

BACTERIOLOGY

Chairman: W. A. KONETZKA, Indiana University
WALTER A. ZYGMUNT, Meade-Johnson Research Laboratory, was elected
chairman for 1959.

ABSTRACTS

Studies on the Complement-Fixing Antigens of Poliomyelitis. VINCENT V. HAMPARIAN and KLAUS HUMMELER, Chas. Pfizer & Co., Terre Haute.—The antibody responses of animals and man following infection and immunization with poliomyelitis viruses were investigated by absorption technics. Potent viral preparations for use as absorbents were prepared by concentration and fluorocarbon treatment of infected tissue culture fluids. Two stage absorptions of sera were employed in all experiments. When homotypic monkey hyperimmune sera were subjected to cross absorption procedures, two antigen-antibody systems were demonstrable. The sera contained antibodies against the unheated as well as against the heated homologous antigens. Neutralizing antibody titers were removed along with antibodies against the unheated antigens, whereas removal of antibodies against heated antigens did not alter the neutralizing antibody titers. The presence of antigenic components common to two or all three types of virus was demonstrated by absorption of a chimpanzee and a human serum with heated antigen preparations. Absorption of a human serum with unheated type II antigen gave direct evidence that this type of virus in its native state contains antigenic components common to the two heterologous types of virus whereas types I and III absorbed only their homologous antibodies.

A Survey of Isolator Systems Used with Germfree Animals. P. C. TREXLER, University of Notre Dame.—Six isolator systems are described and their operation compared. The relationship to other sterile procedures is discussed.

Adsorption Characteristics of Influenza Viruses to Lipids and Fatty Acids. A. F. WOODHOUR, K. E. JENSEN and J. WARREN, Chas. Pfizer & Co., Inc., Terre Haute.—Adsorption characteristics of influenza viruses to certain lipids were studied with a view toward development of improved vaccines. In the course of these investigations marked differences were noted among strains with respect to adsorption to powdered cholesterol, palmitic acid and stearic acid. Adsorption studies conducted in chromatographic columns and batch lots yielded similar results. Saline suspensions of virus sedimented from harvest fluids and resuspended in phosphate buffered saline adsorbed more readily; however, strain specificity in these reactions remained clearly evident. The bonding was not readily influenced by changes in ionic strength and pH nor did formalin-inactivated virus behave differently. Slight increases in antigenic potency were observed when guinea pigs were injected with

mixtures of Type A influenza viruses and cholesterol or stearic acid. In contrast, similar reactions were not observed with Type B viruses.

Cross-resistance Among Bacteria Resistant to Antibiotics and Surface Active Agents. W. M. BAIN and W. A. KONETZKA, Indiana University.—In spite of the well-known chemical and physical differences between Gram negative and Gram positive bacteria, explanations for the dissimilar responses of these organisms to a variety of deleterious agents remains, for the most, unknown. One of the striking chemical differences between these groups is the higher lipid content in the cell walls of the Gram negative bacteria. Although the function of these lipids is obscure, it has been reported that the lipid content of whole cells of *Escherichia coli* and *Salmonella* species increases as resistance to chloramphenicol increases. This investigation was undertaken to determine the role played by lipids in bacterial resistance to bactericidal agents. The lipid content of strain of *E. coli*, sensitive and resistant to chloramphenicol, has been studied and results concerning the localization of this material in the cell wall will be presented. The chloramphenicol-resistant strain has been found to be resistant to the bactericidal action of the cationic detergent, cetyltrimethylammonium bromide, which has been shown to disorganize the cell's permeability barrier. The sensitivity of a number of strains of Gram negative and Gram positive bacteria, resistant to a variety of surface active agents and antibiotics has been analysed to determine whether cross-resistance to these substances exists. The results of these determinations and their possible relation to the phenomenon of microbial resistance to chemotherapeutic agents will be discussed.

Bacterial Respiration and Growth in Soil Sterilized by a High Energy Electron Beam. G. H. PETERSON, Purdue University.—Soil sterilized by a high energy electron beam at a dosage of 3.3×10^6 rep, was seeded with bacteria isolated from soil in order to trace their growth and respiration in "unaltered" soil in the absence of unknown symbiotic and antagonistic microorganisms.

Sterilization techniques generally alter the physical and chemical properties of soil. Thus, the environment offered to microorganisms in soil sterilized by heat or chemical agents is quite different from that in field soil. It has been concluded that the properties of air dry soil are not altered to a marked degree when sterilized by an electron beam. The activities of microorganisms in irradiated soil should more nearly approach their activities in field soil than soil sterilized by other techniques. The activity of one microbial species is influenced by the environment, including the presence of other organisms.

Moistened irradiated soil released carbon dioxide and consumed oxygen in a ratio of 1:1. The activity apparently was due to respiratory enzymes that were not inactivated by electron bombardment. The amount of gaseous exchange was markedly decreased when the soil was autoclaved due to denaturation of respiratory enzymes. Also, the respiratory quotient is much higher than is expected in an aerobic environment. It is likely that the evolution or uptake of gases by

autoclaved soil results from chemical action taking place during heat sterilization.

A species of *Pseudomonas*, isolated from soil, seeded into irradiated soil in a Warburg flask exhibited no initial lag phase during growth. The generation time during the "logarithmic" phase was about 2.0 hours. The maximum number of viable cells was produced in thirty hours and was about 1×10^9 cells per gram of dry soil or about 2×10^9 cells per ml. of soil solution. This value compares favorably with bacteria grown in liquid media. The respiratory quotient was about 0.8.

This method gives promise for cultivating and measuring the activities of soil microorganisms in various environmental and nutritional situations. It is possible to trace the biological consequences of symbiotic and antagonistic interactions between two or more members of the soil flora.