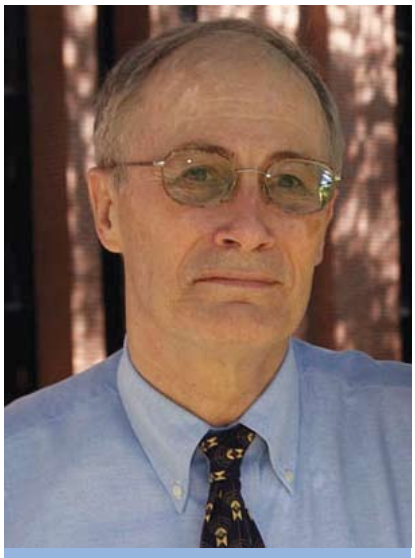


Natural Experimentation Poses Greatest Threat

Dr. Richard Moyer,
Acting Director, Emerging Pathogens Initiative

I have been studying viruses most of my adult life, particularly large, complex poxviruses like smallpox, monkeypox, rabbitpox and vaccinia. Smallpox — which killed more than 300 million people in the 20th century before it was eradicated in 1977 — provides both political and scientific lessons about the value of further scientific research on viruses.

Since September 11, 2001 and the anthrax attacks that occurred that fall, emergency planners have worried about smallpox virus samples falling into the hands of terrorists. Although there is an excellent smallpox vaccine available, it is relatively crude, so a great deal of effort has been devoted to developing new vaccines and antiviral drugs.

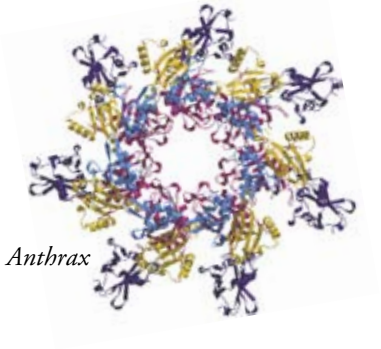
The right biological agent in terrorists' hands could have devastating consequences, but while it is important to remain vigilant to terrorist threats, as my friend and colleague Grant McFadden says: "The greatest bioterrorist is Mother Nature herself."

Nature has been conducting biological experiments for millions of years, carefully selecting and tuning both host organisms and pathogens for countless different diseases. There are two overriding scientific questions of enormous importance which are relevant not only to smallpox but any infectious agent. Why is a pathogen such as smallpox so very specific and devastating to humans but not other animals? Humans are the only hosts in which smallpox causes a severe, frequently lethal, infection. Second, how does a pathogen which enters the body in such small amounts overcome all the immune and other defenses of the host organism to such a degree that in some cases death of the host can result?

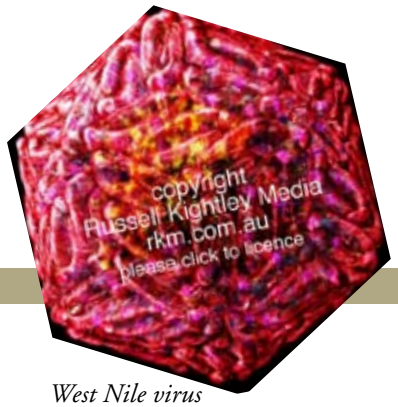
In a world made ever smaller by international travel and trade, and where human, plant and animal populations are being brought together by development, "natural experimentation" can only increase. Florida, with it's favorable climate and large human and animal populations, provides an ideal environment for the evolution of novel pathogens of major clinical or economic importance to humans, animals and plants. The chances of humans, animals or plants in Florida becoming infected with naturally occurring, novel or newly emerging pathogen are far greater than by a terrorist act.

In 2003, the National Institutes of Health established a nationwide set of regional centers of excellence to study emerging pathogens, including those which could be manufactured by bioterrorists. The University of Florida is one of the six members of the Southeastern Regional Center of Excellence for Emerging Infections and Biodefense, or SERCEB. The mission of this consortium — which includes UF, Duke, Vanderbilt, Emory, the University of North Carolina at Chapel Hill and the University of Alabama, Birmingham — is "to perform basic and translational research to make drugs, vaccines and diagnostics to protect society from naturally emerging infections as well as man-made infectious agents."

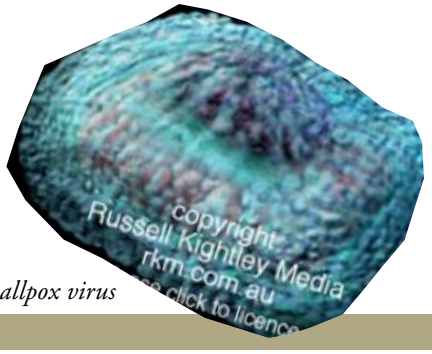
I was one of the authors and creators of the SERCEB grant and since last fall have served as co-principal investigator. Out of my experience



Anthrax



West Nile virus



Smallpox virus

Nature has been conducting biological experiments for millions of years, carefully selecting and tuning both host organisms and pathogens for countless different diseases.

with SERCEB came a growing realization that the University of Florida is uniquely equipped to address emerging pathogens in a comprehensive way.

Almost no other university in America has so many scientific disciplines assembled on a single campus. Medical researchers literally need only walk across the street to collaborate with colleagues in agriculture and veterinary medicine.

My colleague Walter Tabachnick, director of UF's Florida Medical Entomology Laboratory recently made the comment "When you're sitting around the table talking about the disease cycle, and trying to get at this big elephant, you've got people who see the elephant from completely different perspectives and disciplines."

While Walter was referring specifically to mosquitoes, he could just as well have been referring to pathogens in general. For example, entomologist Jonathan Day says mosquito scientists' experience with birds that transmit mosquito-borne diseases like West Nile Virus could prove invaluable to avian influenza researchers.

"We specialize in pathogens that have avian amplification hosts. The knowledge we've gained about birds in Florida may become critically important to fighting avian influenza if it gets to Florida," Day says.

Veterinary researcher Cynda Crawford adds that vets often are the first to notice emerging diseases in animals — the pool from which new human diseases emerge.

By uniting the various scientific disciplines present on our campus around emerging pathogens, we hope to create a broad-based multidisciplinary teams that can rapidly respond to the emergence of newly emerging pathogens.

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