A HISTORY OF THE AMERICAN BIOLOGICAL SAFETY ASSOCIATION.
PART III: SAFETY CONFERENCES 1978-1987

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INTRODUCTION

The biological safety conferences continue to grow in attendance and the number of presentations. Many topics that were matters of concern at the first biological safety conference in 1955 continue to interest those attending: biosafety cabinets; air sampling; laboratory-acquired illnesses; and decontamination. Improvements have occurred as described in A History of the American Biological Safety Association Part I (Barbeito 1997) and Part II (Krusce 1997). Today, more infectious microorganisms are studied by an increased number of scientists and laboratory personnel, but laboratory-acquired infections have decreased. Biological safety personnel must aggressively continue to pursue basic and applied research applicable to biosafety. Class II biosafety cabinets are replacing Class I biosafety cabinets. Data presented in biological safety conferences have been instrumental in significant changes in microbiological safety. The biological safety conference's eulogy to Dr. Wedum in the form of an Annual Memorial Lecture had an auspicious beginning with Dr. Karl M. Johnson delivering the first lecture.

21st Biological Safety Conference

The twenty-first biological safety conference, sponsored by the Center for Disease Control Hepatitis Laboratories, Phoenix, was held November 6-8, 1978 at the Safari Hotel Convention Center, Scottsdale, Arizona. After a Sunday night cocktail party many attendees left to enjoy Mexican food.

Dr. John Jaugstetter, Centers for Disease Control (CDC), discussed a revision of the Classification of Etiological Agents on the Basis of Hazards. It included an expanded list of etiologic agents, a detailed explanation of containment levels, and a list of containment levels commensurate with the risk of the etiologic agent.

Vincent Oviatt, World Health Organization (WHO), discussed four special programs established in 1976 by WHO: laboratory safety elements; emergency services; shipment of infectious substances; and maximum containment laboratories. A WHO brochure Public Health Aspects and Safety Regulations in General Experimentation was published.

Dr. John Forney described changes over the past 18 years at CDC. Most important were modifications of buildings, procedural changes, and the added number of personnel handling infectious material. In 1977, an extensive survey and questionnaire received 99% response from bench microbiologists who believed training programs needed strengthening. Most employees were not cognizant of the Safety Manual.

Ralph Kuehne described the special containment facilities available at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) to study highly infectious viruses (Ebola, Lassa, Machupo, Marburg, etc.) for which there are no effective prophylaxis or therapy. USAMRIID is the only facility in the United States capable of transporting, isolating, and providing medical care to persons exposed to high hazard microbes.

Dr. Martin Favero, CDC-Phoenix, discussed disagreements among space scientists in bringing Martian “soil” to earth.* Some scientists believe the risks are enormous, some state contamination technology is inadequate and join others stating the mission should be cancelled. Dr. Favero believes the United States has the capability and technology to fully contain a sample from Mars.

James Lauer described 15 clinical laboratory cases of hepatitis that occurred in 1977 at the University of Minnesota in high-risk areas; eight in

*Note: See article “Mars Sample Return and Biocontainment” in this issue of JABSA.
the hemodialysis-transplantation area, and seven in the clinical laboratories. Of 76 samples of environmental surfaces, 26 were positive for hepatitis B surface antigen.

Dr. Waldemar F. Kirchheimer delivered the 2nd Arnold G. Wedum Memorial Lecture entitled, Recent Advances in Experimental Leprosy. Dr. Kirchheimer was Dr. Wedum’s assistant until he joined the staff of the U.S. Public Health Service’s (USPHS) hospital in Carville, Louisiana. He compared treatment of leprosy from Biblical times to today’s patient care. Dr. Kirchheimer described the hospital and laboratories at Carville, and discussed new research he was instrumental in perfecting. The nine-banded armadillo (Dasypus novemcinctus Linn.) always gives birth to identical quadruplets, and provides a system for the study of immunological factors which control development of the disease. Mycobacterium leprae has been cultivated to 10⁹ viable organisms in the armadillo.

Dr. Jerome Landy, Germfree Laboratories, Inc., described a new total exhaust laminar flow biosafety cabinet in which air is not recirculated.

John Harb, University of North Carolina (UNC), discussed the effectiveness of formaldehyde gas at various humidities and contact times. Paper strips impregnated with Bacillus subtilis subsp. niger (BG) were placed in a desiccator and exposed to formaldehyde gas at relative humidities (RH) of 33%, 53%, and 75% and contact times of 1, 4, 7, 10, 16, and 24 h. He reported that only at 75% RH and 10-h contact time were 10⁵ BG spores completely killed. At 33% and 53% RH, complete kill did not occur even after 24-h contact time. The discussions that ensued suggested that, if his data were correct, everything learned or practiced on decontamination procedures up to this time was wrong.

Mr. Everett Hanel, Jr., described the methodology used to successfully decontaminate an animal holding facility in which animals infected with slow viruses had been housed for several years. Sodium hypochlorite adjusted to pH 11.5 was used as a primary decontaminant followed by depolymerization of paraformaldehyde.

22nd Biological Safety Conference

The twenty-second biological safety conference, sponsored by National Cancer Institute (NCI), met October 15, 1979 in Bethesda, Maryland. Dr. Robert Stevenson, Litton Bionetics, moderated a seminar on the Ethical and Legal Issues in the Laboratory Workplace. The participants: Samuel Gorovitz, University of Maryland; Sheldon Samuels, AFL-CIO; Estell Ramey, Georgetown University School of Medicine; and Daniel Singer, Attorney, Washington, DC, described hazards found in the scientific laboratory in addition to etiological agents. They further stated that laboratory personnel faced inconsistent regulations and real risks that might interfere with their scientific freedom and privacy rights.

Dr. Previn Blatt described the development of safety guidelines at Yale University. Individual investigators had assumed responsibility for safety until 1970 when a university-wide Safety Advisory Committee developed uniform policies and procedures. In 1978, the Department of Biological Safety was established.

Dr. Hotse Bartlema, European Molecular Biology Laboratory, Heidelberg, Germany, described a U-shaped tunnel approximately 19 m with a diameter of 30 cm that is used to test HEPA filters.

On Tuesday afternoon, the safety conference moved to Fort Detrick for the Dr. Arnold G. Wedum memorial. The event took place in front of Building 550, the headquarters of Industrial Health and Safety Division when the Post was under the command of the U.S. Army Chemical Corps. Dr. William Payne, NCI, introduced Everett Hanel, Jr., Frederick Cancer Research Center (FCRC), who introduced the platform guests. After a brief statement, Major General Kenneth Dirks, U.S. Army, presented the dedicatory flag to Mrs. Wedum and Eric, Dr. Wedum’s son. Dr. Donald S. Frederickson, Director of National Institutes of Health (NIH), gave the dedication speech followed by remarks of Dr. Arthur Upton, Director of NCI. Many friends of Dr. Wedum and personnel who worked in Industrial Health and Safety Division attended.

After the ceremony, a trip to Cozy Restaurant in Thurmont, Maryland. After dinner, Dr. Clarence J. Gibbs, NIH, delivered the 3rd Arnold G. Wedum Memorial Lecture entitled, Transmissible Virus Dementias of Man, an Overview. The viruses causing kuru, Creutzfeld-Jakob disease, and scrapie are called “subacute spongiform virus encephalopathies.” They are very resistant to ultravio-
let and ionizing radiation, heat, and formaldehyde. The diseases may have an incubation period of 90 months before the onset of symptoms. Clinical, pathological, and epidemiological data on the diseases were discussed.

Dr. David Stuart, The Baker Company, described concentration of toluene vapor in a Class II, Type B biosafety cabinet. His data showed work should be performed toward the rear of the work area.

Dr. Jerry Walker, Plum Island Animal Disease Center (PIADC), discussed the escape of foot and mouth disease virus from a high containment laboratory that infected normal cattle on the island. After all the animals were transferred into laboratories, all areas were disinfected. An investigation showed that the pressure differential in a high containment laboratory had changed from negative to positive, and the filters leaked around the gaskets. Another probable source of viral escape may have been from liquid seepage under a temporary partition erected during construction.

Vincent Oviatt, WHO-Geneva, discussed essentials for developing biosafety programs. Programs were implemented in member countries, and occupationally-acquired illnesses now will be reported to WHO.

23rd Biological Safety Conference

The twenty-third biological safety conference, sponsored by MEDI, Inc., was held October 12-15, 1980 at the Campbell House Inn, Lexington, Kentucky.

Everett Hanel, Jr., presented the first 25 years of biosafety conferences. Dr. Jerry Tulis reviewed the first year of the Bioscience Program at University of North Carolina's (UNC) graduate educational program established under Chairman John E. Larsh, Jr., in the School of Public Health, to confer M.P.H. and Dr.P.H. degrees. Dr. Albert Balows, CDC, and President, American Society for Microbiology (ASM) stated that the failure of many scientists to adhere to microbiological safety practices is a pressing problem.

Kenneth Brow, NCI, analyzed time and cost required to build or renovate small laboratory suites, research animal facilities, P-3 laboratories, and large multistoried buildings. Dr. Howard Larsh, University of Oklahoma, described procedures used to decontaminate and remove 15-year-old wooden safety cabinets from the Missouri State Chest Hospital in Mount Vernon that had been used for isolating and identifying M. tuberculosis and pathogenic systemic fungi such as Histoplasma capsulatum and Blastomyces dermatitidis. Dr. Arthur DiSalvo described South Carolina's 93,000 ft² Public Health Laboratory Building. The laboratories have one-pass airflow with a separate air system for the animal quarters. Stanley Nagle, NIH, described the extensive modifications needed to construct the P-4 laboratory in Building 550, Fort Detrick. Dr. Sol Miller, Abbott Laboratories, described new safety laboratories with entry and exit air locks to each module, HEPA-filtered supply air, HEPA- and charcoal-filtered exhaust air.

Back then...

An old-fashioned North Carolina Bar-B-Que was planned for dinner on Monday. Saturday night people met at Bourbon Arabians. The pigs were slowly cooked over hickory embers from dusk Saturday to dawn Sunday. A good time was had by Irene and Mac Vandivere; Cathy, Markita and Norm Goodman; Eleanor and Ken Schatzle; Connie and Serf Guerra; Eve and Roy Hubbard; the Bob Rushes; the Desmond Robinsons; Dan Lieberman; Jim Sullivan; and Bob Everett who joined the cooks Ann and Tom Christenberry. Sunday, at noon, many sleepy individuals enjoyed lobsters, compliments of The Baker Company, cooked and served by chef Robert Rush.

Dr. Susan Rubinstein, University of Alberta, discussed Canada's laboratory safety regulations and guidelines. In 1977 the Medical Research Council published guidelines for recombinant DNA molecules, animal viruses and cells, and demanded compliance by researchers they funded. Dr. Desmond Robinson, Department of Health and Social Security, London, discussed methods by which the United Kingdom's safety recommendations were initiated, implemented and enforced. Wally Guntho, London School of Hygiene and Tropical Medicine, described the British Standard for Microbiological Safety Cabinets. Dr. Hotse Bartlema described the European Molecular Biology Laboratory's procedure for biotesting laminar flow biosafety cabinets. The protocol varies from the procedures employed in the United States and
England in that a person sits in front of the cabinet during aerosolization of the test organism. He believed this procedure to be more realistic than the use of a metal cylinder on the work surface. Dr. Barbara Page-Roberts, Vickers Limited, described a negative pressure, flexible heavy gauge plastic isolator system that provided primary containment similar to a Class III biosafety cabinet.

Dr. Alfred Wallbank, University of Manitoba, showed that formaldehyde (2 to 10%) was effective against poliovirus (Sabin L Sc, 2ab) in 8.5% bovine serum albumin (Difco, Detroit, MI). Skim milk (Difco, Detroit, MI) neutralized the reaction.

Dr. Riley D. Housewright, former Scientific Director of Fort Detrick, and Past President of ASM, presented the 4th Arnold G. Wedum Memorial Lecture entitled, Safe Drinking Water and Health. He discussed his long-time association with Dr. Wedum and the many meetings in which more protection for personnel was advocated by Dr. Wedum.

Dr. Peter Gerone, Delta Regional Primate Research Center, described hazards of using experimental animals in relation to their potential impact on human health, the quality of scientific work, and environmental contamination. Dr. S.S. Kalter, Southwest Foundation for Research and Education, discussed experiments with primates, and stated that a vigorous and rigid husbandry protocol must be implemented to prevent animal and human illness. Dr. A.E. New, NCI, discussed the increased use of specific pathogen-free rodents in research. Gnotobiotic animals were defined by Dr. Perry Mathews, National Animal Disease Center (NADC), and he discussed the many ways these animals were used in research.

Lola Bilowich, M.D. Anderson Hospital and Tumor Institute, reviewed the many problems she encountered while establishing a biological safety program.

Irene Melvin, University of Kentucky Medical Center, presented a history of tuberculosis. Case rates show that tuberculosis was far from being eradicated and remains a hazard to personal health and financial security. She emphasized the need for more specific skin test materials.

Dr. Emmett Barkley, NIH, described revisions to the Guidelines for the Laboratory Use of Chemical Carcinogens, issued June, 1979, that recommend three procedures and safeguards applicable to the laboratory to minimize exposure to carcinogenic substances.

At the business meeting, Dr. Emmett Barkley appointed Edward Lazear, Jerry Tulis, David Stuart, Kenneth Jones, Manuel Barbeito, and Richard Kruse to serve on a steering committee charged with coordinating plans for the formation of a formal safety organization.

24th Biological Safety Conference

The twenty-fourth biological safety conference, sponsored by the University of Georgia, CDC, and U.S. Department of Agriculture’s (USDA) Southeast Poultry Research Laboratory, was held October 5-7, 1981 at the Center for Continuing Education, University of Georgia, Athens.

Lowell Muse, University of Georgia, described the results from monitoring personnel exposed to isotopes of tritium and iodine. Dr. Julio Rivera, NIH, discussed the protocols for medical surveillance from NIH’s Guidelines for Laboratory Use of Chemical Carcinogens. Lola Bilowich reviewed the genotoxic potential of cancer therapeutic agents. A study, using mutagenic activity in urine, confirmed that pharmacy personnel were absorbing these agents. Mary Woebkenberg, National Institute for Occupational Safety and Health (NIOSH), described a passive monitoring method based on Fick’s law of diffusion.

Dr. Marshall Levine, Johns Hopkins Medical Institutions, in Considerations in Developing a Medical Surveillance Program for Laboratory-Associated Diseases, stated that programs should be designed as an integral part of the overall laboratory safety program, and should include: establishment of goals, close cooperation between health and safety departments, health education, and periodic evaluation of program effectiveness.

Stephen Pijar summarized 15 years experience with biological safety cabinets, from Class I biosafety cabinets manufactured in the early 1950s to the current Class II biosafety cabinets. Dr. Melvin First, Harvard School of Public Health, described a 2-week course Certification of Biological Safety Cabinets sponsored by NIH. Ten classes were held between June 1979 and August 1981, and 115 attendees completed written and practical examinations. Additional courses will be offered.
Back then...

Monday night, everyone traveled to Charlie William’s Lodge where Georgia Bar-B-Que was served. The fellowship between the students of Dr. Tulis’ class mingling with the “old timers” was outstanding.

Janet Macher, Harvard School of Public Health, discussed studies on the collection efficiency of old and new biological air samplers.

Joseph Songer reported that biohazards exist in all environments. They may be toxic or allergenic substances. Examples are: animal toxins from snakes, bees, wasps, and ants; plant toxins from poison ivy, oak, and sumac; allergens from fungi in air conditioners; and grain dust and fungi from hay on farms. Norman Petersen described the increased risk of viral hepatitis experienced by clinical laboratory personnel handling blood and blood derivatives. Although many biological and biomedical assays are now automated, care must still be taken while unpacking, decapping, transferring, and disposing of specimens.

Tuesday night, after a social hour and dinner, the 5th Arnold G. Wedum Memorial Lecture entitled, Responsibility for Scientific Response to Nonspecific Judgments in the Public Arena was delivered by Dr. Fred Davidson, President of the University of Georgia. He said, “Honest responses and straightforward answers always should be given. Never cover up an accident or illness, but be truthful and timely.”

25th Biological Safety Conference

The twenty-fifth biological safety conference, sponsored by the Massachusetts Institute of Technology (MIT), Harvard School of Public Health, and Harvard University, was held November 4-6, 1982 at 57 Park Plaza Hotel, Boston.

The Keynote Address Genetic Manipulation with Retroviral Vectors was presented by Nobel Laureate Dr. David Baltimore, Director, Whitehead Institute for Biomedical Research. The retroviruses first came into prominence as causes of cancer in animals. Their genetic strategy made them ideal vectors for carrying new genetic information into cells.

C.A. Schlegel, The Baker Company, discussed the handling of antineoplastic agents. A horizontal airflow clean work station should never be used. She stated that an assessment of risk should be performed to: identify and characterize the agents used; describe normal activities; and identify possible exposure. Appropriate disposal of antineoplastic-chemotherapy waste was essential.

Keith Allner discussed the Centre for Applied Microbiology and Research that formerly was the Ministry of Defense Establishment, United Kingdom. Their work was oriented toward health care and public health research involving vaccine production, biotechnology, genetic manipulation, environmental microbiology, and biological safety.

E.C. Cole, UNC, using a 6-stage Andersen Sampler, demonstrated the presence of high concentrations of bacteria and fungi in a poultry farm's coop air.

Back then...

After the business meeting, the attendees traveled to the New England Aquarium for a reception. It was extremely interesting and the sights were, as one attendee stated, “terrific.”

Dr. John Richardson, CDC, discussed risk assessment and precautions against HIV. The illness, acquired immunodeficiency syndrome (AIDS), first came to medical attention in 1981, and is characterized by immunosuppression of undetermined origin, a biopsy-proven Kaposi's sarcoma, or culture-proven opportunistic infection in previously healthy individuals.

C. Welty, Channing Laboratory, Boston, discussed the booster effect of serial tuberculin skin tests. The booster phenomenon increased as an individual aged. The mean age of the subjects was 64 yr. At a VA Hospital, 457 patients received the initial PPD skin test with 106 positive reactions. At two weeks, to evaluate booster effect, 322 patients, who initially had negative PPD skin tests, received the second PPD testing. The booster effect is an increase in size of the tuberculin skin test reaction by serial skin testing thought to be due to stimulation of the immune skin test. The booster effect was at least twice that observed in younger populations. Having worked with experts in mycobacteriology, namely Drs. Mac Vandiviere and George Kubica, Richard Kruse asked if these data were realistic because PPD is a mixture of several tuberculin-proteins, each of which could cause a delayed hypersensitivity reaction.
Dr. D.A. Giard described the large-scale Cell Culture Center established in 1974 at MIT. The facility produces approximately 400 L of suspensions and 2,000 roller bottles per month.

Friday was poster session day. Fran Wimberly, University of Georgia, displayed a micro-computer system that provided current status, location, date of last survey, and air velocity of chemical fume hoods on the campus. Robyn Gershon displayed an outline of the expanded medical surveillance program at Yale University. Shigeo Hino, Nagasaki University School of Medicine, displayed a modified biosafety cabinet for handling animals. Thomas Allen, Flanders Filters, displayed a technique to improve safety when contaminated HEPA filters are removed and bagged. Dr. Robert Olcerst, Mercy College, New York, displayed results of microbial assays performed on the surface of microscope oculars and showed that pathogenic, or potentially pathogenic, microorganisms were recovered from 28% of the oculars. Robert Gross, Medical Repair Laboratories, compared the sensitivity of the DOP leak test, the halogen leak test, and other leak tests for Class II biosafety cabinets and concluded that the halogen leak test was unnecessarily stringent. He claimed that DOP could be used satisfactorily for leak testing the biological safety cabinet but NSF rejected the procedure.

The 6th Arnold G. Wedum Memorial Lecture, entitled, Biosafety—A Discipline in Transition was delivered by Dr. W. Emmett Barkley.

Dr. Melvin First, Terry Webb, and Shigeo Hino compared characteristics of various nebulizers used at National Sanitation Foundation (NSF). All three stated the 6-jet Collison consistently delivered a more uniform aerosol than the DeVilbis 40, or glass and plastic Vaponefrin nebulizers. Dr. First stated the Collison should be modified so its discharge velocity would approximate that of the DeVilbis 40 nebulizer used by NSF for cabinet testing. The presenters constantly mentioned DeVilbis 40 nebulizer, but this nebulizer was not used for the initial microbiological tests (National Sanitation Foundation 1976).

The final session was devoted to “Waste Management” that included Integrated Approach to Waste Management by Judith Gordon, Gordon Resources Consultants; Destruction and Recovery of Waste Solvents by Mark Jensen, National Animal Disease Center (NADC); Destruction of Chemical Carcinogens by Dr. Eric Sansone, FCRC; Decontamination of Microorganism Waste by Steam Sterilization by William Rutala, UNC, and Methods for Decontamination of T-2 Mycotoxins by Ralph Kuehne.

A conference proceedings, with the text of most presentations, was prepared and distributed to the attendees. This was the second time conference proceedings were distributed. Becton, Dickinson and Company prepared proceedings of the 17th biological safety conference.

26th Biological Safety Conference

The twenty-sixth biological safety conference, sponsored by M.D. Anderson Hospital and Tumor Institute, was held October 17-19, 1983 at the Warwick on the Park Hotel in Houston.

S. Lindell discussed the results of a survey questionnaire sent to 544 University of Iowa faculty who used hazardous biologicals and chemicals. Ninety-five percent responded and the most common complaint was improper storing and handling of chemicals.

Alex McIntosh described microbiological safety practices at the University of Strathclyde, Glasgow, Scotland. George Harper, Porton Down, England, used dynamic microbiological tests to assess the safety of all sealed containers in laboratory centrifuges.

Trevor Menzies, Ultraviolet Supplies at Victoria, Australia, described a biosafety cabinet and room in Australia used exclusively to prepare cytotoxic drugs.

Dr. David Stuart, The Baker Company, proposed a performance envelope to be used to certify biological safety cabinets. NSF Standard Number 49 specifies that a biosafety cabinet’s airflow be set within ± 5 fpm for NSF certification tests. Microbial tests were performed using four airflow settings: (1) high inflow-high down-flow; (2) high inflow-low down-flow; (3) low inflow-low down-flow; and (4) low inflow-high down-flow to ascertain if the cabinet contained the test microorganisms. Barbara Rake, Contamination Control, Inc. (CCI), also evaluated the performance envelope concept. She tested 16 different airflow combinations and found an acceptance range of ± 25% from designated set-point values for the personnel protection test and an
even larger range for product protection and cross contamination tests. Lynn Harding, Harvard University, evaluated effects of operator activity on airflow and microbial tests in Class II biosafety cabinets.

Back then...

After Happy Hour, compliments of the Winfield Corporation, the attendees became cowgirls and cowboys and traveled to Mickey Gilley's Club in nearby Pasadena. People forgot their safety training and attempted to ride the bucking broncho at top speed. After a few "long necks" the bruises were forgotten.

William Brubaker (USAMRIID) described procedures employed to decontaminate a 20,000 ft² research laboratory. Class II and Class III biosafety cabinets, aerosol chambers, vacuum lines, filter plenums etc. were treated by depolymerized paraformaldehyde or liquid formalin in the entire research laboratory. Filter paper patches, impregnated with 10⁹ BG spores were placed at various locations throughout the area. After 18-h contact time, each patch was placed in a tube of thioglycollate broth (Difco Laboratories, Detroit, MI) and the tube was incubated at 37°C to verify decontamination effectiveness. Lawrence Gibbs, University of Connecticut, discussed problems encountered in the disposal of waste scintillation counting fluids. An automated recovery process was developed that removed radioactivity and purified the organic solvent.

After a social hour and dinner, the 7th Arnold G. Wedum Memorial Lecture entitled, AIDS was presented by Dr. Peter W.A. Mansell, Department of Cancer Prevention, M.D. Anderson Hospital and Tumor Institute.

Dr. Daniel Liberman, MIT, described three converging research areas as researchers search for the molecular basis of cancer: oncogene and retroviral biology, and amphotropic virology.

William H. Puckett, Jr., M.D. Anderson Hospital and Tumor Institute, showed that antineoplastic drugs can be carcinogenic. Studies have shown mutagenic activity in the urine of personnel who prepared certain antineoplastic drugs in a horizontal airflow clean bench.

27th Biological Safety Conference

The twenty-seventh biological safety conference, sponsored by the School of Public Health, University of North Carolina, was held October 14-17, 1984 at the North Raleigh Hilton Hotel. Joseph Songer delivered the keynote address entitled, Risk Management in the Laboratory and emphasized that assessment of risk is an essential part of safety.

Robyn Gershon described the first laboratory-acquired infection with Rocio virus. The researcher became ill with fever, severe headaches, malaise, and meningismus. Serology showed a 2-fold rise in titer to Rocio virus. The infection was of unknown origin.

Charles Miller presented an epidemiological review of zoonotic infections incurred at NADC. It was estimated that 46% of employees were exposed to infectious microorganisms. Syringe use and animal necropsy were responsible for the majority of exposures.

Terry Webb, WHO Collaborating Centre for Biosafety, Canada, compared the dioctylphthalate-forwarding light-scattering photometer (DOP) method and the sodium chloride-hydrogen flame photometer (NaCl) method for testing HEPA filters.

Barbara Rake evaluated a 2-ft Class II biosafety cabinet. She modified NSF Standard Number 49 microbial tests by (1) placing a manikin in front of the cabinet, and (2) having a person sit in front of the cabinet and perform normal microbial techniques.

Back then...

Monday night we heard oomph-pah-pah music from the ballroom and assembled there for a buffet of German dishes. The Little German Band, dressed in Lederhosen and Tyrolean hats played polkas and other music. Larry Taylor of paraformaldehyde fame, was now Reverend Taylor and gave the blessing. The dance floor was full, the food scrumptious, the music superb, and a great time was had by all. Thank you, Jerry.

Keith Allner, Porton Down, England, discussed formaldehyde decontamination of smallpox isolation hospitals that were closed by The Department of Health and Social Security. Wayne Thomann, Duke University Medical Center, described the airflow dynamics in a 20-bed Hematology-Oncology Unit. Using an Andersen Sampler he demonstrated that the supply air was consistently negative for
Aspergillus spp., but the problem of fungal contamination was exacerbated by excessive Aspergillus spp. in the air of 11 of 12 rooms. J.L. Lauer discussed methods used to control Aspergillus spp. in a Bone Marrow Unit at the University of Minnesota Hospitals. In-room recirculating HEPA filters were installed and reduced nosocomial aspergillosis from 18% to 5.4% in immunosuppressed patients.

Deborah Wilson, NIH, described a dynamic aerosol unit to expose animals to continuously generated infectious aerosols. Studies varying exposure times of guinea pigs to aerosols of *M. tuberculosis* were carried out that ascertained minimum exposure time for 100% infection.

David Brantley, E.I. DuPont, and Joseph Van Houten, Schering Corporation, discussed biosafety programs at their respective companies. Each company adopted NIH's *Guidelines for Research Involving Recombinant DNA Molecules* as corporate practice.

Dr. Emmett Barkley discussed *Biosafety in Microbiological and Biomedical Laboratories* published after 7 yr. research. Four biosafety levels were established that provided a risk assessment, data on laboratory hazards, and recommendations. Vincent Oviatt discussed WHO's *Laboratory Safety Manual* that had guidelines for international application.

Dr. Donald E. Gardner, Northrop Services, Inc., Research Triangle Park, North Carolina delivered the 8th Arnold G. Wedum Memorial Lecture entitled, *Pulmonary Infections in a Compromised Host*. He explained how false data were derived from the death of animals from nosocomial infections, not from the organism under study. Proper methods for housing the animals were discussed.

Mary Ellen Kennedy, Centre for Laboratory Control, Canada, moderated a session on *Infectious Waste*. Dr. Jonathan Richmond discussed methods used at NIH; Roy Hubbard, Con-Test Ltd., described actions of the Environmental Protective Legislation in the Province of Ontario; Dr. James Vacik, University of South Alabama, described the school's new facilities for infectious wastes; Lawrence Gibbs described methods used at Yale University; and Dr. Eric Sansone, FCRC, discussed decontamination and destruction of chemical carcinogens.

**28th Biological Safety Conference**

The twenty-eighth biological safety conference, sponsored by the Salk Institute for Biological Studies, was held October 20-23, 1985 at the LaJolla Village Inn, LaJolla, California.

Debra Hunt, Duke University Medical Center, continuing the aerobiological monitoring previously reported at the 27th biological safety conference said effective control of Aspergillus spp. depends on appropriate filtration of source air, airflow barriers, restrictive access, and modified work practices.

Dr. David Stuart stated that raising the window height on a Class II biosafety cabinet to 10 in. affected the performance envelope. Long discussions ensued as safety cabinet manufactures stated that the work access opening in their biosafety cabinets was 10 in. and they met NSF Standard Number 49, including the performance envelope tests.

Jolanda Janczewski, Smithsonian Institution, discussed parasitic infections in animal keepers in zoological parks. Five of seven animal keepers at the National Zoological Park's primate area had intestinal parasites: two had *Giardia lamblia* and three had *Entamoeba histolytica*. The medical history of the animals revealed that several monkeys were infected with either *Giardia* or *Entamoeba*. Animal parks and zoos must be cognizant of the dangers of parasitic infections.

Raymond Hackney, UNC, reported a laboratory-acquired *Neisseria gonorrhoeae* infection. There was no documented accident.

Dr. Jonathan Richmond discussed eight possible *Bordetella pertussis* infections. A throat culture isolate confirmed presence of *B. pertussis*. Serum antibody levels were negative.

Deborah Wilson discussed the high number of diseases among pathologists and mortuary workers.

N.J. Brace, Bootle, Merseyside, England, stated that H.M. Factory Inspectorate had been responsible for occupational health and safety in the United Kingdom for 150 years. In 1975, the Inspectorate was incorporated into the Health and Safety Executive Agency. E.A. Meyrick, Central Public Health Laboratory, London, described the relocation of the Public Health Laboratory to a newly designed complex.
Back then...

We boarded buses and traveled to the San Diego Wild Animal Park. After observing African dancers, we took a train ride and observed the animals at dusk. The evening culminated in a delightful buffet at the park, but the guide had an acerbic wit when he questioned where the meat came from.

Dr. Colin Ludford discussed the Australian National Animal Health Laboratory, a maximum containment laboratory with a multiple barrier system to control infectious material.

The 10th Arnold G. Wedum Memorial Lecture entitled, *Risks of Containment of Viruses* was delivered by Nobel Laureate Dr. Renato Dulbecco of the Salk Institute. Dr. Dulbecco pioneered research in virology and oncogenic virology, and his presentation corroborated the intensive research he performed that earned him the Nobel Prize.

Manuel Barbeito, in *Development of Evaluation Standard for Animal Containment Room Which Functions as the Primary Barrier*, described USDA's Agricultural Research Service Evaluation Standard for assessing an animal containment room. Research with infected livestock and poultry was conducted in which the animal room served as the primary barrier. This primary barrier (animal room) prevented horizontal transmission between large research animals in adjacent rooms when test animals were infected with a virus with an infectious dose of a single particle.

Dr. Eric Sansone discussed decontamination and destruction of antineoplastic agents in laboratory wastes.

At the 27th biological safety conference, the American Biological Safety Association, henceforth known as ABSA, became a reality. Elected to office were: Everett Hanel, Jr., President; Dr. Jerome Schmidt, Secretary-Treasurer; and an Executive Council. However, the election procedures stated in ABSA's constitution were not followed and the elected officials became pro tem. A new election was held and elected were: Jerry Tulis, President; Jerry Schmidt, Secretary-Treasurer; and as members of the Executive Council: Judith Gordon, Kathlene Peterson, John Keene, and Manuel Barbeito.

29th Biological Safety Conference

The twenty-ninth biological safety conference, sponsored by MEDI, Inc., was held October 5-9, 1986 at the Radisson Plaza Hotel in Lexington, Kentucky.

Back then...

Richard Kruse drew the wrath of some Council members when the letter announcing the conference was in "Southern Drawl." He was prepared to scrap the second letter and apologize, but Emmett Barkley said, "No! You do not owe anyone an apology and besides the world needs a little humor." While attending a Canadian safety conference, Vince Oviatt and his wife offered congratulations for the letters; they had made copies for many member countries of WHO. Sunday night at the cocktail party, along with the usual cheeses, coldcuts, and dips were steamship rounds of beef, country hams, and beaten biscuits. Who can ever forget Cynde's Bourbon fountain and the aroma?

The conference started with two Keynote Speakers. Dr. Peter Gerone discussed leprosy in animals, and Dr. Ward Bullock, University of Cincinnati Medical Center, discussed leprosy in humans.

Dr. Eric Sansone evaluated the potential occupational hazard to laboratory and maintenance personnel who work in chemical fume hoods. Mutagenic activity of the organic fraction was assessed by the Ames Salmonella mammalian assay method.

Dr. Clarence Styron, Monsanto Company, described the facilities at St. Louis which consisted of laboratories, fermentation pilot plants, growth chambers, green houses, and farms. Dr. Melvin First described a commercial version of the old balanced laminar airflow cabinet. The unit is similar to a Class 100 clean work station except it has a view screen and slotted air intake grill extending across the entire width of the work opening. The unit was evaluated by test protocols of NSF Standard Number 49, and when tested microbiologically failed to provide personnel and product protection.

At the banquet, President Tulis announced the formation of the President's Award. The recipient was Joseph Songer from the National Animal Disease Center, Ames, Iowa.

Dr. Howard W. Larsh, Emeritus Professor of Microbiology, University of Oklahoma, delivered the 10th Arnold G. Wedum Memorial Lecture entitied, *Fungi: Interesting, Remarkable and Ex-
tremely Complicated. He stated that steak is enhanced by mushrooms and penicillin has saved many lives, yet fungi cause dangerous pulmonary infections. He discussed his long association with Dr. Wedum and emphasized the assistance received. After his speech, Dr. Joyce Scott presented the Wedum Memorial Plaque to Dr. Larsh. The audience was surprised when they learned Joyce was Dr. Wedum’s daughter. She too was surprised when, like her father at the 18th biological safety conference, she was inducted into the Honorable Order of Kentucky Colonels.

Dr. Kurel Styblo, International Union Against Tuberculosis, The Hague, Netherlands, presented Tuberculosis in Europe and the World. Tuberculosis was, and continues to be, a major problem in developing countries. It has been estimated that the disease will be virtually eliminated in developed countries in a few decades. Nevertheless, approximately four million cases develop in the world annually. Poor results of nationwide case-findings and chemotherapy programs were the main reasons for this deplorable situation. Dr. Hans Rieder, CDC, stated that cases of tuberculosis in America had decreased 34.5% from 1975 to 1984, but data indicate tuberculosis remains a problem as the case-rate decreased only 0.2% in 1985.

Dr. George Kubica, CDC, stated that infection could result by inhaling a single tubercle bacillus. The risk of tuberculosis infection is 3- to 5-times greater for mycobacteriology laboratory workers than for other hospital personnel. Problems of safety in the tuberculosis laboratory were compounded by world-wide distribution, the speed and extent of international travel, and the mass movement of immigrant populations.

Dr. Mac Vandiviere, University of Kentucky Medical Center, discussed skin testing in his presentation entitled, PPD: A Witches Brew - Interpretation: An Enigma Too. PPD is a mixture of several tuberculo-proteins, each capable of eliciting a delayed hypersensitivity reaction. Cross reactions and “false positives” were possible. Approximately 8% of bacteriologically confirmed cases gave “false negatives.” A positive PPD meant there was reasonable probability of an infection or disease due to M. tuberculosis, but it might indicate a non-M. tuberculosis etiology. These factors make eradication of tuberculosis (that was predicted in the 1950s) unrealistic.

Dr. Donald Ahern, Georgia State University, warned individuals wearing mascara and contact lenses. The applicator for applying mascara could cause accidental trauma to the corneal epithelium. Many mascaras support the growth of Pseudomonas aeruginosa. Serious infection may result when the eye’s integrity is compromised by a scratch or chemical irritation. Contact lenses may cause infections by improper hygienic practices and long periods of contact on the eyes.

Robert O’Leary, American Sterilizer Company, described AMSCO’s vapor phase hydrogen peroxide (VPHP) sterilant for special medical applications.

Manuel Barbeito summarized USDA’s Guidelines for Biotechnology Research that followed closely NIH’s Guidelines for Research Involving Recombinant DNA Molecules.

Drs. David Henderson, NIH, and Albert Balows, CDC, discussed occupational risks of AIDS. Dr. Robert McKinney, NIH, moderated a panel discussion on biosafety in AIDS virus production operations.

30th Biological Safety Conference

The thirtieth biological safety conference, sponsored by Memorial Sloan Kettering, was held October 18-21, 1987 at the Meadowlands Hilton Hotel in Secaucus, New Jersey.

The opening session repeated a subject of intense interest at the 29th biological safety conference, AIDS. P. O’Donnell discussed the mechanism of action of retroviruses; B. Polsky reviewed the impact nosocomial infections have on AIDS patients; and D. Armstrong described information on the increase and distribution of AIDS.

Dr. Jonathan Richmond, NIH, discussed the challenges and successes of an interdisciplinary task force that designed a large centralized biomedical research animal facility.

Several presentations focused on biosafety cabinets. James Edwards, Charcoal Services Corporation, discussed the nuclear industry’s HEPA filter test; Shigeo Hino stated that a decrease of electrical voltage drastically reduced airflow in a biosafety cabinet. From The Baker Company, Theodore Greenier reviewed the discrepancies that occur when inflow velocity is calculated or measured in Class II, Type A biosafety cabinets, and Robert Jones
described the effects that low ceilings have on the Class II biological safety cabinet's performance.

Ashraf El Dessouky described biosafety and human behavior in developing countries. He attempted to avoid hazardous problems that might evolve from the behavior of personnel working in a laboratory. Biosafety rules, regulations, personal hygiene standards, and the tasks and risks of their jobs were explained to 14 employees. They were not told they would be observed for six months. For six to eight weeks they followed rules. Thereafter there was a gradual decrease with the following mistakes: (1) eating or drinking in restricted areas; (2) not washing hands properly; (3) going three to four days without shaving; (4) hands brought to mouth, eyes, nose, and hair while working; and (5) not wearing coats, gloves, or mask.

Alfred Tavares described Fort Detrick's continuous flow sterilization system that is capable of treating 280,000 gal/day of infectious liquid waste at 270°F for a minimum retention time of 28 min. The system has a heat recovery exchanger for energy conservation.

Dr. Donald Vesley, University of Minnesota, discussed a 1986 survey of laboratory-acquired infections and injuries in clinical laboratories.

Dr. Jerry Tulis environmentally analyzed specific habitats of an elderly male who was diagnosed as having hypersensitivity pneumonitis. Fungi such as Aspergillus spp. and Penicillium spp., which are classified as aeroallergenic fungi, were isolated.

James Otten, Oak Ridge National Laboratory, reviewed air sampling methods to identify sources of bioaerosols in the indoor environment.

The 11th Arnold G. Wedem Memorial Lecture was presented by Dr. Robert E. Shope, Yale University Arbovirus Research Unit. He described his twenty years experience with biosafety level 3/4 arboviruses. The early equipment afforded protection, but did not compare with today's equipment. His research with arboviruses included his interest in finding vaccines and prophylaxes.

CONCLUSIONS

We did not intend this to be a history of the authors, but one was present at every biological safety conference.

The conferences we chaired and the commit-tees on which we served were not all work, we did enjoy ourselves, especially when it culminated in a successful conference. We were pleased to be part of the Steering Committee that was instrumental in paving the way for the formal organization.

We would be remiss if we did not state that writing the history of the first thirty biological safety conferences has been rewarding as we reminisced about old and new friends, the congeniality that was present, and the good times at the safety conferences. We could have prepared these manuscripts by being very scientific but we believe the reader would rather have "just the facts" with a few embellishments of "back then" that provide a modicum of understanding of interesting tours and social activities. As in Part I and Part II we have continued the Tables. Scientific presentations at biological safety conferences usually became articles in scientific journals and many are presented in Table 1. Table 2 illustrates that the safety conferences were a training ground for future leaders.

Years ago there was an ad on television showing a lady in an old dress and dirty apron washing clothes by hand, pumping water, and cooking on an old wood stove. Suddenly there was a clap of thunder and a flash of light, and from the smoke emerged the modern-day lady sitting in the kitchen with her dish washer running while she watched her soap opera on TV with a voice saying, "You've come a long way baby." So it is with the ABSA.

This history of the ABSA has been a synopsis or "Readers Digest" version. Not all presentations could be included in the history, nor could all the people who contributed to make ABSA a great organization. There have been over 500 presentations at the first 30 biological safety conferences. One only has to remember that at the first conference there were 25 individuals present. Today, ABSA has over 800 members from 40 states and 14 countries and the organization is still growing. The first conferences met in small conference rooms at government installations; today it meets in large, spacious rooms in luxurious hotels. Many of ABSA's Chapters have more members than the number of individuals attending the first conference.

Our search for many past programs has led us to believe there should be a repository established to keep ABSA's data. Who did what at the safety conferences was difficult to find. In Table 3 there is
a data base for the first 30 conferences. Many organizations have a designated historian who maintains these records, and we believe the Council should consider this suggestion.

Everyone agrees that the safety conference had an auspicious beginning with the Keynote Address by Dr. Arnold G. Wedum. Dr. Wedum was a person one respected, his counsel was timely, and of the utmost importance. The preponderance of his influence was the embodiment of the safety conference as his name was and still is synonymous with safety. We were very fortunate as we worked for and with him.

ACKNOWLEDGMENTS

We thank W. Emmett Barkley and Melvin W. First for their critical review of the manuscripts, and for many valuable suggestions; Joseph R. Songer and David G. Stuart for locating many old biological safety programs that provided data for the manuscripts.

REFERENCES


National Sanitation Foundation. 1976. Class II (laminar flow) biohazard cabinetry. National Sanitation Foundation standard no. 49. National Sanitation Foundation, Ann Arbor, MI.


TABLE 1

Selected Publications by Participants at the Ten Biological Safety Conferences 1978-1987


Barbeito, M.S. 1979. Special design features for maintenance requirements of a biomedical facility, p. 177-193. In D.G. Fox (ed.), Design of biomedical research facilities; proceedings of a cancer research symposium 1979 October 18-19, Frederick Cancer Research Center, Frederick, MD. NIH publ. no. 81-2305. National Institutes of Health, Bethesda, MD.


TABLE 1
(continued)


Harvard University School of Public Health. 1987. Testing class II laminar airflow cabinets (course). Harvard University School of Public Health, Boston, MA.


Johns Hopkins University School of Hygiene and Public Health. 1980. Control of biohazards in research laboratories (course). Sponsored by Division of Safety, National Cancer Institute, Johns Hopkins University School of Hygiene and Public Health, Baltimore, MD.


TABLE 1
(continued)


TABLE 2
ABSA Presidents Who Participated in One or More of the Ten Biological Safety Conferences 1978-1987

<table>
<thead>
<tr>
<th>ABSA President</th>
<th>Year President</th>
<th>Year First Participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary Cipriano</td>
<td>1993 - 1994</td>
<td>1986</td>
</tr>
</tbody>
</table>
TABLE 3

Date, Location and Chairperson(s) of the First Thirty Biological Safety Conferences

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Chairperson(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[19] Oct 18-20, 1976</td>
<td>Fort Detrick, MD</td>
<td>E. Hanel, Jr., M. Barbeito</td>
</tr>
<tr>
<td>[21] Nov 6-8, 1978</td>
<td>Scottsdale, AZ</td>
<td>N. Petersen</td>
</tr>
<tr>
<td>[22] Oct 15-17, 1979</td>
<td>Bethesda, MD</td>
<td>M. Barbeito</td>
</tr>
<tr>
<td>[25] Nov 4-6, 1982</td>
<td>Boston, MA</td>
<td>L. Harding, M. First, D. Liberman</td>
</tr>
<tr>
<td>[26] Oct 17-19, 1983</td>
<td>Houston, TX</td>
<td>L. Bilowich</td>
</tr>
<tr>
<td>[27] Oct 14-17, 1984</td>
<td>Raleigh, NC</td>
<td>J. Tulis</td>
</tr>
<tr>
<td>[28] Oct 21-23, 1985</td>
<td>LaJolla, CA</td>
<td>G. Spahn</td>
</tr>
<tr>
<td>[29] Oct 5-9, 1986</td>
<td>Lexington, KY</td>
<td>R. Kruse</td>
</tr>
</tbody>
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