Dr. Mark A. Gallo obtained his Bachelor of Science degree in Biochemistry and Biophysics from the University of Pittsburgh. He then obtained a Master of Science degree in Biochemistry from the University of Pittsburgh Medical School, where he worked in the laboratory of Dr. Norman Curthoys analyzing transcriptional control of many key liver and kidney enzymes, especially those that are affected by chronic and acute metabolic acidosis.

Dr. Gallo then went to Cornell University where he studied under Robert P. Mortlock. It was there where he was introduced to the world of microbes. His thesis research involved the analysis of novel metabolic pathways for the degradation of five carbon sugars in the *Enterobacteriaceae*. His studies also included studies of "evolution in the test tube."

Dr. Gallo continued his education with a post-doctoral position at the University of Wisconsin-Madison in C. Richard Hutchinson's lab, where he studied the genes necessary for the synthesis of daunorubicin/doxorubicin/adriamycin. These valuable anti-tumor agents are synthesized by *Streptomyces peucetius*. While in Wisconsin, he was also on the faculty for the Biology Honor's BioCore program.

Dr. Gallo has been active in the scholarship of teaching and learning. He has a long-distinguished record of hosting science camps for students and teachers from the K-12 community and was the former Chair of the K-12 committee for the American Society for Microbiology. In addition, Dr. Gallo has frequently presented at the National Association for Biology Teachers, the National Science Teachers Association, and the Science Teachers Association of New York State annual meetings.

CURRENT RESEARCH

Dr. Mark A. Gallo is involved in two major projects.

PROJECT ONE

Project one involves the genetic characterization of *Staphylococcal* strains from white tail deer. *Staphylococci* are found in many environmental and clinical settings. *S. aureus* is a pathogen that has become more of a problem in the clinical and agricultural setting due to antibiotic resistance. This study involves a molecular characterization of the level of antibiotic resistance in *Staphylococci* from whitetail deer. It is anticipated that the research will provide clues regarding antibiotic resistance and the genes involved, the types of genes found, and the prevalence and distribution of such genes in the various isolates.

Staph are extremely problematic in human medicine. Methicillin resistant *S. aureus* (MRSA) leads to over 130,000 deaths directly and over 550,000 deaths where it is a contributing factor worldwide annually. Hospital-acquired MRSA infection treatment costs over $35,000 in the U.S with complicated infections easily costing over $75,000 for treatment leading to estimates of over $3.3 billion in direct medical costs annually. Dr. Gallo is actively involved in the isolation

and characterization of bacteriophage (bacterial viruses) that can specifically target and kill MRSA. This strategy is known as phage therapy and is receiving much attention in the medical field as we are running out of successful antibiotics.

Mastitis is a major problem in the dairy industry as well and *Staph* infection is one of the primary causes.; It is costly to the farm as the cow must be taken out of production for treatment, and unfortunately it is not always successful, resulting in the loss of the animal. The same strategies for human medicine may be applicable for treatment of farm animals.

PROJECT TWO

Approximately 10 million blood transfusion units occur per year in the U.S. One of the major human blood type designations is noted by the Lewis ABO system. The variation in blood types is due to the composition of sugar side chains on the surface of erythrocytes. Removal of part/all of these residues would essentially produce a "universal blood". Enzymes responsible for this reaction are known as glycoside hydrolases. Numerous families of these enzymes have been noted however very few have been analyzed for their ability to function on blood. There are several reasons: some have only been tentatively identified as having a specific activity due to computational annotation, and nearly all have never been isolated in pure form and assayed for their ability, especially on blood.

Dr. Gallo has been identifying genes whose protein product seems likely to possess the desired activity. He is in the process of cloning the genes with the ultimate goal of analyzing their ability to perform the desired reaction.

CURRENT INVOLVEMENT

- Chair and Pre Health Advisor, Committee on Recommendations for Pre-Medical and Pre-Dental Students.
- New York Forest Owners Association Co-Chair, Niagara Region.

EDUCATIONAL BACKGROUND

- B.S. Biochemistry and Biophysics, University of Pittsburgh
- M.S. Biochemistry, University of Pittsburgh Medical School
- Ph.D. Microbiology, Cornell University
- Post-doctoral fellow, University of Wisconsin-Madison