 (Nov 2001), before any computer labs or elements of the program had been implemented, and at Time 2 (Nov 2005), after all labs had been implemented. There is a comparison group, which has not received access to this program due to internal politics of the building; thus, it is not a random assignment. Using the data mentioned above we examined whether or not this program had assisted with economic self-sufficiency among
residents. We conclude, after controlling for numerous demographic variables, that implementation length of the NN Program is statistically significant in terms of resident income; however, other factors appear to be influencing public assistance levels.

#12
The Characterization of Biodegradable Polymers based on Hemicellulose
Dr. Arthur J. Stipanovic & Jennifer S. Haghpanah, Quinnipiac University, 197 Sugar Street, Hamden CT 06518

The projected annual production of biomass in the United States is 1.3 billion tons of biomass per year, and twenty seven percent of the total comes from forests. In this study, hardwood hemicelluloses and other hemicelluloses from switchgrass were blended with polyesters and cellulose esters to form homogenous, biodegradable, thermoplastic polymers. Commercial cellulose esters and polyhydroxyalkanoates were first dissolved and then blended with hemicellulose to generate new biodegradable hemicellulose-based polymer materials. These materials were then characterized using differential scanning calorimetry, nuclear magnetic resonance spectroscopy, thermal gravimetric analysis, and dynamic mechanical analysis. The information obtained suggests the glass transition of hemicellulose/ lignin composites to be around 60 degrees. The blend of hemicellulose/ lignin composites with cellulose esters and bacterial esters tended to shift the glass transition.

#13
SPME of Natural Flavors in Candies by GC-MS
Haibi, L., Pylypiw, H, Quinnipiac University, 223 Spring St., Meriden, CT 06451

A simple solventless extraction technique called solid phase micro extraction has been utilized in order to develop a method for the qualitative and quantitative analysis of flavor components in hard candy. Several flavored candies such as lemon, wild cherry, and horehound have been analyzed by the proposed method. The observations obtained include compounds typically found in natural flavorings such as limonene, methyl salicylate, and benzaldehyde. The suspected flavors were obtained by GC/MS library matches of 90% or better and these various peaks were confirmed to be actual flavor analytes by authentic standards. An effort was made to quantify the compounds in the range of 0.5 ppm per compound. Results of this study will be presented along with full method details.

#14
Ambiguous Complex Sentences: The Labyrinth of the Child’s Mind
Michele Segalini, Marisa Kimmel, Emily Carlin, Megan Ferris, Hazel Chi, Dr. Barbara Lust, Cornell Language Acquisition Lab, Cornell University, G17 Martha Van Rensselaer Hall, Ithaca, NY 14853

One of the greatest mysteries of human development is how the child acquires language, and does so within the first three years of life. It is especially intriguing when children are able to comprehend and produce seemingly simple sentences that are actually syntactically and semantically complex. One example of a complex sentence is one that uses “Verb Phrase (VP) ellipsis,” such as when the verb phrase of a sentence is replaced by the sequence “does too.” For example, in the sentence “Bert licks his ice cream and Ernie does too,” the verb phrase “licks his ice cream” is replaced by “does too” in the second clause. Since the verb phrase is not explicitly stated, the child is forced to recreate it in his or her mind. This sentence is also semantically ambiguous due to the usage of the pronoun “his,” resulting in multiple grammatically correct interpretations. We are currently assessing the knowledge of these sentences in children through the use of the Elicited Imitation (EI) task. During the EI task, children are asked to repeat sentences that have been created using an experimental design that controls for a variety of factors including both VP elided and expanded (no VP elision) sentences, definite and indefinite articles, alienable and inalienable objects, the presence or absence of pronouns, and finally voiced and unvoiced sounds in
verbs. Children from 2 years, 3 months of age through 6 years, 1 month of age have been tested. Preliminary results will be reported from a subset of 3- to 4-year-old children tested, with regard to each of the factors used in our design.

#15-G
A Tale of Two Foodsheds: Mapping Local Food Production Capacity Relative to Local Food Requirements
Christian J. Peters, Arthur J. Lembo, and Gary W. Pick, Cornell University, 515 Bradfield Hall, Department of Crop and Soil Sciences, Cornell, NY
Similar in concept to a watershed, a foodshed demarcates the area from which a population derives its food supply. We tested two approaches to mapping potential local foodsheds and estimating the minimum distance within which food needs could be met for Rochester, New York. One method uses an iterative approach involving buffer zones. The other method uses a linear optimization model. Results from both approaches indicate that the basic caloric needs of Rochester could be supplied within a short distance, an average of 10.7 km (optimization) to 17.5 km (buffering). Because of the ability to consider multiple cities simultaneously, optimization is the superior approach.

#16
An Investigation of New York State Finger Lakes Snow Band Events
Helen Carr, Hobart and William Smith Colleges, 2243 Scandling Center, Geneva, NY 14456
The Finger Lakes region of New York State harbors a collection of small lakes with differing sizes which produce lake-effect snow systems. Most of the previous research concerning lake-effect systems has been focused on large lakes, such as the Great Lakes and the Great Salt Lake in Utah, with few investigations examining lake-effect systems over small lakes. Using the Binghamton, NY WSR-88D radar, a climatology of lake-effect and lake-enhanced events was developed over a period of ten winters (October through March) from 1995 to 2004. The 107 events identified provided information on the seasonal and interannual frequency, the duration, and the timing of lake-effect occurrences.
Two case studies were chosen, 2 December, 2002 and 14 February, 1999, to examine the development and evolution of lake-effect events in more detail. In each case, the environmental factors thought to have contributed to the NYS Finger Lake snow band development were examined. Factors determined by previous research that influence lake-effect development include wind direction and speed, lake-850 mb temperature differences, and the height of the inversion layer. A GIS analysis was performed for each event using radar data and snow spotter information from the Binghamton National Weather Service office to determine event-accumulated snowfall distributions and locations which experienced the greatest storm impacts.

#17
The Trainability of Planaria (Dugesia tigrina) for Directional Preference
Sara M. Abbott and Gene K. Wong, Quinnipiac University, 275 Mt. Carmel Ave., Hamden, CT 06518
Planaria (Dugesia tigrina) are freshwater flatworms with a rudimentary brain and synaptic nervous system, suggesting the ability to learn. To re-examine whether planaria have a directional bias and the ability to learn, planaria were run through Y-mazes in pre-training, training, and post-training sessions. Each of these sessions involved 3 trials on 3 consecutive days, with each trial consisting of 10 successive runs through the Y-maze. The pre-training period determined the initial directional bias of planaria and was the basis of assigning a training direction. Planaria were trained to select a specific direction in the Y-maze by using an electrical shock as a negative stimulus when the wrong arm was selected. Post-training analysis was performed to determine if planaria retained their trained behavior. Control planaria were not shocked during the training period, and allowed to freely select their
direction. When observed on individual days, some planaria appear to have a directional bias. However, as cumulative results over 3 consecutive days are compiled, the majority of planaria display no directional preference or are non-bias. Experimental planaria showed changes in their directional bias during the training period, but then returned to the same percentages of directional bias as the controls in the post-training session. Throughout all trials the control planaria maintained approximately the same percentages of directional bias for each individual day. The trained planaria do not appear to retain their trained behavior under the set conditions. Planaria show evidence of being trainable, but the 3-day training period, totaling 30 runs, does not appear to be enough time for planaria to retain their training. Hence, an extended training period is probably required to ensure longer retention in the post-training period.

#18
Directional Bias in Planaria (Dugesia tigrina) Before and After Regeneration
Daynna L. Moriello, Sean Wilsusen, and Gene K. Wong, Quinnipiac University, 275 Mt. Carmel Ave., Hamden, CT, 06518

Planaria (Dugesia tigrina) are freshwater flatworms with the ability to regenerate lost body parts. Preliminary works on directional choices of planaria in Y- and T-mazes have suggested that a majority in a planaria population favor turning in one direction. Bianki et al. noted that 1/3 to 1/2 of tested planaria had a directional preference, while a search of other works has found no mention of a bias. To confirm whether or not planaria have a directional bias, flatworms were placed in Y-mazes and their left or right travel recorded. A trial for a planaria was 10 consecutive runs each day, over 3 successive days, after which half were cut transversely and allowed to completely regenerate. Both uncut and regenerated segments were retested for directional bias. Results suggest that the test period and number of trials can influence the perception of whether planaria have a directional bias, bringing into question some of the results of previous studies using directional mazes. Regenerated segments of planaria show similar findings. In addition, the majority in a planaria population are non-bias (no directional preference) both before and after regeneration.

#19
Planaria (Dugesia tigrina) Directional Bias in an Open Environment
Meghan E. McCarthy and Gene K. Wong, Quinnipiac University, 275 Mt. Carmel Ave., Hamden, CT, 06518

Preliminary work on directional choices of planaria in Y-mazes suggested that a majority favored turning in one direction. Bianki et al. noted that 1/3 to 1/2 of tested planaria had a directional preference, while a search of other works has found no mention of a bias. When tested in Y-mazes over 3 consecutive days before and after regeneration, it was found that planaria exhibited no directional bias. The question arose of whether planaria would also exhibit no directional bias before and after regeneration in an open environment as oppose to a directional maze where turns are forced. To answer this question, planaria were recorded for 30 minutes for 3 consecutive days before and after regeneration. The recordings were analyzed upon review. The results suggest that planaria when placed in an open environment do no have a directional bias. The results also suggest that generally planaria take the same amount of time to change their behavior regardless of the number of behaviors they exhibit in a given time.

#20
Characterization of opsin genes in bat retinas
Kathryn Feller and Dr. Kristy Kenyon, Hobart and William Smith Colleges, 2328 Scandling Ctr, Geneva, NY 14456

This study characterizes the expression of cone opsin genes in retinal tissue from the Microchoptera bat subspecies Myotis lucifugus. Previous research has shown the presence of a possible ultra-violet sensitive cone opsin in both
Megachiroptera and Microchiroptera bat species. Using the polymerase chain reaction, we amplified a 694 base pair fragment from retinal cDNA generated from several specimens. Sequence analyses revealed that this amplified fragment corresponded to a SWS1 cone opsin. Based the presence of critical amino acid sites characteristic of UV opsins within these sequences, we determined that Myotis lucifugus does express the gene sequence for the short-wavelength sensitive opsin previously characterized in bat genomic DNA. It is also likely that this opsin has UV spectral sensitivity due to the corresponding critical changes at specific amino acid sites outlined by Yokoyama and Yongsheng in 2000.

#21
The other man: how sexual behaviors change when the female has a partner
MEG BELLARD, REBECCA BURCH, SUNY OWEGO, 404 MAHAR HALL, OWEGO NY 13126

Previous research has shown that males perform more semen displacement behaviors (altering speed, depth and vigor of thrust) when separated from their partners or suspicious of partner fidelity. Although some have argued that the increased thrusting could be the result of anger at female infidelity, this would not be expected to be the case when a male willingly has intercourse with a woman in a relationship. We examined changes in thrusting behaviors when the male knowingly has sex with a female who has a partner. When in this situation, males reported thrusting quicker, deeper, and with more vigor. Males also reported an easier and more intense orgasm when having sex with someone in a relationship and attempting to prolong intercourse for as long as possible. Females did not.

#22
Marriage as a reproductive contract, wedding as a reproductive ritual
RACHEL BURGESS AND REBECCA BURCH, SUNY OWEGO, 404 MAHAR HALL, OWEGO NY 13126

Buckle et al., and various works of Helen Fisher have examined patterns of marriage and determined that marriages serve as a reproductive contract between men and women. Marriage in the vast majority of cases lasting for periods of time sufficient to raise a child until it can care for itself. Patterns of marriage and divorce also show the genders acting in their own reproductive best interests, for example, men initiating divorce later in life to find younger, more fertile partners. With this in mind, we investigated the rituals, symbols, and ceremonies associated with marriages across several cultures. In each culture, the wedding ceremony contains rituals of reproduction and fertility (which is of importance to both sexes, but especially men), but also displays of wealth and resources, which is of particular evolutionary interest to females.

#23
The reproductive priming effect: Does behavioral change lead to more dating opportunities?
COURTNEY CONDON AND REBECCA BURCH, SUNY OWEGO, 404 MAHAR HALL, OWEGO NY 13126

Dating opportunities sometimes seem to vary as a function of an individual's relationship status: paradoxically increasing when in a new dating relationship and decreasing when not in a relationship. We call this the "reproductive priming effect". Previous research showed that 83.7% of respondents had noticed an increase in dating opportunities during the beginning of a new relationship and the frequency of this effect was correlated with heterosexual sexual activity. Our follow up study examines this phenomenon in more detail, investigating psychological mechanisms (increased confidence, decreased anxiety) behavioral changes (going out more, being more accessible, appearance changes) and/or physiological changes (alteration in endogenous hormonal and/or pheromonal production) that take place during the development of a new relationship. Data indicate that psychological and behavioral changes are not significant and are not sufficient to explain the phenomenon.
The role of paternal absence in partner preferences, gender role, and sexual behavior
Authors: KYLE MCAULIFFE AND REBECCA BURCH, SUNY OSWEGO, 404 MAHAR HALL, OSWEGO NY 13126

The absence of a father or paternal figure has been shown to hinder or damage self-esteem, college attendance, emotional well-being, and attachment formation. Absent fathers are defined as those who do not interact with their children on a regular basis and consequently do not play a significant role in their development. Studies investigating the physiological mechanisms triggering this precocial development, and subsequent sexual behavior and mate preferences, have been confounded and contradictory. Boyd and Parish utilized a college age sample to study levels of androgyny and found no differences among female respondents. However, these researchers failed to examine the timing of paternal departure, subsequent pubertal development and its effects on mating preferences. This study examines the effect of paternal absence, family structure, and support on sexual and gender development and mate preferences and takes these concerns into consideration. It appears that paternal absence in the lives of females shifts preferences to less reliable mates but does not have the same effect in males.

Gram-positive and Gram-negative Bacteria Utilize Distinct Mechanisms To Inhibit Epithelial Cell Motility And Proper Healing Of Skin Cell Wounds
Ashley Battista, Andrew Mullen, and Kirwin Providence, Ithaca College, 953 Danby Rd., Ithaca, NY, 14850

Cell migration is essential to the global program of tissue repair, and host-derived “factors” can profoundly influence the tissue repair process. Plasminogen activator inhibitor type-1 (PAI-1), a serine protease inhibitor important in the control of barrier proteolysis and cell-to-matrix adhesion is an example of a host factor that supports the cell migratory phenotype. We previously demonstrated that PAI-1 mRNA/protein accumulation was induced early after keratinocyte monolayer scraping in an in-vitro model of cutaneous wound healing. Digital time-lapse photography, cell motility assays, and immunoblotting analysis reveal that the wound-induced expression of PAI-1 is specific to the migratory cohort of surviving cells along the wound edge. Antisense down-regulation of PAI-1 synthesis inhibited normal injury repair over a 24 hour period. This study was initiated to determine the effect of two pathogenic species of bacteria on the normal skin tissue repair process. We report that the presence of either Staphylococcus aureus (a Gram positive bacteria), or Enterobacter aerogenes (a Gram negative bacteria) inhibited injury repair over a 24 hour period with keratinocyte motility kinetics similar to antisense PAI-1 treated cultures. This data suggest that these microorganisms may inhibit injury repair by affecting the wound-induced expression of PAI-1. To assess this possibility studies were designed to determine PAI-1 expression using monolayers of keratinocytes scraped in the presence of either S. aureus or E. aerogenes. Our findings implicate the participation of PAI-1 in epidermal wound repair, and suggest the existence of two distinct molecular pathways utilized by Gram-positive and Gram-negative microorganism during their pathogenesis.

A Climatological Study of Lake Champlain Lake Effect Snows In Northern New York and Vermont
Jared Desrochers, Hobart and William Smith Colleges, 3328 Scandling Center Geneva NY, 14456

A number of recent studies have indicated that lake-effect snows can occur in association with lakes of significantly smaller size than the Great Lakes. As an example, Lake Champlain lake-effect storms can generate snowfalls as great as large-scale winter storms and on rare occasions produce snow squalls with
visibilities less than ¼-mile and up to 33-cm (13 inches) of snow in a 12-hour period. To establish a more complete picture of the lake-effect snows in the vicinity of Lake Champlain, a climatological study has been undertaken to determine the frequency and environmental conditions favorable for these events. Additionally, the complex topography of the Adirondacks to the west and the Green mountains to the east of Lake Champlain provides a natural laboratory to investigate the influence of terrain variations on the development of lake-effect systems in this important region.

The current study used Burlington, VT Weather Surveillance Radar 88 Doppler (WSR-88D) radar data to examine lake-effect events for winters (October – March) beginning in 1997; the deployment date of the Burlington WSR-88D radar. Intense coherent lake-effect snow bands and widespread lake-effect snowfall patterns were observed during the climatological analyses with identified events occurring most frequently during the months of December and January. The majority of lake-effect systems developed independent of larger-scale weather systems and events were found to occur during time periods of northerly or southerly flow environments. Southerly flow events were a unique finding since lake-effect systems on other small and large lakes only occur during northerly flow regimes.

#27
Making cell models from unicellular alga Chlamydomonas reinhardtii
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Chlamydomonas reinhardtii are biflagellated unicellular algae. They are used as a model system for studying the eukaryotic flagella. Functions and processes that occur within flagella are still not completely known. In order to have a better understanding of these processes and functions, the flagella need to be demembranated of the plasma membrane to be better studied. This research focused on using different detergents to demembranate but not disrupt the flagellar composition in order to make better cell models resembling live cells.

The three different detergents used were Nonidet P-40, Tergitol, and Octylglucoside. Different concentrations of these detergents were tested to determine which disrupted the flagella the least. Previous research had shown that Nonidet P-40 is the detergent used in making cell models, however the two other detergents were used in isolating the axonems. We determined that Nonidet P-40 is the best detergent to make cell models. Cells treated with different concentrations of the other two detergents were either not affected at all, or seemed to lose their flagella. Further research will focus on using Nonidet P-40 to make cell models, which will then be treated with different drugs to test for any effects.

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Location and Characterization of HSP70 in Chlamydomonas Flagella
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Flagella and cilia are composed of a diverse array of proteins that enable eukaryotic cells to swim through watery environments, pass liquids over their surfaces, or glide along solid substrates. Some recent work on the structure of flagella, specifically on the central pair microtubules, has shown the presence of two proteins of interest. One protein is homologous to heatshock proteins and has been found to be HSP70, while the other is enolase, an enzyme that is active in glycolysis. After some initial work on flagellar locations of enolase, the presence of HSP70 was examined. Heatshock proteins were thought to act simply as molecular chaperones, aiding in the folding of other proteins, but recent studies have shown they carry out other functions in eukaryotic cells as well. Indirect immunofluorescence with HSP70-specific monoclonal antibodies was used to examine the distribution of the protein along the length of wild-type and mutant Chlamydomonas flagella lacking a known HSP70 containing projection. The use of several detergents and their abilities to disassociate flagellar proteins including HSP70 was examined by SDS-PAGE and Western
Preliminary data has shown a punctuated signal along the length of flagella indicating the presence of HSP70.

Aggressive Response of Mandrills Related to Zoo Visitor Characteristics
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Aggressive behaviors of mandrills (Mandrillus sphinx) directed toward zoo visitors was studied at the Rosamond Gifford Zoo in Syracuse, NY. A sign on the mandrill’s exhibit instructs zoo visitors on how to “make a mandrill smile.” We used scan sampling and recorded all occurrences of aggression to assess visitor response to the sign and mandrill response to the visitors. Number of visitors, pink or red clothing (higher ranking male mandrills have redder noses), and aggressive facial expressions and gestures were related to higher mandrill aggression. A follow-up study will test whether removal of the sign will reduce mandrill-visitor aggression.

A Korean Child’s Bilingual Development of English in Word Knowledge and Pragmatic Skills
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Early childhood bilingualism deserves much rigorous investigation because of its mysteriously expeditious development and potential effects on linguistic, cognitive, and neuroscientific outcomes. In this case study, we report preliminary results from our ongoing longitudinal observational and experimental study of a male child (D.O.B. 10/16/2002) who is acquiring English as a second language in an exclusively English-speaking pre-school environment. The purpose of this study is to capture and describe how the development of English and Korean occurs in several linguistic and behavioral aspects, which includes the lexical and pragmatic knowledge. For our general understanding of the child in his bilingualism environment, we include an analysis of the VLL Child Multilingualism Questionnaire. To assess the child’s lexical knowledge, a measure of receptive vocabulary test called the Peabody Picture Vocabulary Test has been given in two language versions (English and Korean) at two different time points (11/2005 and 03/2006 respectively). For the change of pragmatic skills over time, we gave the Pragmatics Profile of Early Communication Skills to the child caregivers and analyzed their reports. We also looked into our observational data in videotapes to see whether the child manifests any noticeable changes in linguistic behaviors in free play settings with the child’s peers and/or teachers. At the present point, the child still maintains more advanced lexical knowledge of Korean, his mother tongue, than that of English but he is developing appropriate communicative skills in English as a second language, which is a potential for more improvement of English in the future.

A Chinese Child’s Bilingual Language Development in English-Lexical, and Pragmatic Aspects
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Developing children, when exposed to a second language learning environment sequentially after the acquisition of their first language, can become bilingual effortlessly. However, given that this bilingual process occurs rapidly, it is often difficult to draw a precise picture of the development of a complex linguistic system. For the reason, a female mandarin-speaking child (3;1 at the beginning of the study) was selected for this longitudinal case study with a combined methodology of observation and experiment. The goal of this study is to illustrate the general linguistic development of the subject in English over time in light of the bilingual process. To accomplish the goal
methodologically, several measurements were employed; the VLL Child Multilingualism Questionnaire; the Peabody Picture Vocabulary Test; the Pragmatics Profile of Early Communication Skills. Also, for broader understanding on the development of lexicon, findings from the previous studies of monolingual children were addressed with the data of this study comparatively. Reports on pragmatic inventory and analyses of the videotaped observation attested the subject’s gradual progress in communicative skills. With respect to the growth of lexicon, the subject showed a consistent development across two different testing points (3;3 and 3;7). However, the scores of the subject on the vocabulary test were not comparable (i.e., lower) to those of English monolingual children. It seems safe to infer on a scientific basis that the subject has developed the lexical and pragmatic aspects in English. Extended observation and experiments should be done to check the stability of the subject’s first language. Further researches on different linguistic aspects are suggested and additional comparisons to the data of English monolingual children should also be followed to catch up the lexical difference.

Investigating the Effects of Bilingualism in Attentional Control: Evidence from a Modified Dimensional Change Card Sort Task
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Advantages in attentional control have been found in bilingual as compared to monolingual children in previous studies; however, other studies have found conflicting data, especially when the DCCS task was given as a measure. We speculated that these contrasting outcomes are associated with striking age-related dissociation phenomenon found on the DCCS, which may overrule bilingualism effects. Thus, the present study examines the impacts of bilingualism by using a more strenuous DCCS than the standard DCCS. In this new version, we increased difficulty levels by adding a negative priming feature and conflicting knowledge-action questions to further probe the robustness of bilingual cognitive advantages. Our hypothesis is that if bilingualism advances facility attentional control, then beneficial effects of bilingualism should replicate in the modified DCCS, if not on the standard DCCS task. This study consists of 25 English monilinguals (M = 51 months) and 26 bilinguals (M = 54 months). The Peabody Picture Vocabulary Test (PPVT-III) was used to access receptive lexical knowledge in English. Bilinguals’ background of their primary languages was also assessed. The bilinguals scored significantly lower (p < .01) on the PPVT than the monolinguals. However, no significant differences in favor of bilingualism were found on the modified DCCS task. This study raises questions about the interaction between lexical knowledge on the PPVT and performance ability on the modified DCCS. Our bilinguals’ significantly low PPVT scores may have negated the cognitive advantages found in prior studies. Language ability, age, and the nature of the task will be further discussed.

Comparison of Archaeological and Magnetic Methods for Identification of Subsurface Features
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Cesium magnetometry records small variations in the magnitude of the earth's local magnetic field caused by subsurface features. This study uses a cesium magnetometer in an attempt to identify the subsurface remains of prehistoric houses. The ability of this magnetic method for identifying the subsurface remains of housing structures is compared with noninvasive and invasive archaeology methods. Data was collected at a 1000-year-old pithouse village site in New Mexico and at a 400-year-old longhouse village in New York. The results from the longhouse site indicates that our model for identifying longhouses in magnetic data needs to be rethought. In contrast, our model for
pithouse identification is sound and matched the results of the archaeological methods as well as the excavations of two pithouses. Cesium magnetometry is of interest to researchers such as archaeologists due to the rapid data acquisition, immediate feedback, and the ability to survey large sites without disturbing subsurface features.

Recruitment to Food Sources by Foragers of the Stingless Bee, *Melipona beecheii*
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Stingless bees (Apidae: Meliponinae) have evolved an interesting communication language in which foragers may indicate food location to nestmates using mechanisms that include piloting, pheromone markings, stereotyped behaviors, sounds and vibrations. The study of this group has initiated a controversy as to how stingless bees recruit nestmates to sites and what specific aspects of a message are being signaled with each mechanism. Using the little studied *Melipona beecheii* in Costa Rica, the following questions are being studied: (1) Do foragers recruit nestmates to sites? (2) If so, what are the mechanisms for such communication? (3) Do these occur inside the nest, outside the nest, or both? In the fall of 2005, recruitment experiments were conducted with paired feeder arrays varying one aspect of the food at a time (distance, direction, or quality). Preliminary tests of distance communication showed that *M. beecheii* foragers do recruit a significantly higher number of nestmates to experimental feeders at 40-80 meters, relative to control feeders at 20-40 meters. Current video analysis will determine whether foragers signal any aspect of location inside the nest by performing behaviors or sounds associated with a particular site. Further recruitment experiments will determine if experienced foragers “pilot” nestmates to feeders outside by timing the departures-from-nest and arrivals-to-feeder of foragers and recruits, predicting that a short time lag (<2sec) between arrivals of foragers and recruits, could support the hypothesis that piloting is being used. Since *M. beecheii* has not been studied in this context, the present project will help resolve the controversy regarding the mechanisms of communication used by *Melipona* bees.