

Los Angeles



Back Row: Cynthia Carrion, Dung "David" Tran, Julie Garchow, Denise Guzman, Yihong Sui, Erin Yokoyama
Front Row: Ephrem Asfaw, Amanuel Asmamaw, Giselle Galang, Jamie Burke
Photo Not Available: Kathryn Demps, Alana Lerner, Angela Venegas

Characterization of Open Reading Frames UL23 and UL30 of Human Cytomegalovirus

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Open reading frames (ORFs) UL23 and UL30 of Human Cytomegalovirus (HCMV) were subcloned into a mammalian cell expression vector pCMV-FLAG with FLAG epitopes at the C-terminus. *Escherichia coli* DH5 α cells were transformed with the recombinant vectors to obtain multiple copies for mammalian cell transfection. Human fibroblast cells will be transfected, and anti-FLAG antibodies will be used to detect the subcellular localization of the UL23 and UL30 gene products. The ORFs will also be cloned into a retroviral vector in order to establish a stable cell line for complementation studies. Overall, the gene products of UL23 and UL30 will be characterized as to their function in HCMV infectivity and reactivation from latency.

Functional Interaction of the Corepressor Groucho with Histone Deacetylase Complex Members Sin3 and Mi-2 in *Drosophila*

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Transcriptional repression mediated through histone deacetylase (HDAC) complexes is widespread. Mechanisms by which HDAC complexes act have been revealed by studies *in vitro* and in cell culture. Studies using Groucho as an affinity reagent to purify proteins from crude embryo extracts identified HDAC1 as a Groucho-interacting protein. We investigated whether Groucho interacts genetically with Sin3 and Mi-2 and sought to define the effect of HDAC inhibitors on Groucho-induced phenotypes observed during wing development. When Groucho was overexpressed in wings, improper vein formation and blistering was observed. Multiple crosses were made to generate progeny which were singly and doubly heterozygous for mutations in Groucho

(gro E48, a strong hypomorphic allele) and HDAC alleles. Mutations in both alleles had synergistic effects on embryonic lethality and pattern formation. These findings support the view that Groucho-mediated repression might involve direct recruitment of HDAC complex members.

Communicating in Networked Infomechanical Systems

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The ability to remotely monitor the dynamics of a natural environment is an increasingly important avenue in wireless communication applications. The Networked Infomechanical Systems (NIMS) Project is an innovative approach to this undertaking. The NIMS node travels through the surroundings on a cable attached to fixed surfaces, communicating with stationary nodes while elevated from the natural growth below. Crucial to this architecture is the assurance that the microclimate nodes can communicate effectively and reliably with the larger NIMS node. A lightweight DJK708 module has been developed which reads temperature, humidity, and light intensity. This module consists of a NTC thermistor, HM 1500 humidity sensor, and a LI-190SA Quantum Sensor. The DJK708 can be lowered 200 ft from the NIMS node and will be able to gauge ambient conditions without disturbing the environment. Closely monitoring uncontrolled environments will now be possible without much intrusion.

Krill Swarms Along the South-East Edge of Monterey Submarine Canyon

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Krill swarms occur along the south-east edge of the Monterey Submarine Canyon. The species composition, size frequency distribution, density and behavior have been studied using a remotely operated vehicle (ROV) equipped with a suction sampler and a remote camera. Krill swarms contained species of the euphausiids, *Euphausia pacifica* and *Thysanoessa spinifera*, with species composition changing between days: on 14 August 2002, species composition was 67% *E. pacifica* and 32.5% *T. spinifera*, while on 15 August 2002, *E. pacifica* was 6.5% and *T. spinifera* was 93.8%. On a given day, all animals within a particular swarm had similar mean body lengths, regardless of species composition. Video footage was used to estimate krill density within swarms. Densities were at least three orders of magnitude higher than previous estimates. These patterns lend support to the hypothesis that there is a non-random aggregation of krill over the shelf edge.

The Effect of Subjective State on Time Preferences

Kathryn E. Demps, and **Daniel M. T. Fessler**, PhD, *Anthropology, University of California, Los Angeles*

Many decisions which humans make on a daily basis involve choosing between a smaller payoff today and a larger payoff in the future (e.g., "should I eat that candy bar now, or abstain because I want to lose weight?"). Such choices are called time preferences. In this project we looked at the effect of subjective state and demographic characteristics on time preferences. Subjects were primed with one of three emotions: anger, disgust, or mortality salience (thinking about their own death). They were then given a choice task involving decisions between monetary amounts to be received in the present or the future. We hypothesized that anger and mortality salience would cause subjects to become present-oriented, disgust would have no effect, and that demographic information might influence time preferences. Results have been inconclusive, and the survey is currently being run again in a different format.

Interactions Among the G-protein Subunits of *Neurospora crassa*

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The heterotrimeric G-protein signaling system, consisting of G- α , G- β , and G- γ subunits, is used by eukaryotes to respond to environmental stimuli. The genes for all the subunits have been cloned and shown to be involved in growth and development of *N. crassa*. The yeast two-hybrid assay and coimmunoprecipitation are being used to ascertain whether the G- β and G- γ subunits associate *in vivo*. The *gng-1* gene was fused to a gene encoding the DNA-binding or activation domain of a transcription factor; these constructs will be transformed into yeast cells containing complementary *gnb-1* fusions. Segments of *gng-1* have also been amplified and are ready to assemble into an epitope-tagged version of the gene, which will be used for coimmunoprecipitation studies. Additionally, *gng-1* has been linked to a green fluorescent protein (GFP) gene and is ready to be transformed into *N. crassa*. This will be used to check the localization of subunits during fungal development.

Phenotypic Analysis of Cell-Cell Spread of HSV-1

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Herpes Simplex Virus type-1 (HSV-1) is the most common cause of infectious blindness in the United States. This motivated us to understand the neuronal response to viral infections. We hypothesized that a mutant US9 gene (US9b) in HSV-1 would disrupt the spread between epithelial cells. Aliquots of US9b and two different wild-type strains were administered via corneal scratches. Three days post-infection, cornea tissue was collected, virus was immunostained with polyclonal antisera to HSV, and flat mounted for imaging. Tissue was then analyzed by electron microscopy. The phenotypes were assayed by measuring the number of multinucleated cells and spread pattern. Images showed that US9b resulted in more multinucleated cells and confined spread to an abnormal squamous layer and adhesion junctions in this layer. These results indicate that a non-functional US9 gene affects one of the steps in the spread of the virus and the transport of the HSV-1 virus between epithelial cells.

Conserved Role of CSF in Communication Between Different Bacillus Strains

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Bacillus subtilis secretes peptide-signaling molecules into the environment. The transcription factor ComA is activated by two extracellular peptides, ComX pheromone and CSF. Previous studies have shown that the ComX pheromone, part of the *comQXPA* peptide-signaling cassette, has a strain-specific role, leading to the question of whether CSF functions in a similar manner. CSF is encoded by *phrC*, which is downstream of and slightly overlaps the gene *rapC*, a negative regulator of ComA that is inhibited by CSF. There is no variability at the *rapCphrC* locus between strains that differ at *comQXPA*, suggesting that the *rapCphrC* signaling system is conserved among *Bacillus subtilis* strains, and that CSF may act as a universal signaling system. To verify this, *Bacillus* strains are being created that differ only at the *comQXP* locus, and a functional assay is being developed that will determine whether CSF has a role in inter-strain communication.

Strain-dependent Effects of the Stress of Maternal Alcohol Consumption During Pregnancy on Body Temperature, Activity, and Hormones of the HPA Axis

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Fetal alcohol exposure (FAE) impairs communication between the immune and nervous systems, and could be responsible for a predisposition to infectious diseases. Genetic and prenatal environmental factors such as FAE interact to affect neuroimmune function. Two different strains of pregnant rats were used to determine how genetic factors were affected by maternal ethanol consumption. Fischer 344 and Lewis rats are inbred strains with differential hypothalamo-pituitary-adrenal (HPA) axis responsivity. In response to stress, the HPA axis is activated, resulting in the release of corticosterone. This surge of corticosterone suppresses the immune system, resulting in a less active, smaller thymus. Lewis rats were less responsive to stress than the Fischer 344 rats; however, both strains had smaller thymuses, suggesting that the alcohol diet impaired immune function in both strains but by different pathways.

Excluded Volume Masks Reduce Protein Conformational Searching

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How does a protein find its native conformation without an exhaustive search? The hydrophobic zipper model hypothesizes that hydrophobic monomers in spatial proximity first form contacts, which then constrain and zip up the next contacts until a hydrophobic core is assembled. Protein conformational searching algorithms have been developed to simulate protein folding and to test whether zipping is the mechanism by which folding occurs. The search algorithm, however, is usually slowed by energy calculations for nonviable contacts. The goal of this project was to build masks to filter out nonviable contacts. It was found that an excluded volume mask effectively eliminated nonviable contacts and reduced conformational search time for short polymer chains; however, the fraction eliminated decreases as the chain length increases. An improved mask effective for larger proteins will be used to increase the efficiency of the conformational search algorithm.

The Hexagon Road: Carbon Fullerenes Self-Assemble by Addition of C_2 Units to Hexagons

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Not all carbon fullerenes that obey the isolated pentagon rule (IPR) have been identified as products of arc synthesis from graphite. Our explanation is that IPR fullerenes without "oddlets" may self-assemble, whereas IPR fullerenes with oddlets may not. [Oddlets are structures comprised of odd numbers of contiguous 666 vertices, vertices that join three hexagons; a cage with N vertices has $N-60$ of these 666 vertices.] For the 51 IPR fullerenes with 60–84 vertices, the "oddlet exclusion rule" successfully placed all of the thus far identified carbon fullerenes in the group of 26 without oddlets and none in the group of 25 with oddlets. This rule may be generated by the Hexagon Road, the assembly of C_2 units into hexagonal faces of growing fullerene fragments, but not by other assembly paths, such as the Pentagon and Fullerene Roads.



Chancellor's Residence, UCLA Campus

NMDA Receptor Function in the Cerebral Cortex of the R6/2 Mouse Model of Huntington's Disease

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Alterations in cortical pyramidal neuronal excitability may lead to striatal cell death in patients with Huntington's Disease (HD). Abnormal N-methyl-D-aspartate (NMDA) receptor function could lead to changes of excitability. We examined functional changes in the NMDA receptor of cortical neurons from an HD mouse model (R6/2) to determine if R6/2 pyramidal neurons have altered levels of excitability. Individual dissociated neurons were exposed to increasing concentrations of NMDA and Mg^{2+} to characterize NMDA responses in 40 and 80 day old wild type and R6/2 transgenic mice. At 40 and 80 days old, R6/2 neurons had significantly increased Mg^{2+} sensitivity resulting in smaller NMDA responses at hyperpolarized holding potentials. Voltage-gated Ca^{2+} currents were also larger in R6/2 neurons. Our results suggest that R6/2 pyramidal neurons may have a complex pattern of altered excitability that could induce striatal atrophy, the primary pathology of HD.

Generation of a Cleavage-resistant VEGF

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Vascular endothelial growth factor (VEGF) directs angiogenesis during physiological and pathological processes. VEGF is involved in the precise spatial distribution of blood vessels within tissues. Differential mRNA splicing produces VEGF isoforms that can be soluble or sequestered in the extracellular matrix (ECM). VEGF165 can produce varied angiogenic effects in the ECM-bound or soluble form. Current research, using a cleavage-resistant, sequestered VEGF165, will help clarify the processes by which the extracellular environment modulates VEGF function and angiogenesis. Incorporation of specific mutations in suspected cleavage sites is being used to produce a cleavage-resistant mutant protein. Sequential PCR and cloning generated a single point mutation (glutamic acid to alanine) at amino acid 113. To further understand the role that VEGF165 plays on vascular patterning, changes in the spatial distribution of vasculature will be examined in the presence of this cleavage-resistant VEGF165.