U.S. Department of Homeland Security
Washington, D.C. 20528

Description of Homeland Security Expertise of Site – Plum Island Animal Disease Center

Pursuant to the requirements established in Homeland Security Presidential Directive 9 (HSPD-9): Defense of U.S. Agriculture and Food, and the strategic objectives of the Science and Technology Directorate's Agriculture Thrust Area, the Department of Homeland Security (DHS) Plum Island Animal Disease Center's (PIADC's) foremost science goal is to minimize infection, transmission, and the economic impact of a natural or intentional introduction of foot-and-mouth disease (FMD) to U.S. livestock.

FMD is the most highly contagious disease of domestic livestock and wild cloven-hoofed animals including cattle, swine, sheep, goats, and deer. Due to its potential for rapid spread, impact on trade, ease of access, and severe economic and social consequences, FMDV is widely recognized as the most threatening agricultural pathogen and the highest priority for research and development (R&D). Though the last outbreak of accidentally introduced FMD in the United States was in 1929, it is widely recognized that FMD can be introduced not only unintentionally, but also is readily accessible to terrorist groups, as FMD is endemic in many countries around the world.

FMD can rapidly replicate in the host and is spread by direct contact, as well as through aerosol transmission, to other susceptible cattle, swine, sheep, and goats. The causative agent of the disease is an RNA virus (Picornavirus) and is therefore highly mutable. Today, the disease occurs and is endemic in many parts of South America, Africa, Middle East, and Asia. The recent FMD epidemics that have occurred in countries such as England, Taiwan, and Japan have re-emphasized the devastating repercussions associated with FMD outbreaks.

DHS established a Targeted Advanced Development (TAD) science team at PIADC with the goal of developing biological countermeasure tools for use against FMD. DHS scientific staff at PIADC is composed of seven federal employees, one contract staff, and three academic fellows. The science program is addressing this goal through the following overarching technical objectives for developing countermeasures for FMD:

- Development of next-generation vaccines for inclusion in the National Veterinary Stockpile (NVS) and the identification of one or a limited number of vaccine platforms that can provide ideal target product profile attributes[1];
- Licensure of antiviral biotherapeutics (immunomodulators) to complement next-generation vaccines and close the susceptibility gap between vaccination and protection;
- Characterization of current generation vaccines available for short-term use against incursions of high-consequence foreign animal diseases (FADs), specifically those housed in the North American FMD Vaccine Bank (NAFMDVB).

More information on Plum Island Animal Disease Center can be found at:
http://www.dhs.gov/xres/labs/editorial_0901.shtm

Plum Island Animal Disease Center

1. Provide a description of your facility's experience hosting undergraduate students for internships, for example, number of interns hosted each summer, approximately how many years have you hosted interns.

Plum Island Animal Disease Center (PIADC) has hosted undergraduate students during the summer of 2005 and 2007. In the summer of 2005, we hosted a DHS S&F intern who is currently enrolled in a dual PhD/DVM program. In the summer of 2007, we hosted a DHS S&F intern who is currently in their senior year. Also in the summer of 2007, we hosted an ORISE summer intern (May 07 college graduate) who is currently enrolled in a DVM program. In addition, PIADC has had an active post-graduate ORISE program since 2004 and there are currently several ORISE scientists with term appointments in the DHS S&T science program.

2. Provide a description of additional benefits your facility can provide interns, for example, subsidized housing arrangements, local transportation allowance, professional lectures and seminars, social activities, etc.

The PIADC facility is located on a U.S. government owned 860 acre island in the Long Island Sound, approximately 1.5 miles from the tip of Long Island and 9 miles from Connecticut. Transportation to/from the island is provided by government ferry and subsidized housing arrangements in NY and CT are available (there is no housing on the island). There are over 120 scientists employed by USDA and DHS and an additional 80 employees that provide operational support. PIADC is the only U.S. facility allowed to conduct research on and diagnosis of foreign animal diseases. Scientist work in BSL-3 laboratories and BSL-3Ag animal facilities housing livestock. Security clearance and select agent clearance are required for working in BSL-3 containment. The scientific community has an active seminar and professional lecture series.

3. Provide the name and contact information for the person that would be the primary point of contact for DHS S&T in administering internships at your facility.

Christopher Schutta, PhD.
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Plum Island Animal Disease Center
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Project Title, Description and Point of Contact

1. **PROJECT***:* *Development of Bovine Interferon-Alpha Subtypes as Potential Biotherapeutic Agents Against Foot-and Mouth Disease*

   DESCRIPTION: The intern will work with DHS scientists on studies to develop candidate bovine interferon-alpha biotherapeutic agents to complement ongoing vaccine studies being conducted in cattle. This research would involve the characterization of individual bovine interferon-alpha subtypes, incorporation of promising candidate subtypes into a mammalian expression system, and measurement of antiviral capabilities of each expressed recombinant subtype in an in-vitro model of FMDV infection. Studies employ several molecular and cell culture techniques such as RT-PCR, plasmid mini-preps, PCR plasmid cloning, DNA sequencing, ELISA, virus titration and isolation, and serum neutralization. The majority of the 10-12 week internship will be carried out in BioSafety Level 3 (BSL-3) DHS labs. Interns with laboratory experience with molecular biology and/or virology techniques and interest in veterinary medicine and foreign animal disease are preferred. Study design:

   I. PCR amplify complete cDNA of 8 bovine IFN-alpha subtypes expressed in response to in-vivo FMDV challenge.
   II. Develop recombinant expression constructs for each subtype, possibly in using the Baculovirus Expression System.
   III. Characterize antiviral activity of each vector expressed recombinant subtype using in vitro ant-FMDV assays.

   POINT OF CONTACT: The primary point of contact for DHS S&T for this project is:

   Christopher Schutta, PhD.
   USDHS, S&T, TAD
   Plum Island Animal Disease Center
   Office: 631-323-3182
   Laboratory: 631-323-3133/3337
   Email: Christopher.schutta@associates.dhs.gov

2. **PROJECT:** *Viral, Molecular and Cellular Imaging of FMDV*

   DESCRIPTION: The intern will primarily conduct microscopic characterization of FMDV-infected cells and tissues. In collaboration with USDA-ARS and USDA-APHIS scientists, the intern will work with the VCMI group to observe and analyze FMDV-infected tissues and cultured cells. The intern will use laser scanning confocal microscopy and laser capture microdissection to select cells and/or populations of cells for molecular analysis. The intern will section paraffin-embedded or frozen material for histology and immunostaining. For interns not acquainted with histological techniques, training will be provided. Project may also include molecular techniques such as PCR and RT-PCR. The 10-12 week internship will be carried out in BSL3 DHS labs. Interns with laboratory

experience with histology, electron microscopy or molecular techniques are preferred.

POINT OF CONTACT: The primary point of contact for DHS S&T for this project is:

Tom Burrage, PhD.
USDHS, S&T
Plum Island Animal Disease Center
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Laboratory: 631-3277
Email: Thomas.Burrage@dhs.gov

Facility Description and Internship Terms

PIADC is the only U.S. facility allowed to conduct research on and diagnosis of foreign animal diseases. The PIADC facility is located on a U.S. government owned 860 acre island in the Long Island Sound, approximately 1.5 miles from the tip of Long Island and 9 miles from Connecticut. Transportation to/from the island is provided by government ferry). Subsidized housing arrangements in NY and CT are available (there is no housing on the island).

There are over 120 scientists employed by USDA and DHS and an additional 80 employees that provide operational support. Scientist work in BSL-3 laboratories and BSL-3Ag animal facilities housing livestock. Interim security clearance and Select Agent approval and authorized escort at all times are required for working in BSL-3 containment. Individuals working in BSL-3 containment required mandatory, daily shower-out procedures.

Scientists participate in a weekly journal club and present their research at weekly research-in-progress seminars. In addition, the scientific community has an active seminar and professional lecture series. There is an opportunity to also participate in the USDA APHIS Foreign Animal Disease Training Module (lectures, hands-on disease observations).

The 10-12 week internship should start no later than June 15th, 2008 and end no later than August 30th, 2008. Interim secret clearance and Select Agent approval will be required prior to internship start date and this approval process should be initiated approximately 3 months in advanced of the anticipated start date.