

Project: Looking for nearby ultra-faint dwarf galaxies

Organization: Haverford College

Dollar Figure: \$346,364.00

Jobs Created: Less than 1 (undergraduate research assistant)

Summary from Recovery.gov: This award is funded under the American Recovery and Reinvestment Act of 2009 (Public Law 111-5). Dr. Willman, Dr Geha and their team will apply their well-tested algorithms to search for nearby ultra-faint dwarf galaxies in vast regions around the Milky Way. They will use new datasets from large surveys, including the Sloan Digital Sky Survey, the Red Sequence Cluster Survey and the Southern Sky Survey. Data are already available from all these except the Southern Sky Survey, which should begin in 2009. The team will improve their algorithms to search for faint dwarf galaxies in new regions of parameter space in size, age and distance. Follow-up observations including both deeper photometry and spectroscopy will measure the mass, metallicity and other fundamental properties of new candidate dwarfs. The work will yield a sample of ultra-faint dwarfs with a broad range of intrinsic properties, in a statistically significant volume around the Milky Way. A postdoctoral researcher and both graduate and undergraduate students will be trained as they participate in this research. Dr. Willman and Dr. Geha will develop and disseminate curricular resources based on this research for classes in Galactic Astronomy at the advanced undergraduate level. The postdoctoral researcher will have the opportunity for a closely mentored undergraduate teaching experience at Haverford College. The team will create a wiki to compile and maintain information on Local Group dwarf galaxies.

Project: How typical is the Milky Way as a galaxy?

Organization: Haverford College

Dollar Figure: \$75,621.00

Jobs Created: 0

Summary from Recovery.gov: This award is funded under the American Recovery and Reinvestment Act of 2009 (Public Law 111-5). Dr. Willman and her collaborators will study numerical simulations that follow the formation and evolution of the Milky Way's stellar halo. They will address two major questions: what is the origin of the stellar halo (is it composed of the remains of dwarf galaxies that merged into the Milky Way?) and, how typical is the Milky Way as a galaxy? The team has already performed high-resolution simulations of the formation of eight galaxies resembling our Milky Way. These incorporate physical processes including the gas dynamics, and can resolve dark halos with circular speeds of only 10-20km/s. The model will make predictions for the motions and chemical composition of the halo stars, comparing the properties of stars that were formed in the halo with those formed in smaller satellite galaxies that subsequently merged with the central galaxy. The results from these simulations will be compared to observations of the Milky Way's stellar halo from the large Sloan Digital Sky Survey. Thus award will support the thesis project of a female graduate student. Dr Willman will develop a computational lab based on this research for her advanced undergraduate classes, and for dissemination on her website. Predictions from this project will facilitate

the interpretation of data from future large surveys of stars in the halo of the Milky Way and nearby galaxies.

Project: To study the weathering of the bedrock and the soil in Puerto Rico

Organization: University of Pennsylvania

Dollar Figure: \$4,346,611.00

Jobs Created: 0

Summary from Recovery.org: This project will establish a monitoring network in two watersheds of the Luquillo National Forest in Puerto Rico to evaluate the physical, chemical, hydrological and biological processes involved in weathering of bedrock and the evolution of the soil environment. This will be an addition to the Critical Zone Observatories (CZO) that are being initiated at various locations in North America. The Luquillo CZO will use the natural laboratory of the Luquillo Mountains to quantify and contrast how critical zone processes in watersheds underlain by granodiorite and volcaniclastic bedrock are affected by climatic conditions and hydrologic, geochemical and biogeochemical cycles. A set of interrelated hypothesis, sampling sites, and a unified data management system will allow critical zone processes to be contrasted by bedrock, landscape position (ridge, hillslope, riparian), depth (surface to bedrock), forest type (Tabonuco, Colorado, Cloud) and location (upland to coastal). Changing climate affects many processes, and the breakdown of rocks into soil; is one of the most important. In addition, there may be changes in water flow in rivers, as well as erosion of surficial materials. Sediment is already the nation's largest water quality pollutant and modern land uses are eroding soils and sculpting bedrock in unprecedented ways. The Luquillo Critical Zone Observatory will provide the infrastructure and baseline studies needed to evaluate short and long-term impacts of this erosion on soil and water resources. The Observatory will also support integrated, multi-institutional and multicultural exchanges among a diverse cadre of scientists, who will collaborate to determine the effects of climate change on the terrestrial environment.

Project: Mining Text from Internet Message Boards

Organization: University of Pennsylvania

Dollar Figure: \$482,925.00

Jobs Created: 0

Summary from Recovery.gov: This project will mine text from Internet discussion boards, chat rooms, and blogs to identify possible side effects and adverse events associated with the use of herbal supplements in breast and prostate cancer. We will identify sites that support these communication resources, develop controlled vocabularies for herbal supplements and pharmaceuticals and refine and use state-of-the-art text mining software to identify side effects, adverse events, and interactions.

Project: Studying how genes affect taste perception

Organization: Monell Chemical Senses Center

Dollar Figure: \$302,315.00

Jobs Created: 1 position retained

Summary from Recovery.gov: This award is an Administrative Supplement to the NIH project R01DC000882, "Genetics of Taste Perception". The goal of the parent grant is to identify genes involved in sweet and sour taste using a phenotype-driven positional cloning approach. The sense of taste is the primary sensory system that determines whether a food or beverage will be ingested or rejected. Taste also influences food processing by the digestive system. Consequently, understanding the mechanisms underlying this sense is central to our ability to control intake of nutrients and to modulate the excesses of consumption that may underlie diseases such as obesity, hypertension and the metabolic syndrome. The studies of the parent grant, when completed, will provide important new avenues for interventions designed to modify excess food consumption.

Project: Studying the Couch Potato Gene

Organization: University of Pennsylvania

Dollar Figure: \$467,861.00

Jobs Created: 2 jobs retained

Summary from Recovery.gov: This award is an Administrative Supplement to the NIH project R01DC000882, "Genetics of Taste Perception". The goal of the parent grant is to identify genes involved in sweet and sour taste using a phenotype-driven positional cloning approach. The sense of taste is the primary sensory system that determines whether a food or beverage will be ingested or rejected. Taste also influences food processing by the digestive system. Consequently, understanding the mechanisms underlying this sense is central to our ability to control intake of nutrients and to modulate the excesses of consumption that may underlie diseases such as obesity, hypertension and the metabolic syndrome. The studies of the parent grant, when completed, will provide important new avenues for interventions designed to modify excess food consumption.

Project: Port Security for Spirit Cruises

Organization: Spirit of Philadelphia

Dollar Figure: \$122,216.00

Jobs Created: 0

Summary from Recovery.gov: American Recovery and Reinvestment Act Port Security Grant Program (ARRA PSGP)

Statement from Gary Frommelt, Vice President of Marine Operations at Entertainment Cruises: "As active members of the maritime community, Entertainment Cruises applied for and received a federal grant in order to meet new maritime security regulations for passenger vessels. The grant fund will be used to increase and improve security for the added safety of our passengers and crew. We are proud to work with the Department of Homeland Security through the U.S. Coast Guard to further the safety and security of our ports and waterfront communities."

Project: Studying the link between Type 2 Diabetes and Heart Disease in South Asia

Organization: University of Pennsylvania

Dollar Figure: \$499,993.00

Jobs Created: 0

Summary from Recovery.gov: The goals of this project are to perform assay related to diabetes, lipid metabolism and coronary disease in the Pakistan Risk of Myocardial Infarction Study (PROMIS). This project will generate novel data regarding the links between T2DM and CHD in Pakistan, thereby advancing scientific understanding and informing the development of regionally appropriate strategies to prevent and control T2DM and CHD in South Asia.

Project: Studying the song of zebra finches

Organization: Rutgers University

Dollar Figure: \$147,796.00 + \$7,725.00 (2 grants)

Jobs Created:

Summary from Recovery.gov: Songbirds are the most easily studied of the few animal groups that learn to produce vocal signals for social communication as humans do. Among songbirds, our knowledge of the zebra finch is most advanced and provides the best developed model system for understanding vocal learning. Young zebra finches learn their vocalizations from adult tutors through a process of imitation that resembles human speech acquisition. These vocalizations become stereotyped in adulthood and are unique to each individual, providing rich material for quantitative study of the brain processes that serve this communication system. This application proposes to use the properties of auditory neurons in the songbird forebrain to investigate basic neural processes that serve discrimination and memory for auditory communication signals. Previous work in the laboratory has identified a brain structure, the caudo-medial nidopallium, that plays a special role in processing and remembering vocal signals. The purpose of this Career Staff Scientist Supplement is to retain a Research Associate who makes important contributions to the projects in the parent grant. The Research Associate is a skilled experimentalist with a strong background in auditory neurophysiology and 6 years of experience in all aspects of songbird research as a member of my Laboratory. She will accelerate experimental progress by studying auditory processing that occurs during vocal interactions between awake behaving birds (Specific Aim 3 of the parent grant). The results will not only provide a quantitative description of auditory processing for behaviorally relevant signals in songbirds, but also may reveal basic principles of neural function that help us to understand normal and pathological speech processing in humans. In addition, this work will further the professional development of a highly talented individual and guarantee her retention in the active scientific community, consistent with the goals of the Career Staff Scientist program.

Project: Studying Zebrafish

Organization: Princeton University

Dollar Figure: \$63,765

Jobs Created: 0

Summary from Recovery.gov: All vertebrates have internal asymmetries along the left-right (LR) axis, such as the asymmetric placement of organs about the midline. Correct asymmetric placement of organs is critical for their function, as it allows for proper connectivity within the developing vasculature. While many genes implicated in LR patterning have been identified, we do not yet know how the LR axis is established or patterned, how the LR axis is aligned with the dorsal-ventral or anterior-posterior axes, or how organs obtain their final asymmetric positions. This proposal focuses on two zebrafish mutants, switch hitter (swt) and non-partisan (npt), with distinctive LR patterning phenotypes. swt mutants result in either wildtype or completely reversed organ patterning. Consistent with this phenotype, swt mutants often display right-sided expression of nodal components. We hypothesize that swt functions upstream of nodal to bias the directionality of the LR axis, npt mutants properly establish asymmetric nodal expression, but asymmetric organ morphogenesis is affected. We hypothesize that npt functions downstream of nodal to affect organ asymmetries. We will explore the potential roles for Swt and Npt in two mechanisms implicated in LR patterning: cilia formation and movement, and lateral plate mesoderm cell polarity. We will image heart morphogenesis in live wildtype and npt and swt mutant embryos to lay the foundations for understanding asymmetric organ positioning and the role of npt in this process. We will determine the subcellular localization for Swt and Npt and use mosaic analysis to determine their sites of function. Finally, we will use tandem affinity purification and two-hybrid analysis to identify proteins that interact with Swt and Npt. Relevance: It is estimated that as many as 1/5000 infants are born with LR patterning defects which are often manifested as congenital heart disease (Casey 2000). In this proposal, we plan to characterize the roles of two zebrafish mutations in LR patterning. Since many genes involved in LR patterning have conserved roles in humans, the proposed studies will enhance our understanding of LR patterning and the genetic basis of laterality defects that can result in congenital heart disease.

Project: Study of social interaction / social strata in Uganda

Organization: Princeton University

Dollar Figure: \$495,090.00

Jobs Created: 0 full-time jobs in the U.S. / Organization retained some research assistants and hired some field researchers

Summary from Recovery.gov: Development scholars and policy planners regard cooperative producer organizations as a core component of poverty reduction strategies, but little is known about the social dynamics that make some of these organizations more successful than others. This research focuses on the social factors that explain variation in economic performance of such groups, and the consequences of economic development on the quality of life of households and villages. The research team will examine the roles of social and spatial networks, associational capital, and leadership accountability in shaping economic and social outcomes. The research will focus on Uganda's largest rural development project -- the Agriculture Productivity Enhancement Project (APEP) -- which involves over 60,000 farmers and 2,500 village-level organizations. APEP's stated goal is to increase small farmers' productivity and marketing capabilities. Its rate of success varies across villages. It is thought that the variations are related to local leaders'

capacities to spread information, elicit trust relationships, and facilitate the emergence of accountability practices. Following a multilevel and multimethod research design, data will be collected at the farmer, village, and parish levels and will include observational data, social networks, and behavioral games, to capture the motivations behind actors' strategic interactions and provide valuable insight on the effect of interpersonal, associational, and spatial (inter-village) networks on economic outcomes. The research contributes to the shift from a suggestive to an empirically grounded understanding of social capital. Also, the theory that underpins the study distinguishes between social capital -- defined as the ability of persons and groups to secure benefits through social networks -- and its source mechanisms (i.e., social norms, trust, reciprocity) and consequences (i.e., innovation adoption, organizational building, economic performance).