

## DHS Centers and MSI research teams partner on critical security needs

### *Infectious diseases, disaster preparedness, food bioterrorism, among research subjects*

Each summer, DHS' Office of University Programs sponsors visits by faculty and student research teams from Minority-Serving Institutions (MSI) to the host institutions of the DHS Centers of Excellence.

In 2007, seven faculty and 11 students from six MSIs visited the Centers to research infectious disease prevention, disaster preparedness among special populations, and food contamination monitoring, among other subjects.

### *Yogurt and cheese helpful in detecting bioterror poisons - NCFPD and North Carolina A&T State University*

Ensuring the safety of our agricultural and food supply is critical. The effects upon public health, social and economic effects of illness and death caused by poisoning of a food product can be significant, as shown by past events.

Detecting a contaminant in food products is an important first step in preventing a product from reaching consumers or stopping further consumption of a product. The summer research team from North Carolina Agricultural and Technical State University (NC-A&T) partnered with the DHS National Center for Food Protection and Defense to address this challenge.

Dr. Salam Ibrahim of NC-A&T, along with students Rosette Dibanza and Samantha Bailey, worked with Francisco Diez-Gonzalez, an Associate Professor in the Department of Food Science and Nutrition at the University of Minnesota, to look at the possibility of using dairy cultures as a means of developing a practical approach to detecting contaminants.

The team used lactic acid bacteria (LAB) and bifidobacteria, microbes typically found in dairy products such as yogurt and cheese, to determine the reaction of LAB to arsenic, cadmium sodium cyanide, tetramine and ricin - contaminants that would cause problems if present in the food supply.



*Samantha Bailey (middle) and Rosette Dibanza, students at North Carolina A&T State University and members of the summer research team hosted by the NCFPD Center, shared their research at the NCFPD 2007 Biennial Meeting in June. At left is NCFPD Co-Director Dr. Frank Busta.*

Preliminary results suggest that dairy cultures such as LAB could indicate the presence of chemical compounds such as arsenic. The group from NC-A&T looks to continue their work examining additional substances that could be used for bioterrorism.

### *Seeking safe and effective ways to study potential bioterror threats - FAZD and University of Texas A&M-Kingsville*

The Rift Valley Fever (RVF) is a viral disease native to Africa that affects livestock. Periodically a threat on that continent, RVF kills large numbers of animals and can cross species to also kill humans. As such, the RVF virus is a critical bioterrorism concern.

A naturally-occurring or intentionally-created outbreak could pose a significant threat to our nation's health and economy. Although a vaccine for rift valley fever is available, an effective recombinant vaccine that can be quickly and economically mass produced might serve to better protect our citizens and economy.

*Continued on page 1*

This article is an excerpt from the U.S. Department of Homeland Security Student and Alumni Network Newsletter.

The Network serves students and alumni who are current and past recipients of DHS funding and participants in DHS Student Programs. This includes DHS Scholars and Fellows, Summer Faculty Research Team Program members, student researchers at the DHS Research and Education Centers, AAAS Fellows, and Post-doctoral Research Associates.

The value of the Network is in facilitating professional and social collaboration, as well as communicating DHS and homeland security-relevant news and events, and employment and funding opportunities.

Please visit the DHS Network at [www.DHSNetwork.org](http://www.DHSNetwork.org)

# Summer research teams share results, from page 1



*The team from Texas A&M - Kingsville: Dr. David Pledger (middle) with Abygail Cardenas and Perla Hasbun.*

passed by generations of mosquitoes and whether they can transmit or acquire the virus by feeding on blood. The team is also looking at ways to examine the functions of specific genes in the RVF virus.

Ultimately, this research aims to provide a safe and effective model to research and understand the RVF virus, permitting other institutions to further this research in order to prevent and mitigate potential threats.

## **Helping populations in need prepare for natural disasters and terrorism - START / PACER Centers and Morgan State University School of Public Health and Policy**

The United States' experience in dealing with natural disasters calls for a greater need to educate low-income populations on how to react before, during and after a disaster. Add to this the potential for unexpected terrorist events, and this need to aid special populations is clear.

In addressing special populations' emergency preparedness and response needs, the research team from Morgan State University, consisting of Assistant Professor Dr. Randolph Rowel and doctoral candidates Shanita Wooten and Lakaisha Barber, has spent its summer at the START Center of Excellence. Dr. Rowel is also an investigator with PACER.

The focus of their research has been further development of the Special Populations Response to Emergency Health Threats Survey (SPRETS) Instrument. This unique tool helps health departments and emergency management agencies measure a community's levels of knowledge, attitudes and behavior associated with appropriate preparedness, recovery, and response to disasters. The audiences addressed in this study have been Spanish speaking and African American populations.

With the help of an expert panel, the team from Morgan State University has worked to strengthen the reliability and validity of



*The team from Morgan State: Dr. Randolph Rowel, Shanita Wooten, Lakaisha Yarber, Myrtle Holland-Evans, and Dr. Mildred Ofusu*

This summer, a research team from Texas A&M University-Kingsville has partnered with the DHS Center for Foreign Animal & Zoonotic Disease to address RVF vaccine research and development. Led by Dr. David Pledger, the Kingsville team of Abygail Cardenas and Perla Hasbun spent 10 weeks in College Station, Texas, investigating this challenge.

Understanding how the RVF virus can be a potential threat is daunting since as few as three research centers in the U.S. can carry out such research due to the biological containment required. The team from Kingsville is addressing this obstacle by seeking a safe and effective model for studying RVF.

While the virus can be spread through contact with the body fluids of infected individuals, mosquitoes are a major carrier of RVF virus via blood feeding on animals and humans. Dr. Pledger and his students are using a vaccine strain of RVF that has been safely used in humans to study how the virus is spread by mosquitoes.

Their research seeks to understand how the virus can be

SPRETS. A key is recognizing the impact of variables such as income, educational level, sex and geographic location upon other "non special-population" groups. An additional context for enhancing SPRETS has been realizing the differences between preparedness for potential terrorist events versus natural disasters.

Ultimately, the team will develop a more rigorous research design to help community leaders and educators use SPRETS to assess the knowledge, attitudes and behavior of a more diverse and larger sample of participants.

The team has not only spent their summer in the research library. They participated in the START Annual Conference and an 8-day DHS Summer Workshop on Teaching Terrorism at Morehouse College in Atlanta. In Atlanta, the team toured the Centers for Disease Control and Prevention to learn more about CDC's role in terrorism preparedness, response, and recovery. Further activities include the publication of a manuscript entitled, "Reflections of Isabel and Katrina: A low-income perspective," and a tour of the White House.

### **Cutting through the noise to detect bioterror events - IDS-UAC Center - Howard University and Morgan State University**

As homeland security officials prepare for the threat of bioterrorism events on U.S. soil, disease incidence is closely watched. Critical to minimizing the human injury and loss of life resulting from intentional or accidental contamination is early detection.

A challenge linked to early detection is deciphering true signals of an outbreak versus the unavoidable noise picked up by current surveillance methods. Achieving better early-warning surveillance that “cuts through the noise” has been the goal of two teams partnered with the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS) at Rutgers University, a DHS IDS-UACs Center of Excellence member.

One team from Howard University, lead by Dr. Abdul-Aziz Yaku-bu, and another from Morgan State University, lead by Dr. Asamoah Nkwanta, partnered with DIMACS to investigate the theoretical effects of entropy in solving this challenge. Howard student members were Ashley Crump and Devroy McFarlane. Students from Morgan State were Nakeya Williams and Anthony Ogbuka.

In the context of this project, entropy involves measuring the uncertainty associated with a particular variable. In bio-surveillance, the variable may be a signal picked up through detection methods. A signal may contain a measurable amount of information along with noise.

The two teams and DIMACS researcher Dr. Nina Fefferman have hypothesized that the signal to noise ratio will increase during an outbreak. Should the increases in this ratio be large enough to be measured, this could mean that an outbreak is occurring. The outcomes of this study could improve the speed with which an outbreak is detected.

A highlight of the teams’ experience was a trip to a conference in South Africa that addressed the mathematical modeling of infectious diseases. The conference gave the Howard and Morgan State teams the chance to share their research with a global audience, while learning about the modeling of diseases.



*Students Anthony Ogbuka of Morgan State and Devroy McFarlane of Howard University. During the summer, members of the two research teams attended a mathematical modeling of infectious diseases conference in South Africa.*

### **Study of violence, drug trade, elections in Colombia give perspective on factors contributing to terrorism – START Center and John Jay School of Criminal Justice**

The country of Colombia provides an interesting context from which to study terrorism. At question are linkages between violence and homicide and elections in that country. The additions of Colombia’s coca cultivation and cocaine production make for an interesting mix of social, economic, political and historical elements.

In collaboration with the DHS START Center, two students from the John Jay School of Criminal Justice, Hannah Baldwin and Felice Howard have been creating a comprehensive terrorism database for that country.

A major component of Baldwin and Howard’s work is coding variables relative to elections, demography, manufacturing and production, homicide rates, and illegal drug production.

Coding is a process in which data is given signatures or notations that allow for the examination of correlations between specific variables. The team first began with records on population and voting records. Specific to voting, this includes information on presidential and congressional elections, as well as the 2003 mayoral elections in each of Colombia’s 34 “states” and 1,173 cities.

Ultimately, the two will compare their database with a violence database retrieved from Colombia for a cross-comparison and a better understanding of what political, social and economic factors contribute to terrorism and acts of violence in that country.