



## **Bruce S. Seal, PhD - Past Accomplishments and Future Research**

Dr. Bruce S. Seal has been an active molecular biologist for the past twenty plus years primarily involved with veterinary microbiology. He has over 100 peer-reviewed publications, published proceedings as well as invited book chapters. He has directed the research of graduate students, post-doctoral associates and international visiting scientists supported by extramural funds. Dr. Seal has more than 500 gene sequence submissions to GenBank at the National Center for Biotechnology Information which includes full-length viral genomes for both positive and negative-sense RNA viruses and bacteriophages. During 2004 Dr. Seal assumed the position of Research Leader for the Poultry Microbiological Safety Research Unit joining the food safety research programs for the Agricultural Research Service of USDA.

Dr. Seal has made scientific presentations at more than 100 internationally recognized conferences, and has presented over 70 national or internationally invited seminars at scientific institutions, as well as to commodity associates. Dr. Seal holds an adjunct faculty position in the Department of Infectious Diseases, College of Veterinary Medicine at the University of Georgia, Athens and is a full member of the graduate faculty. The incumbent has served as a member of several editorial boards and provides *ad hoc* reviews for 25 other professional journals. Dr. Seal has been invited to serve on grant proposal review panels for the National Research Initiative Competitive Grants Program of USDA, the National Science Foundation and the National Institutes of Health along with providing *ad hoc* reviews on an annual basis for 12 other granting agencies nationally and internationally.

Scientific accomplishments have included demonstration that bovine herpesvirus-1 may have a tick vector in the Sierra Nevada mountains and this is the only case wherein a mammalian herpesvirus may have an arthropod vector. Post-doctoral research involved examination of differential gene expression in T-cell lymphoma cells by subtraction hybridization and Dr. Seal demonstrated that the genomes of alcelaphine herpesviruses from wildebeest versus hartebeest were uniquely distinct virus types. Dr. Seal also demonstrated that caliciviruses related to vesicular exanthema of swine, an exotic animal disease agent, may also be isolated from animals other than swine. Significantly, no disease or exposure to these viruses has occurred in domestic or feral swine. Dr. Seal reported the first molecular characterization of the recently emergent U.S. isolate of avian metapneumovirus (aMPV) previously considered exotic to North America and demonstrated its close genetic relationship to the human MPV. More recently, Dr. Seal completed extensive molecular epidemiological analyses of Newcastle disease virus isolates and supported that effort for the Animal Plant Health inspection Service (APHIS, USDA) during the 2002-2003 out-break in the southwestern U.S. along with directing development of improved diagnostics.

Ongoing collaborations within the current research program include testing efficacy of rep-PCR on bacterial genomes for molecular epidemiology, genomics-proteomics analyses of food-borne bacterial pathogens and examining bacteriophage or their gene products along with antimicrobial peptides (bacteriocins) as potential alternative antimicrobials to combat bacterial disease. Specifically, immediate future research involves molecular epidemiology and characterization of *Clostridium perfringens* the causative agent of necrotic enteritis in chickens, gas gangrene in humans and is the third leading cause of bacterial food-borne disease among humans. Bacteriophages that infect the bacterium are being characterized by full-genome sequencing and expression of the phage lytic enzymes and holins as alternative antimicrobials.

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