

## ABSA: THE PAST, PRESENT, AND FUTURE

Richard C. Knudsen

Centers for Disease Control and Prevention, Atlanta, Georgia

### The Past

The origins of the American Biological Safety Association are associated with the biological warfare (BW) program that was developed at the U.S. Army Biological Research Laboratories at Camp (now Fort) Detrick during World War II (1943-45) (Bernstein, 1987, Covert, 1993, Kruse, 1998). Two months before Pearl Harbor, Secretary of War Henry L. Stimson asked the President of the National Academy of Sciences to evaluate the requirements for a biological warfare (BW) program. In February of 1942 a special committee of the National Academy of Sciences submitted a report to Mr. Stimson saying that an enemy attacking with biological weapons could gravely harm crops, livestock and human beings and made recommendations for the future of the BW program. As a consequence Camp Detrick was established in 1943 to serve as the focal point for developing America's offensive and defensive BW program. Biological warfare agents are, by their very nature, highly hazardous and the successful development of this program needed to ensure the safety of the scientists and technicians working in this program, as well as the safety of the surrounding community of Frederick, MD. At this time there was no disciplined body of knowledge applicable to working safely with BW agents during their laboratory development, pilot plant production and testing. Out of necessity Camp Detrick personnel proceeded to develop the appropriate safety facilities, equipment and practices and in the process gave birth to the field of biological safety (Covert, 1993). Dr. Gail Dack was the first Safety Director. Dr. Arnold G. Wedum, widely recognized as the father of biological safety, became Safety Director in 1946.

By 1955 interest in further developing the concept of "biological safety" and sharing information on this subject with other practitioners led Dr.

Wedum to convene the 1<sup>st</sup> Biological Safety Conference at Camp Detrick. Fourteen representatives from Camp Detrick, Pine Bluff Arsenal, Arkansas, and Dugway Proving Grounds, Utah attended. The 1<sup>st</sup> Biological Safety Conference evolved into the Annual Biological Safety Conference and has met every year since 1955. Since the first conference biological safety has evolved from being concerned with BW agents into applying to all biological agents in a wide variety of laboratory and non-laboratory settings. In 1998 we held our 42<sup>nd</sup> Annual Biological Safety Conference at Orlando, FL with more than 300 attendees from academia, industry and government throughout the United States and the world. Manny Barbeito and Richard Kruse, original members of Dr. Wedum's safety group, have documented the early biosafety conferences in a series of *JABSA* articles (Barbeito and Kruse 1997a, 1997b, 1998). Other milestones in the development of the field of biological safety include the establishment of the position title "Biological Safety Officer" in the 1976 NIH Recombinant DNA Guidelines (Federal Register, 1976) and the evolution of the Annual Biological Safety Conference into the American Biological Safety Association (ABSA) in 1984. This year also marked the publication of the first edition of the CDC/NIH Guidelines "Biosafety in Microbiological and Biomedical Laboratories" (BMBL) (Richardson and Barkley, 1984) which provided for the first time a disciplined body of information on biological safety. The seeds that were planted by the personnel at Camp Detrick in 1943 had grown into the "biosafety tree" in 1984.

By 1991 ABSA had grown to the extent that part-time management of the organization by members with full-time career positions had become too time consuming and a professional management organization, Stygar Associates, was hired to ensure the proper operation of the business side of ABSA.

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This article is an expanded version of the President's Address from the 42<sup>nd</sup> Annual Biological Safety Conference held in Orlando, Florida on October 25-28, 1998.

A growing professional organization needed a newsletter to keep its members informed (the Internet was in its infancy in 1991) and biological safety as a profession also needed training programs for its members. Both of these were initiated by ABSA in 1991. Members felt that they needed to be recognized as professionals and in 1994 the Registered Biological Safety Professional program was established. By 1996 ABSA members felt that the profession of biological safety had matured enough to initiate the first issue of the *Journal of the American Biological Safety Association (JABSA)*. National and international communications via the Internet were growing rapidly during the early '90s and ABSA's Internet site was established in 1996. Further growth of biological safety as a profession occurred in 1997 with the initiation of the Certified Biological Safety Professional program in association with the American Society of Microbiology's National Registry of Microbiology. This year also marked the first ABSA sponsored spring training program in association with the Eagleson Institute.

### The Present

Our members can be proud that ABSA has now established an ambitious program of annual meetings, biosafety training, professional certification, and a variety of ways of communicating with fellow members and the public through our newsletter, journal, other publications, and our Internet site. In 1998 we co-sponsored with the Centers for Disease Control and Prevention the 5<sup>th</sup> National Symposium "Rational Basis for Biocontainment." We co-sponsored with the Eagleson Institute our second spring training session on animal biosafety and R-DNA. We also published our first book "Proceedings of the 5<sup>th</sup> National Symposium" and our training guide. We added a list of infectious agents classified by hazard to our web site. We will also update our web site in December 1998 and turn it over to professional management in 1999. Our annual meetings continue to attract top notch speakers from government, industry, and academia. This year Dr. Joanne Burkholder of North Carolina University, author of "And the Waters Turned to Blood" told us about *Pfeisteria piscicida*, Thomas Rowe of CDC reviewed the avian influenza outbreak of 1997-98, Nancy and Jerry Jaax of USAMRIID at Fort Detrick shared their experiences in the

hot zone with us, and Margaret Race of NASA told us about "Extraterrestrial Sample Return."

In 1998, in accordance with our strategic plan, we established a Marketing Committee and a Media Committee to help us show our wares to the scientific community and to the public. We developed a Technical Resource Committee to focus attention on the resources that we can offer to the public. We developed a Publications Committee to oversee and develop ABSA publications of which several are in development. These new initiatives should be showing results over the next few years.

### The Future

Our future is going to involve more people on this planet and tremendous increases in technology. For ABSA this means that our challenges of the future will lie in the areas of more emerging and re-emerging biological agents of plants, animals and humans, the possible use of biological agents for terrorism, safely applying biotechnology in the laboratory, ensuring the safe application of biotechnology to the environment, and taking advantage of all the new advances in electronic communications to advance ABSA's mission. I have discussed these future challenges in more detail in the following paragraphs.

Our world population is increasing by 70 million people a year. To support such huge increases in people more land needs to be cleared and food and water supplies increased. Social, economic, and political systems need to absorb them. More people means increased use of fossil fuels which leads to global warming which in turn may alter or broaden the geographic range of insect vectors for diseases such as dengue and malaria. As forest land is cleared people are brought into contact with new agents such as Sabia virus and new vectors which have been hidden in the forest (Gibbons, 1993). Modern travel allows people, as well as well as hitch hiking infectious agents such as influenza viruses and insect vectors to be transported around the world in a day. As more people crowd into urban areas which cannot support them the poverty level increases and infectious agents, such as measles, have greater opportunities to spread. In a 1997 review of emerging diseases, Mahy (1997) listed 42 new viruses and 4 new rickettsia discovered since 1988. Other new infectious agents whose names

were unknown 20 years ago but with which we are now familiar include: human immunodeficiency virus, the causative agent of AIDS; Hantavirus, the causative agent of pulmonary syndrome; *Helicobacter pylori* as a causative agent of peptic ulcers; Chlamydia pneumoniae as a causative agent of atherosclerosis; *Escherichia coli* 0157:H7 as a foodborne pathogen causing hemolytic uremic syndrome; *Cryptosporidium parvum* as a causative agent of waterborne intestinal disease; *Pfeisteria piscicida* toxin as a causative agent of skin ulcers and neurological diseases; and obscure agents that cause transmissible bovine spongiform encephalopathy. Other emerging or reemerging diseases include antibiotic resistant *Mycobacterium tuberculosis*, *Streptococcus pneumoniae* and *Staphylococcus aureus*. The global public health issues associated with emerging infectious diseases has spawned a new journal *Emerging Infectious Diseases*. As a result ABSA should expect a continuing increase in new infectious agents, new or wider ranges of vectors, and the reemergence of long subdued infectious agents.

Fifty-five years ago the development and use of an infectious or biological agent for biological warfare purposes was a technologically complex and costly process that could only be performed within well financed and staffed government laboratories. Today's advances in technology and information have made these agents relatively easy to grow, cheap to produce, and easy to disseminate. Information available on the Internet provides "how to" instructions. Biological agents have been called the poor man's weapon of mass destruction because they can be produced in the basements of our homes. Alternatively, deadly agents may be purchased from supply houses or stolen from containment laboratories. In recognition of this our federal government has restricted the transfer and use of the worst of these agents, termed "select agents," in a new federal regulation (Federal Register, 1996). The growth of the field of genetic engineering also raises the specter of developing new bioterror agents from genetically modified microorganisms genetically endowed with special characteristics to enhance their deadliness. To prevent theft of biological agents from our laboratories we may expect stricter security requirements. To ensure legitimate use of these agents we might expect stricter facility,

equipment and procedural standards for our laboratories. Any future domestic bioterror incidents may lead to expanding the list of agents and more stringent controls on their possession, use and transfer.

Advances in understanding the basic biology of the cell as well as the genetic code and the manipulation of genetic information has spawned the new, but explosively growing, field of biotechnology. Biotechnology can be divided into those activities that are conducted in the laboratory and those activities that involve the introduction of biotechnological products into the environment. The first step in the development and testing of biotechnological products almost always takes place in the laboratory. Laboratory activities include growing cells, tissues and organs in vitro, the development of products for therapeutic use from these cells, the isolation and identification of genes from genetic material and the introduction of genes into microorganisms or other cells of plant, animal or human origins forming genetically modified organisms (GMOs). We can also include the laboratory aspects of transplantation of animal organs into humans in this category. There are many safety issues associated with protecting the laboratory worker from hazardous exposures such as hitchhiking contaminants in cultured cellular materials, genetic materials contained in transfer vectors, genes coding for virulence factors or toxins or, inadvertently creating hazardous agents by genetic transfers, and protecting the cellular products from contaminants, such as cultured cells or organs which may be used *in vivo* for transplantation. The diversity and complexity of this explosively growing area will provide many challenges and many opportunities for ABSA.

After being genetically engineered in the laboratory, the GMO's may be released into the environment for a variety of purposes. We are now familiar with potatoes and other vegetables and plants genetically engineered to make their own pesticides, strains of strawberries genetically engineered to survive freezing temperatures, and genetically engineered microbes that can "eat" oil or other materials. GMO's that are developed and tested successfully in the laboratory may prove a disaster when released into the environment. As a consequence environmental releases need to be carefully planned and monitored and risk assessments need

to be performed and approved by government representatives. The process must be carefully regulated from beginning to end. The increasing number of environmental releases of GMO's is spawning a huge new discipline. In recognition of this several international meetings have been held that address "biological safety" in the environment. The American Type Culture Collection (ATCC) last spring proposed a meeting "Principles of Biological Safety and Risk Assessment" that dealt almost entirely with the environmental releases of biotechnological products and GMO's. Environmental biosafety goes beyond our traditional roots in the laboratory and ABSA needs to decide if it has the interest and enthusiasm to bring this discipline under its umbrella.

Technological advances in communications, information management and transportation have made our world smaller. People can be transported around the world in a day. Huge amounts of information can be transmitted around the world via the Internet or cellular phones in a matter of minutes. We can expect more information to be available to our members and faster and wider communications via the Internet. We can expect our communications through our newsletter, journal, and training courses to become available electronically. The *Journal of Emerging Diseases* is available entirely through the Internet. Annual Conferences may be attended electronically via video conferencing and many training courses may be available electronically. Remote sensing of laboratory facilities and equipment is being installed in the newest high containment labs as is remote video surveillance for safety purposes. Perhaps one day laboratory inspection programs may be entirely automated and evaluated by electronic measures.

### Responding to the future

I am concerned that there are a number of under developed areas within ABSA. One under developed area is associated with biological agents affecting livestock, poultry, and other animals. Some of the largest high containment facilities such as the Plum Island Animal Disease Center, and the newest, such as those at the Australian Animal Health Laboratories in Geelong and the New Canadian federal laboratories in Winnipeg work with infectious agents of livestock and other animals. Another under developed area is associated with biological

agents affecting plants. Laboratory work with these agents also requires high containment laboratories aimed at preventing their escape to the outside environment. Both of these subject areas are dealing with emerging and reemerging diseases and harnessing biotechnology to produce more and better agricultural food products. Both subject areas require federal permits to work with selected animal or plant pathogens, and livestock and crops are excellent targets for biological warfare or terrorism. Other subject areas that are under developed include biological toxins, a number of which are now regulated under the select agent regulation (Federal Register, 1996), and insect vectors of infectious diseases of plants, animals and humans, which also require biological containment laboratories.

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**TABLE 1**  
**Proposed Subject Matter Committees**

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Infectious agents of humans
Infectious agents of animals
Infectious agents of plants
Toxins from living organisms
Vectors of infectious diseases
Biotechnology in the laboratory
Biotechnology in the environment
Application of Information Systems to biological safety

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What can ABSA do to respond to strengthening under developed areas while also responding to the challenges of the future? One approach would be for ABSA to study the possibility of including in its organization "Subject Matter Specialties" or equivalents (divisions, committees, resources, etc.) (Knudsen,1998). The American Industrial Hygiene Association contains subject matter committees and the American Society of Microbiology is divided into divisions. A proposed list of subject matter committees is shown in Table 1. Each subject matter specialty would be represented by a committee composed of a chair and members with deep interest and expertise in that specialty. The committee would serve as a technical resource for ABSA for answering questions, reviewing guidelines and regulations, and otherwise providing expertise in that subject matter area. The Specialty Committee would also be responsible for developing a session

in this specialty at the annual meeting. I believe that if we do not begin to focus on our specialty areas ABSA will remain rooted in the activities that we are performing today instead of growing to meet our future challenges.

*I would like to express my deepest appreciation to the members of the American Biological Safety Association for bestowing upon me the honor of representing them as President this past year.*

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